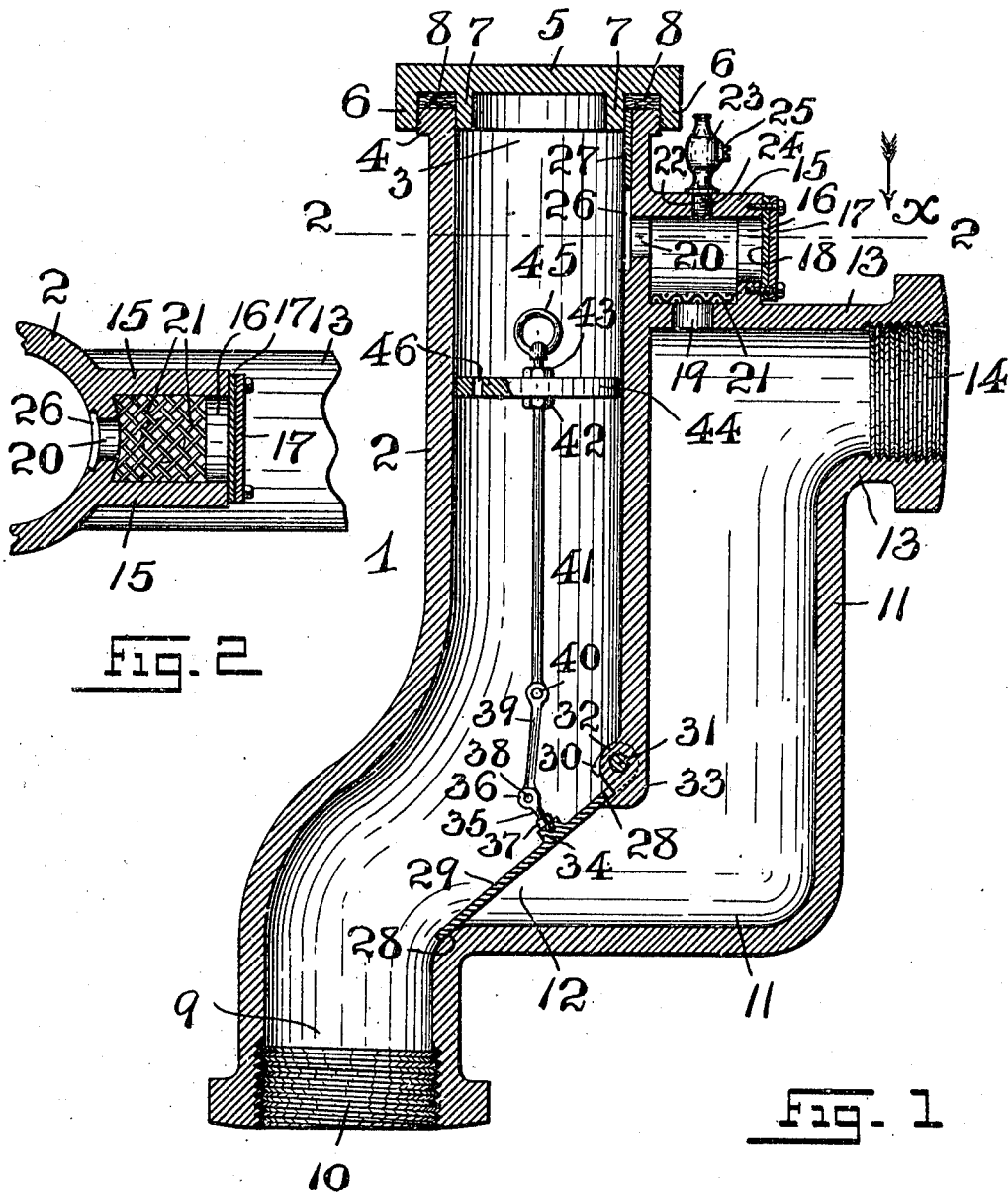


J. COLLIS.
 RETURN CHECK VALVE.
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UNITED STATES PATENT OFFICE.

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RETURN CHECK-VALVE.

