(No Model.) 2 Sheets—Sheet 1.

H. C. LOWRIE.

BALL VALVE.

No. 343,327. Patented June 8, 1886.

Fig. 1.

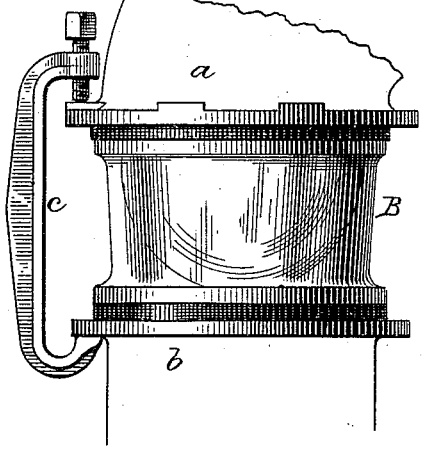


Fig. 2.

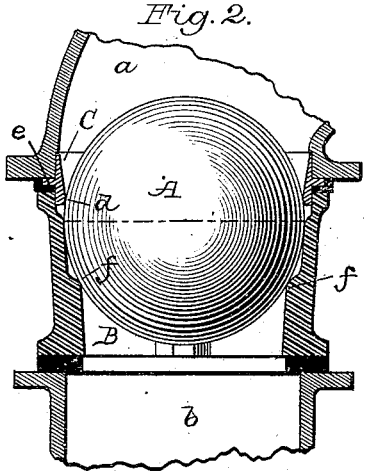


Fig. 3.

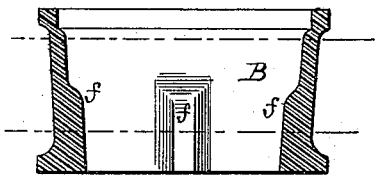


Fig. 4.

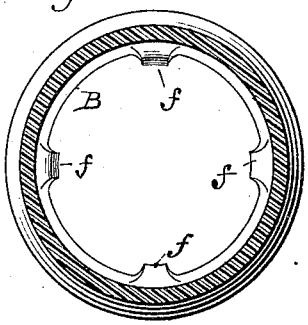


Fig. 5.

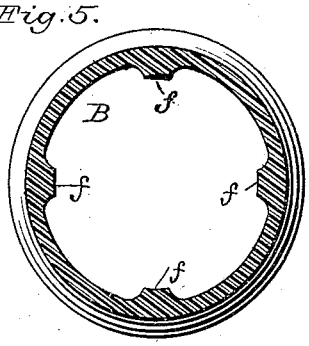
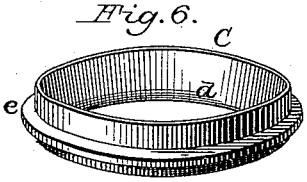


Fig. 6.



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(No Model.) 2 Sheets—Sheet 2.

H. C. LOWRIE.

BALL VALVE.

No. 343,327. Patented June 8, 1886.

Fig. 7.

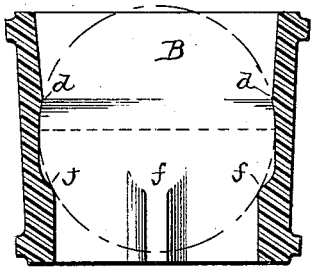


Fig. 8.

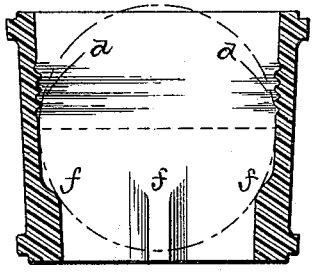


Fig. 9.

