F. SCHAFER & H. C. HILLS.

DOUBLE VALVE BOILER CHECK.

APPLICATION FILED MAY 7, 1908.

936,571.

Patented Oct. 12, 1909.

2 SHEETS—SHEET 1.

Fig. 1.

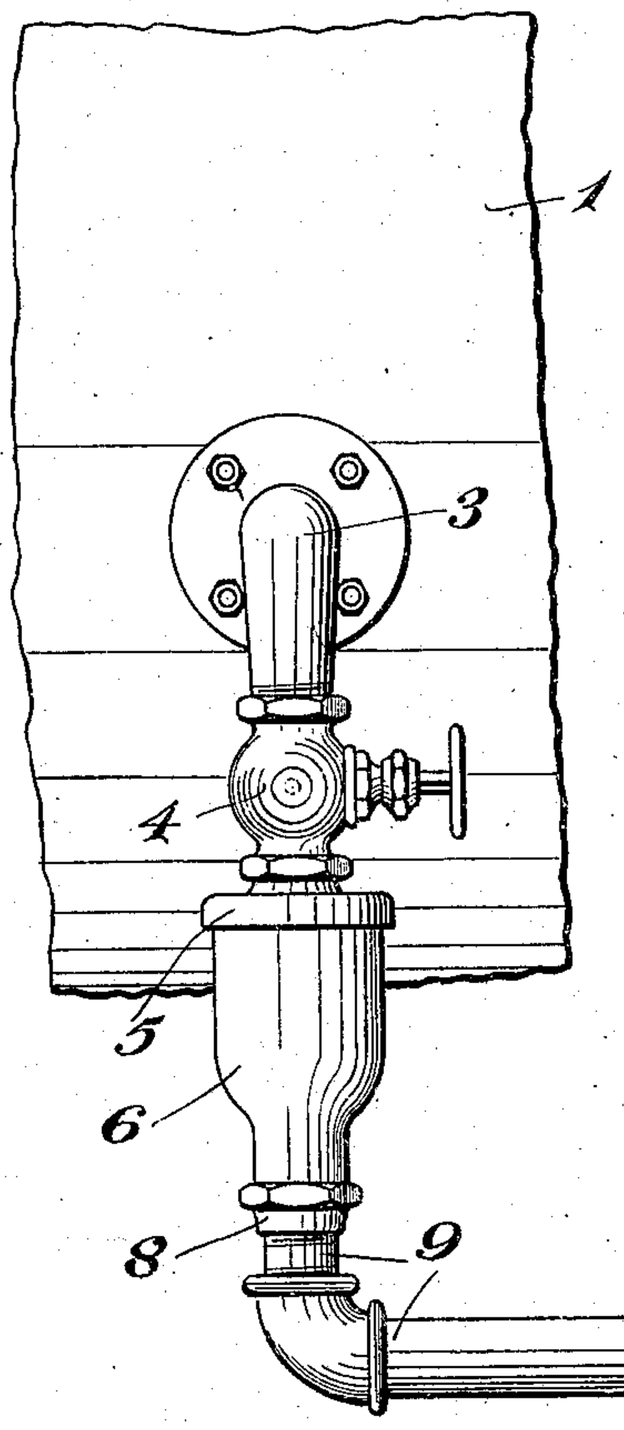


Fig. 2.