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Specification of Letters Patent.

Patented May 3, 1910.

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To all whom it may concern:

Be it known that I, JOHN COLLIS, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Return Check-Valves; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to characters of reference marked thereon, which form a part of this specification.

My present invention relates, generally, to improvements in valves; and, the invention has reference, more particularly, to a novel check-valve for use with radiators and other units used in vacuum heating systems, the valve being also adapted for other uses where a drainage or a discharge valve is essential.

This invention has for its principal object to provide a novel and simple construction of valve of the general character hereinafter more fully specified, for relieving a radiator, or the like, of small quantities of air and vapor, without the operation of the main valve-disk of the valve; and, which is also operative in removing large quantities of the collected water of condensation from the radiator, or other source, by the lifting of the valve-disk from its seat, to a vacuum-producing source.

The invention has for its further object to provide a novel form of return-valve which is very effective in its operation, and which can be readily cleaned without disturbing the general arrangement of the movable parts of the valve.

Other objects of this invention not at this time more particularly enumerated will be clearly understood from the following detailed description of my present invention.

The invention consists, primarily, in the novel return-valve hereinafter set forth; and, the invention consists, furthermore, in the novel arrangements and combinations of the various devices and parts, as well as in the details of the construction of the same, all of which will be more fully described in the following specification, and then finally embodied in the clauses of the claim which are appended to and which form an essential part of the said specification.

The invention is clearly illustrated in the accompanying drawings, in which:—

Figure 1 is a transverse vertical sectional representation of a return check-valve showing one embodiment of the principles of the present invention; and Fig. 2 is a horizontal sectional representation of a portion of the said valve, said section being taken on line 2—2 in said Fig. 1, looking in the direction of the arrow *a*.

Similar characters of reference are employed in all of the above described views, to indicate corresponding parts.

Referring now to the said figures of the drawings, the reference-character 1 indicates a complete return check or drainage valve, the same being made according to and embodying the principles of my present invention, and the said check-valve comprises a suitably formed hollow or chambered body or casing 2, which is formed with an open top 3, which is surrounded, preferably, by means of a screw-threaded flange 4, for suitably securing a closing cap or member, as 5, over said opening. This cap is preferably made with an internally screw-threaded flange 6, so as to be screwed down upon the said flange 4, in the manner shown in said Fig. 1; but, it will be understood, however, that any other form of closing cap may be employed and the same may be otherwise secured over the upper open end of the said valve-casing or body 2. If desired, the said cap may be made with another annular flange or rib 7, which is adapted to be fitted in the upper open portion 3 of the valve-casing or body, said flange or rib 7 forming with the annular flange 4, an annular receiving portion in which may be placed a suitable packing, as 8, for producing a tight joint when the said cap or member 5 is secured over the said upper open portion 3. In its lower part, the said valve-casing or body 2 is preferably curved, substantially in the manner shown, said lower part being formed with an outlet, as 9, which may be internally screw-threaded, as at 10, for the attachment thereto of a suitable pipe which is connected with a vacuum-producing source. In lieu of the screw-threads 10, it will be evident, that any other suitable means for connecting this pipe with said outlet 9 may be employed, if desired. Connected with one side of said main body or casing 2 is an auxiliary chambered portion 11, forming a water collecting chamber, and 12 indicates a suitable

outlet from said portion 11 forming a means of communication between the chamber of said portion 11 and the lower chambered portion of the main valve-body or casing 2.