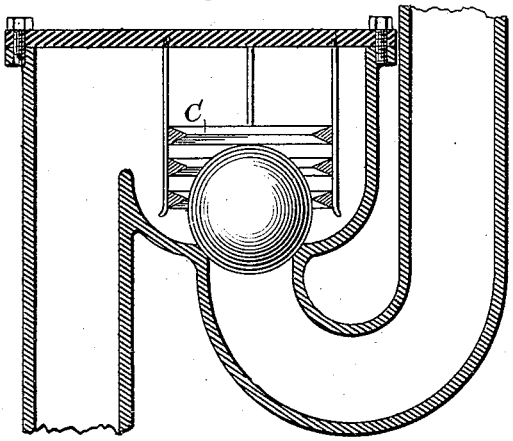


Fig. 10.

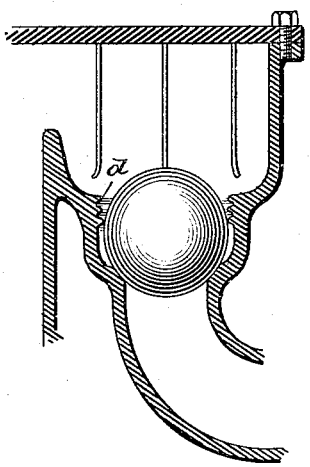
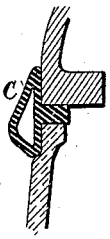


Fig. 11.



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UNITED STATES PATENT OFFICE.

HARVEY C. LOWRIE, OF DENVER, COLORADO.

BALL-VALVE.

SPECIFICATION forming part of Letters Patent No. 343,327, dated June 8, 1886.

Application filed October 12, 1885. Serial No. 179,652. (No model.)

To all whom it may concern:

Be it known that I, HARVEY C. LOWRIE, of Denver, in the county of Arapahoe and State of Colorado, have invented certain new and useful Improvements in Ball-Valves; and I do hereby declare that the following specification, taken in connection with the drawings furnished and forming a part of the same, is a clear, true, and complete description of my invention.

My said improvements relate, mainly, to a peculiar variety of ball-valves disclosed by me in my Letters Patent No. 310,529, dated January 6, 1885. Said valves are so constructed that a tight closure is effected, which is not wholly dependent upon the weight of the ball in resting upon its seat; but is largely due to the frictional adhesion of the ball and seat, and said balls are therefore generally more or less compressible or elastic, and the seat is essentially so formed that the ball can wedge itself therein. The prime use of such valves is in connection with traps and siphons in sewer and drainage pipes; and it is obvious that the balls of valves so used are liable to become slimy, and consequently less capable of adhesively seating themselves than when new and clean, and one object of my present invention is to so construct the valve that during its movements to and from its seat the ball will keep itself practically clean. This portion of my invention is, however, applicable to many ordinary ball-traps in which the ball does not wedge itself, and whether said ball be compressible or not.

One feature of my invention consists in the combination, with a ball and a seat, of an annular scraper, with which the ball engages in moving to and fro. In ordinary traps one or more annular scrapers may be employed, but as the seats are cup-shaped, so as to merely support the ball, said one or more scrapers are located above the seat, and when operating solely as scrapers or cleaner, one or more of them can also be located above a seat, in which the ball can be wedged. In valves of the latter class the seats are generally inclined or conical, and the degree of adhesion of the ball with its seat depends upon various conditions—as, for instance, the weight of the ball, the height of its fall into its seat, and the degree of inclination of the sides of the seat. It is obvious that the said degree of inclination can only be slightly varied. The weight of the ball can be almost indefinitely varied; but it is frequently desirable to employ a comparatively light ball with an extraordinary degree of adhesion to its seat. The height of the fall of the ball would seem to be capable of indefinite variations, but it is not so practically, because such valves must frequently be located in positions where but little height is possible. In this connection my object is to provide for any desirable degree of adhesion of the ball with its seat, regardless of any undue weight of ball; or, in other words, so that the weight of the ball may be at a minimum, and the length of fall as slight as any occasion could possibly demand, and yet obtain a maximum degree of adhesion of the ball with its seat. In accomplishing these ends the ball must be kept reasonably clean, and I therefore employ an annular scraper, but it is so organized with the valve-seat that the flexible-faced ball in falling into its seat has an annular portion of its surface cleaned by its contact with the scraper, and the latter then occupies an annular indentation made by it in the flexible face of the ball, thus causing the ball to be more firmly seated than would be possible without the use of the scraper or its equivalent. In this form of valve the scraper may be integral with the seat, or of separate construction, and the form of said scraper may be widely varied without material departure from my invention.