5 In its upper part, the said chambered portion 11 is provided with a laterally extending portion 13, forming an inlet into said chambered portion 11, said portion 13 being internally screw-threaded, as at 14, for the connection therewith of a pipe which in turn is suitably attached to the outlet of a radiator, or other unit from which it is intended to draw off water of condensation. Of course, it will be understood, that in lieu of the internally screw-threaded portion 14, any other suitable means of attaching the pipe from the radiator to said portion 13 may be employed, if desired. Another chambered portion, as 15, may be connected with a portion of the main valve-body or casing 2 and the said portion 11, substantially as shown, the said portion 15 having an open part 16, which is ordinarily closed by means of a plate 17 and a packing-disk 18. Communication is established between said chambered portion 15 and the portion 11 by means of a suitably formed hole or opening 19. Another hole or opening, as 20, is provided which establishes a communication between said chambered portion 15 and the upper chambered portion of the main valve-body or casing 2. Suitably arranged over the said hole or opening 19 is a suitably formed screen or wire-mesh element, as 21, and screwed into a screw-threaded hole 22 in said member 15 is the screw-threaded shank 24 of a pet-cock 23, the valve-plug of which can be opened or closed by means of a suitably formed portion 25, which is preferably slotted, as indicated in said Fig. 1 of the drawings, for the reception of the end of a screw-driver by means of which the said valve-plug can be turned, for the purposes to be presently more fully described.

45 In order that the hole or opening 20 may be closed, when necessary and as will hereinafter also more fully appear, the chambered main body or casing 2 is formed upon its interior surface, in close proximity with said hole or opening 20, with a guide 26 in which is disposed, so as to be vertically slidable in said guide, a gate 27 which can be moved directly over said hole or opening 20 to close said opening, or may be moved in an upward direction so as to provide an unobstructed passageway through said hole or opening 20. Within the interior of said main valve-body or casing 2, surrounding the outlet 12 of said chambered portion 11, is an angular seat 28 and arranged upon said seat, so as to close the same, is a valve-disk or closing plate 29, the said plate being provided with suitably formed ears or lugs 30 which are arranged upon a pin or pintle 31, which extends on opposite sides of a perfo-

rated and lug-shaped part 32, and from side to side of the wall-portion 33 of the main valve-body or casing 2. In this manner, the said valve-disk or closing plate 29 is arranged in an angular position and in a hinge-like manner directly over the outlet 12 which is surrounded by the seat 28, and upon which said disk 29 is fitted so as to form a closure. The said valve-disk or plate 29 is also provided with a screw-threaded boss or receiving socket, as 34, into which is screwed the screw-threaded end-portion of a stem 35 which is provided at its free end with an eye 36, and has a lock-nut 37 upon the screw-threaded portion to prevent the shaking loose of said stem from said boss 34. Pivotally connected with said eye 36, by means of a pin 38, is the lower end-portion of a link 39 to the upper end-portion of which is pivotally connected, by means of a pin 40, the lower end-portion of a rod 41. The upper end-portion of this rod 41 is also made screw-threaded, so as to receive thereon two nuts 42 and 43, adapted to be arranged upon the opposite faces of a disk 44, for fixing the said disk in its operative position upon said rod 41. Upon its extreme upper end-portion, the said rod 41 may be provided with a suitable ring 45, or other suitable fingerpiece, which serves as a lifting device or means for manually raising the valve-disk or plate 29 from its seat 28, should this be necessary. The said disk 44 is slidably arranged within the tubular or chambered part of the main valve-body or casing 2, at a point suitably below the hole or opening, so that the said chambered body or casing 2 is practically divided into a lower vacuum chamber and an upper air chamber, as will be clearly evident. A small hole or perforation 46 is provided in the said disk 44, the area of said hole or perforation 46 being smaller than that of either said holes or openings 19 and 20, as shown and for the purposes to be presently more fully described.

Having in the foregoing description set forth the general arrangement and construction of the devices and parts which comprise the novel return-check or drainage valve, I will now briefly set forth its operation.

When the vacuum-producing source is set in operation, such as a pump which is usually employed in vacuum heating systems, the air is drawn from the return side of the radiator, or other part, with which the portion 13 is connected, into said portion 13 and through the hole or opening 19 into the chambered portion 15, from which the air is drawn through the open hole or opening 20 into the upper chambered part or receiving chamber of the main valve-body or casing 2, and thence through the small hole or orifice 46 in the disk 44, into the

of said main valve-casing, means for conveying air and steam into said valve-casing and above the disk therein, an angularly disposed valve-seat located in said means of communication between said water-collecting chamber and said main valve-casing, a pivot-pin extending across said main valve-casing at a point above said valve-seat, a valve-disk secured to said pivot-pin in a hinge-like manner, and a means of mechanical connection between said sliding disk and said valve-disk.

4. A return check-valve comprising a main chambered valve-casing, a disk slidably arranged in said valve-casing, said disk having a restricted opening, said casing being provided with an outlet, an auxiliary water-collecting chamber connected with said valve-casing, said water-collecting chamber being formed with an inlet and being also in communication with the interior of said main valve-casing, an angularly disposed valve-seat located in said means of communication between said water-collecting chamber and said main valve-casing, a pivot-pin extending across said main valve-casing at a point above said valve-seat, a valve-disk secured to said pivot-pin in a hinge-like manner, an air and steam conveying means between said auxiliary water-collecting chamber and the upper interior portion of said main valve-casing, and a means of mechanical connection between said sliding disk and said valve-disk.

5. A return check-valve comprising a main chambered valve-casing, said casing being provided with an outlet, an auxiliary water-collecting chamber connected with said valve-casing, said water-collecting chamber being formed with an inlet and being also in communication with the interior of said main valve-casing, a valve-disk in said means of communication from said water-collecting chamber into said main valve-casing, a second disk slidably arranged in the upper end-portion of said valve-casing, and a connecting means between said last-mentioned disk and said valve-disk.

6. A return check-valve comprising a main chambered valve-casing, said casing being provided with an outlet, an auxiliary water-collecting chamber connected with said valve-casing, said water-collecting chamber being formed with an inlet and being also in communication with the interior of said main valve-casing, a valve-disk in said means of communication from said water-collecting chamber into said main valve-casing, a second disk slidably arranged in the upper end-portion of said valve-casing, a connecting means between said last-mentioned disk and said valve-disk, and an air-conveying means between said auxiliary water-collecting chamber and the upper interior portion of said main valve-casing.

7. A return check-valve comprising a main chambered valve-casing, said casing being provided with an outlet, an auxiliary water-collecting chamber connected with said valve-casing, said water-collecting chamber being formed with an inlet and being also in communication with the interior of said main valve-casing, an angularly disposed valve-seat located in said means of communication between said water-collecting chamber and said main valve-casing, a pivot-pin extending across said main valve-casing at a point above said valve-seat, a valve-disk secured to said pivot-pin in a hinge-like manner, a second disk slidably arranged in the upper portion of said valve-casing, and a connecting means between said last-mentioned disk and said valve-disk.

8. A return check-valve comprising a main chambered valve-casing, said casing being provided with an outlet, an auxiliary water-collecting chamber connected with said valve-casing, said water-collecting chamber being formed with an inlet and being also in communication with the interior of said main valve-casing, an angularly disposed valve-seat located in said means of communication between said water-collecting chamber and said main valve-casing, a pivot-pin extending across said main valve-casing at a point above said valve-seat, a valve-disk secured to said pivot-pin in a hinge-like manner, a second disk slidably arranged in the upper portion of said valve-casing, a connecting means between said last-mentioned disk and said valve-disk, and an air-conveying means between said auxiliary water-collecting chamber and the upper interior portion of said main valve-casing.

9. A return check-valve comprising a main chambered valve-casing, said casing being provided with an outlet, an auxiliary water-collecting chamber connected with said valve-casing, said water-collecting chamber being formed with an inlet and being also in communication with the interior of said main valve-casing, a valve-disk in said means of communication from said water-collecting chamber into said main valve-casing, a second disk slidably arranged in the upper portion of said valve-casing, a stem connected with said valve-disk, said stem having an eye-portion, a link pivotally connected with said eye-portion, a rod pivotally connected with said link, said rod having its upper end-portion extending through said slidably arranged disk, means for securing said rod to said last-mentioned disk, and a ring-shaped finger-piece upon said rod, substantially as and for the purposes set forth.