To more particularly describe my improvements, I will refer to the accompanying drawings, in which Figure 1 is an exterior or side view of one of my inclined seated ball-valves embodying my present improvements in what I deem their best form for this variety of valve. Fig. 2 is a central vertical section of Fig. 1. Fig. 3 is a vertical central section of the valve-seat chamber detached. Figs. 4 and 5 are horizontal sectional views of the seat-chamber, respectively on lines *x* and *y*, Fig. 3. Fig. 6 is a perspective view of the scraper detached. Fig. 7 is a central vertical section of a ball-seat having a scraper integral therewith and in its simplest form. Fig. 8 is a central vertical section of a ball-seat having sev-

eral integral scrapers. Fig. 9 illustrates one form of my novel ball-scraper applied to a well-known form of ball-trap. Fig. 10 illustrates the same trap with a form of scraper like that in Fig. 8. Fig. 11, in section, illustrates a modification of the scraper shown in Figs. 1 and 6.

Referring first to Figs. 1 to 6, inclusive, it is to be understood that the valve therein illustrated has a ball, A, and a seat-chamber, B, into which the ball can wedge itself when dropped into position, and that said ball is flexible or has a flexible exterior, as in my prior ball-valves. The seat-chamber B, as heretofore constructed by me, is provided with flanges at top and bottom, so as to be conveniently placed between the flanges of any two pipes, *a* and *b*, and securely confined by one or more suitable clamping devices, *c*. The scraper C, as here shown, is an entirely novel feature. It is annular in form, and its operative surface is at its lower inner side, as shown at *d*, but it has an annular flange, *e*, at its outer side, which is interposed between the pipe *a* and the top of the ball-seat chamber B. The inner edge, *d*, of the scraper is here shown to be rounded, but it may be more or less sharp, and in some cases the latter form is specially desirable. It is, however, essential in this variety of valves that the diameter of the scraper at *d* should be a little less than the normal diameter of the ball A, so that the latter, being flexible, will be more or less contracted in passing the scraper—as, for instance, with a four-inch ball said scraper will work well if it be three and thirty-one thirty-seconds inches in diameter. Below this scraper the seat-chamber may be indefinitely varied in form and dimension—as, for instance, it may be slightly tapered, so as to fully arrest the undue downward movement of the ball, and also contribute to the degree of adhesion with which the ball will be seated; or it may be straight, in which case several inwardly-projecting lugs, *f*, can be well employed to operate as positive stops for the ball. With this form of scraper I prefer to employ a rubber or other packing between the adjacent pipe-flange and the ball-seat chamber, the latter being frequently composed of glass, but it may be made of metal. It will be seen that with the scraper smaller in diameter than the ball the latter will be frictionally confined in its seat to a degree greater than would be possible with a ball-seat which was merely inclined, but without the scraper or its equivalent, and it will also be seen that the scraper alone will so confine the ball that the seat below need not always do more than arrest its further downward movement, as by the lugs *f*. While it is preferable that the scraper should have a continuous annular edge, it may be scored across said edge at intervals, if desired, without departure from my invention.

Referring now to Fig. 7, it will be seen that the ball-seat chamber B is tapered inwardly for a portion of its length, and then expanded, thus forming a scraper at *d* which is integral with the seat. The diameter of the scraper in this case, as before, should be less than the normal diameter of the ball, so that the latter in falling will be partially contracted in passing the scraper, and then be free to resume its normal diameter, or to be slightly compressed below the scraper, as may be desired, and in either case the lugs *f* prevent an undue fall of the ball. With a scraper thus employed it is obvious that the ball will be kept practically free from slime, because the latter will be scraped from the ball at the contact-points every time it rises and falls, and as the ball can seldom fall twice in the same precise position new surfaces will be presented to the action of the scraper, and it will be obvious that the ball cannot be dislodged from its seat without the application of much more force than would be needed if the scraper were not employed.