10. A return check-valve comprising a main chambered valve-casing, said casing

lower portion or what may be termed the vacuum chamber of the main valve-body or casing 2 and thence out of the outlet 9 thereof into the pipe which is connected with said outlet, and all without having raised the valve-disk or plate 29 from its valve-seat 28, the pump being operated under such reduced pressure as is sufficient to produce this result. In this manner, a vacuum is produced upon the lower side of the disk 44, as well as in the chambered portion or element 11, and partly so in the radiator which is connected therewith, the restricted passageway 46 being sealed by the capillary action of the steam which enters the said receiving chamber formed above the disk 44, as will be clearly evident. Any water of condensation that may have been produced in the radiator, or the like, will collect in the receiving chamber formed by the part 11, causing the collected water of condensation, in the form of a column, to bear upon the back of the valve-disk or closing plate 29. Upon a sufficient quantity of water having collected back of the said disk or plate 29, the latter is raised from its seat 28, so as to readily permit the water to flow down into the outlet 9 of the main body or casing 2, and thence into the pipe connected with said outlet. The water of condensation having thus been removed from the chambered portion 11, the counterbalancing effect of the disk 44 causes the valve-disk or closing plate 29 to again become seated upon the seat 28, in which relative position the said disk or plate is maintained, until another sufficient quantity of water has collected back of said disk 28 in the chambered portion 11. Thus, it will be clearly evident, that an intermittent and automatic removal of the water of condensation constantly takes place, any further collection of air within the radiator, or the like, being removed by suction in the manner hereinbefore described.

When it is desired to remove the valve-disk or closing plate 29 for cleansing purposes or for repairs, the cap 5 is removed and the sliding gate 27 forced down over the opening or hole 20 to close the same, in order to prevent any dirt or foreign matter getting into the chambered portion 15, and then by driving out the pin 31 and taking hold of the fingerpiece 45, the two disks 44 and 29 can be readily removed, as will be clearly evident.

By closing down the gate 27 over the hole or opening 20 and opening the pet-cock 23 the steam from the radiator, and other source, may be used for blowing out and cleansing the chambered portion 15; and, on the other hand, any particles of foreign matter that may have become lodged in the meshes of the screen 21 can be removed by forcing a piece of wire through the open pet-

cock and poking its end through the interstices of the wire-mesh. The disk 44 can also be removed from within the chambered valve-body or casing 2 without disturbing the closed position of the valve-disk 29.

I am aware that some changes may be made in the general arrangements and combinations of the several devices and parts, as well as in the details of the construction of the same, without departing from the scope of my present invention as set forth in the foregoing specification and as defined in the claims which are appended to the said specification. Hence, I do not limit my present invention to the exact arrangements and combinations of the said devices and parts as described in the foregoing specification, nor do I confine myself to the exact details of the construction of the said parts as illustrated in the accompanying drawings.

I claim:

1. A return check-valve comprising a main chambered valve-casing, a disk slidably arranged in said valve-casing, said disk having a restricted opening, said casing being provided with an outlet, an auxiliary water-collecting chamber connected with said valve-casing, said water-collecting chamber being formed with an inlet and being also in communication with the interior of said main valve-casing, means for conveying air and steam into said valve-casing and above the disk therein, a valve-disk in said means of communication from said water-collecting chamber into said main valve-casing, and a means of mechanical connection between said sliding disk and said valve-disk.

2. A return check-valve comprising a main chambered valve-casing, a disk slidably arranged in said valve casing, said disk having a restricted opening, said casing being provided with an outlet, an auxiliary water-collecting chamber connected with said valve-casing, said water-collecting chamber being formed with an inlet and being also in communication with the interior of said main valve-casing, a valve-disk in said means of communication from said water-collecting chamber into said main valve-casing, an air and steam conveying means between said auxiliary water-collecting chamber and the upper interior portion of said main valve-casing, and a means of mechanical connection between said sliding disk and said valve-disk.