Although I have thus far only described balls either wholly elastic or having elastic faces, and scrapers which are rigid, it is not to be understood that I am limited thereto under the main feature of my invention, it being obvious that if the valve be one in which the ball is wedged in its seat either the ball or the scraper, or both, must be elastic, as, for instance, if the annular scraper C has its inner face, as at *d*, composed of elastic rubber, or if it were wholly composed of rubber, then the ball would properly co-operate therewith, whether it was elastic or inelastic, and when the annular scraper C is elastic, hollow, and air-tight, as illustrated in Fig. 11, a solid inflexible ball, or any variety of elastic balls, can be used therewith with good results, thus enabling a very wide range in the character of balls, their weight, and degree of adhesion in or to their seats. It is also to be understood that the scrapers, if not elastic, may be composed of earthenware, glass, hard rubber, gutta-percha, or other more or less rigid material.

In Fig. 8 several integral scrapers are shown at *d*, each in the form of an interior corrugation near the upper end of the ball-seat chamber. In this case but one or more of said scrapers need be less in diameter than the flexible ball, the others being slightly larger, but nevertheless serving to clean the ball by their frequent contact therewith during its upward and downward movements, thus indicating the value of such scrapers in other forms of ball-trap in which the ball is not adhesively held by its seat or the scraper—as, for instance, as illustrated in Fig. 9, wherein a common and well-known form of ball-trap is shown with my novel ball-scrapers attached. In this case the scraper C has a larger diameter than the ball, and hence the latter may or may not be flexible, because the ball need only be free to rise and fall, and to rest with its weight on its seat, or even floated against its seat, as

in the case of an inverted valve. The scraper here shown consists of a series of rigid rings sharp edged at their interior surfaces, and mounted on pendent wires or stems, which are secured to the underside of the top plate of the trap, and it might be termed, as a whole, a "ball-cage" open at the bottom, but so near the seat that the ball is limited to a vertical movement. This form of ball-scraper would only be well suited for use in connection with set wash-bowls and other similar places where little or no solid matter would be liable to reach the trap, because the cage-like ball-scraper would be liable to collect and retain obstructive matter. One or more of the rings of this scraper may be slightly less in diameter than the ball, if desired, by making them of elastic material, and they can also be rigid, and yet be of slightly less diameter than the ball, if the latter be specially flexible and elastic. In this form of trap, however, the ball-scraper can be of the form illustrated in Fig. 8—as, for instance, as shown in Fig. 10—the several corrugations or annular scrapers being located at *d* in the tubular portion of the trap above its cup-shaped ball-seat.

I am of course aware that ball-valves have been provided with cages or wires for preventing the balls from getting unduly displaced from their seats; but in such prior cages no provision is made for scraping the ball, and my annular scrapers could be readily applied thereto.

It should be observed that in using the term "ball-seat" I refer to that interior annular portion or surface of the chamber B with which the ball engages in closing contact when at its lowest position, and that said seat is in no manner to be confounded with the lugs *f*, which merely prevent the ball from dropping unduly beyond the point at which it should be seated.

Having thus described my invention, I claim as new—

1. A ball-valve provided with one or more annular scrapers for the ball, substantially as described, whereby in moving to and from its seat said ball has its surface scraped and freed from adhering matter.

2. The combination, with an elastic-faced ball, of a ball-seat and a scraper for said ball, which is above said seat and smaller in diameter than said seat, and also smaller in diameter than the normal diameter of said ball, substantially as described, whereby the ball in falling into its seated position will have a portion of its periphery freed from adhering matter, and also enable said ball to be wedged upon or in its seat, as set forth.

3. The combination of an elastic-faced ball and a ball-seat chamber provided with an annular ball-scraper less in diameter than the normal diameter of the ball, and stop-lugs below said scraper, substantially as described.

HARVEY C. LOWRIE.

Witnesses:
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JAS. S. LITTELL.