3. A return check-valve comprising a main chambered valve-casing, a disk slidably arranged in said valve-casing, said disk having a restricted opening, said casing being provided with an outlet, an auxiliary water-collecting chamber connected with said valve-casing, said water-collecting chamber being formed with an inlet and being also in communication with the interior

being provided with an outlet, an auxiliary water-collecting chamber connected with said valve-casing, said water-collecting chamber being formed with an inlet and being
 5 also in communication with the interior of said main valve-casing, a valve-disk in said means of communication from said water-collecting chamber into said main valve-casing, a second disk slidably arranged in
 10 the upper portion of said valve-casing, a stem connected with said valve-disk, said stem having an eye-portion, a link pivotally connected with said eye-portion, a rod pivotally connected with said link, said rod hav-
 15 ing its upper end-portion extending through said slidably arranged disk, means for securing said rod to said last-mentioned disk, a ring-shaped finger-piece upon said rod, and an air-conveying means between said
 20 auxiliary water-collecting chamber and the upper interior portion of said main valve-casing.

11. A return check-valve comprising a main chambered valve-casing, said casing being provided with an outlet, an auxiliary water-collecting chamber connected with
 25 said valve-casing, said water-collecting chamber being formed with an inlet and being also in communication with the interior of said main valve-casing, an angularly dis-
 30 posed valve-seat located in said means of communication between water-collecting chamber and said main valve-casing, a pivot-pin extending across said main valve-casing, at a point above said valve-seat, a valve-disk
 35 secured to said pivot-pin in a hinge-like manner, a second disk slidably arranged in the upper portion of said valve-casing, a stem connected with said valve-disk, said
 40 stem having an eye-portion, a link pivotally connected with said eye-portion, a rod pivotally connected with said link, said rod having its upper end-portion extending through said slidably arranged disk, means for secur-
 45 ing said rod to said last-mentioned disk, and a ring-shaped finger-piece upon said rod, substantially as and for the purposes set forth.

12. A return check-valve comprising a
 50 main chambered valve-casing, said casing being provided with an outlet, an auxiliary water-collecting chamber connected with said valve-casing, said water-collecting chamber being formed with an inlet and being also
 55 in communication with the interior of said main valve-casing, an angularly disposed valve-seat located in said means of communication between water-collecting chamber and said main valve-casing, a pivot-pin extend-
 60 ing across said main valve-casing at a point above said valve-seat, a valve-disk secured to said pivot-pin in a hinge-like manner, a second disk slidably arranged in the upper portion of said valve-casing, a stem connect-
 65 ed with said valve-disk, said stem having an

eye-portion, a link pivotally connected with said eye-portion, a rod pivotally connected with said link, said rod having its upper end-portion extending through said slidably arranged disk, means for securing said rod
 70 to said last-mentioned disk, a ring-shaped finger-piece upon said rod, and an air-conveying means between said auxiliary water-collecting chamber and the upper interior portion of said main valve-casing.

13. A return-check-valve comprising a main chambered valve-casing, said casing being provided with an outlet, an auxiliary water-collecting chamber connected with said
 80 valve-casing, said water-collecting chamber being formed with an inlet and being also in communication with the interior of said main valve-casing, a valve-disk and a slidably arranged disk, both of said disks being within said valve-casing, said slidably ar-
 85 ranged disk being provided with a small perforation and said disk dividing said valve-casing into a lower vacuum-chamber and an upper receiving chamber, an air-conveying means between said auxiliary
 90 water-collecting chamber and said receiving-chamber of the valve-casing, and a means of mechanical connection between said sliding disk and said valve-disk, substantially as and for the purposes set forth.

14. A return check-valve comprising a main chambered valve-casing, said casing being provided with an outlet, an auxiliary water-collecting chamber connected with said
 100 valve-casing, said water-collecting chamber being formed with an inlet and being also in communication with the interior of said main valve-casing, a valve-disk and a slidably arranged disk, both of said disks being within said valve-casing, said slidably ar-
 105 ranged disk being provided with a small perforation and said disk dividing said valve-casing into a lower vacuum-chamber and an upper receiving-chamber, an air-conveying means between said auxiliary wa-
 110 ter-collecting chamber and said receiving-chamber of the valve-casing, consisting of a chambered portion connected with and forming parts of the walls of said water-collecting chamber and said main valve-casing,
 115 said chambered portion being formed with communicating openings between said chambered portion and the water-collecting chamber, and between said chambered portion and the receiving chamber of said valve-
 120 casing, and a means of mechanical connection between said sliding disk and said valve-disk, substantially as and for the purposes set forth.

15. A return check-valve comprising a
 125 main chambered valve-casing, said casing being provided with an outlet, an auxiliary water-collecting chamber connected with said valve-casing, said water-collecting chamber being formed with an inlet and be- 130

ing also in communication with the interior of said main valve-casing, a valve-disk and a slidably arranged disk, both of said disks being within said valve-casing, said slidably arranged disk being provided with a small perforation and said disk dividing said valve-casing into a lower vacuum-chamber and an upper receiving chamber, an air-conveying means between said auxiliary water-collecting chamber and said receiving-chamber of the valve-casing, consisting of a chambered portion connected with and forming parts of the walls of said water-collecting chamber and said main valve-casing, said chambered portion being formed with communicating openings between said chambered portion and the water-collecting chamber, and between said chambered portion and the receiving chamber of said valve-casing, and a gate for closing the opening between said chambered portion and the receiving-chamber of said valve-casing, and a means of mechanical connection between said sliding disk and said valve disk, substantially as and for the purposes set forth.

16. A return-check-valve comprising a main chambered valve-casing, said casing being provided with an outlet, an auxiliary water-collecting chamber connected with said valve-casing, said water-collecting chamber being formed with an inlet and being also in communication with the interior of said main valve-casing, a valve-disk and a slidably arranged disk, both of said disks being within said valve-casing, said slidably arranged disk being provided with a small perforation and said disk dividing said valve-casing into a lower vacuum-chamber and an upper receiving-chamber, an air-conveying means between said auxiliary water-collecting chamber and said receiving-chamber of the valve-casing, consisting of a chambered portion connected with and forming parts of the walls of said water-collecting chamber and said main valve-casing, said chambered portion being

formed with communicating openings between said chambered portion and the water-collecting chamber, and a sieve arranged over the opening between said chambered portion and said water-collecting chamber, and a means of mechanical connection between said sliding disk and said valve-disk, substantially as and for the purposes set forth.

17. A return check-valve comprising a main chambered valve-casing, said casing being provided with an outlet, an auxiliary water-collecting chamber connected with said valve-casing, said water-collecting chamber being formed with an inlet and being also in communication with the interior of said main valve-casing, a valve-disk and a slidably arranged disk, both of said disks being within said valve-casing, said slidably arranged disk being provided with a small perforation and said disk dividing said valve-casing into a lower vacuum-chamber and an upper receiving-chamber, an air-conveying means between said auxiliary water-collecting chamber and said receiving-chamber of the valve-casing, consisting of a chambered portion connected with and forming parts of the walls of said water-collecting chamber and said main valve-casing, said chambered portion being formed with communicating openings between said chambered portion and the water-collecting chamber, a sieve arranged over the opening between said chambered portion and said water-collecting chamber, and a pet-cock connected with said chambered portion, and a means of mechanical connection between said sliding disk and said valve-disk, substantially as and for the purposes set forth.

In testimony, that I claim the invention set forth above I have hereunto set my hand this 13th day of November, 1909.

JOHN COLLIS.

Witnesses:

FREDK. C. FRAENTZEL,
FRED'K H. W. FRAENTZEL.