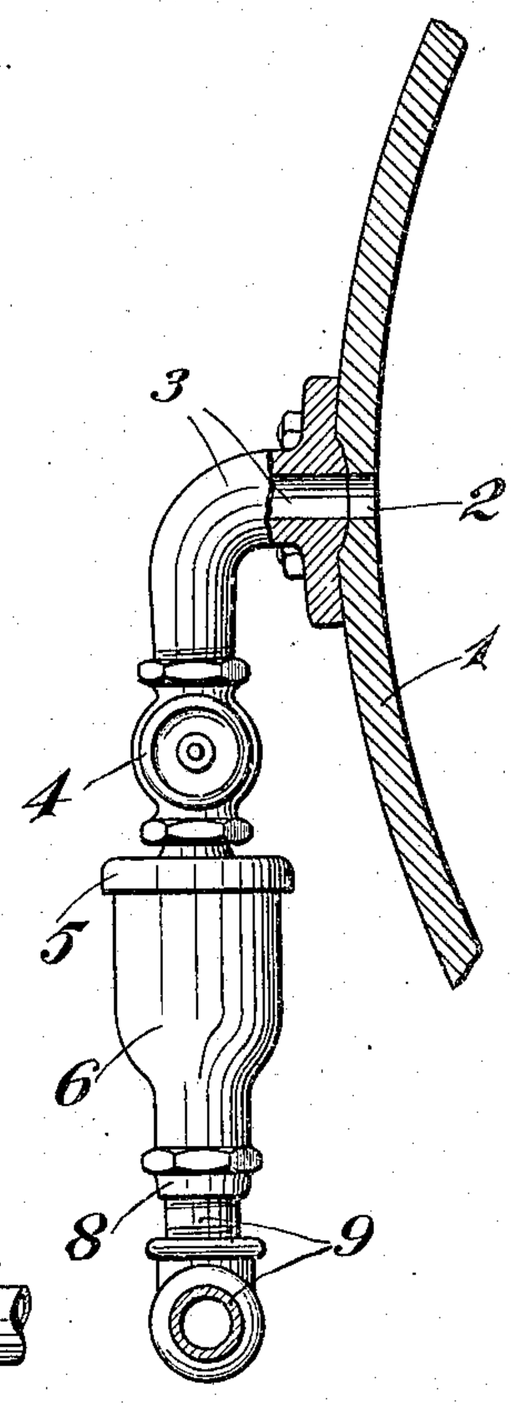
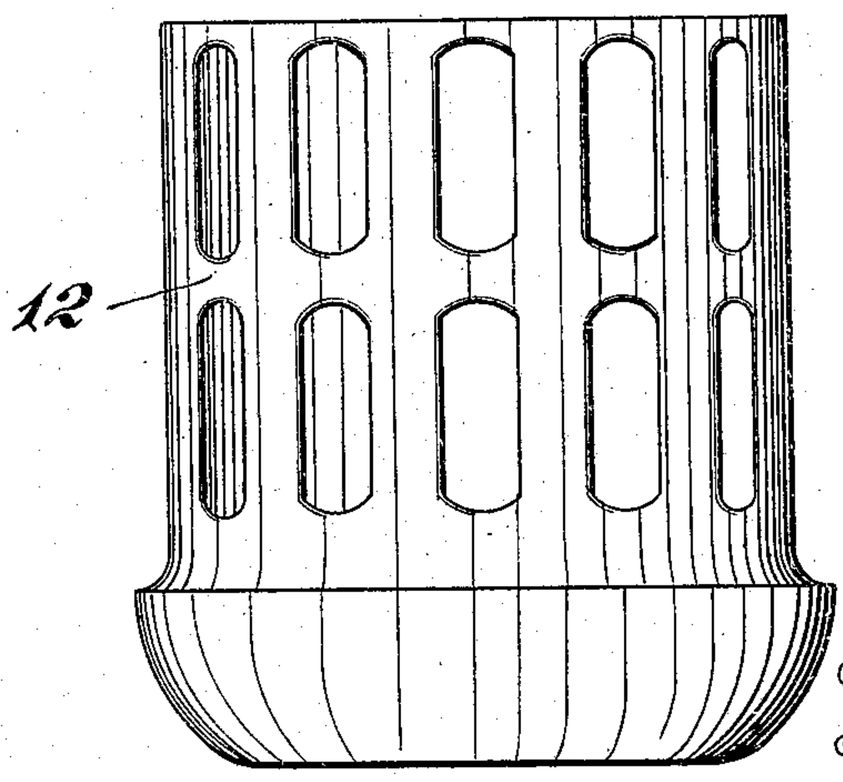


Fig. 3



Witnesses:

W. H. Souba.

Harry Opsahl.

Inventors:

Frank Schafer.

Harry C. Hills.

By their Attorneys:

Williamson & Merchant

ANDREW. B. GRAHAM CO., PHOTO-LITHOGRAPHERS, WASHINGTON, D. C.

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Fig. 4.

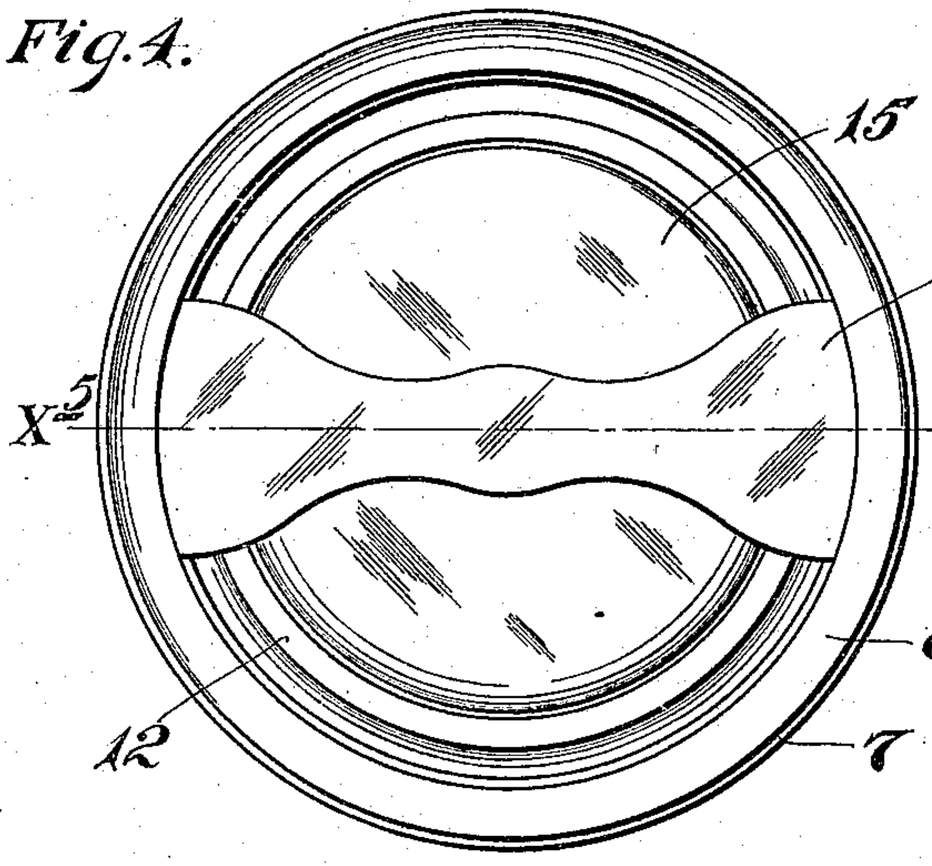


Fig. 5

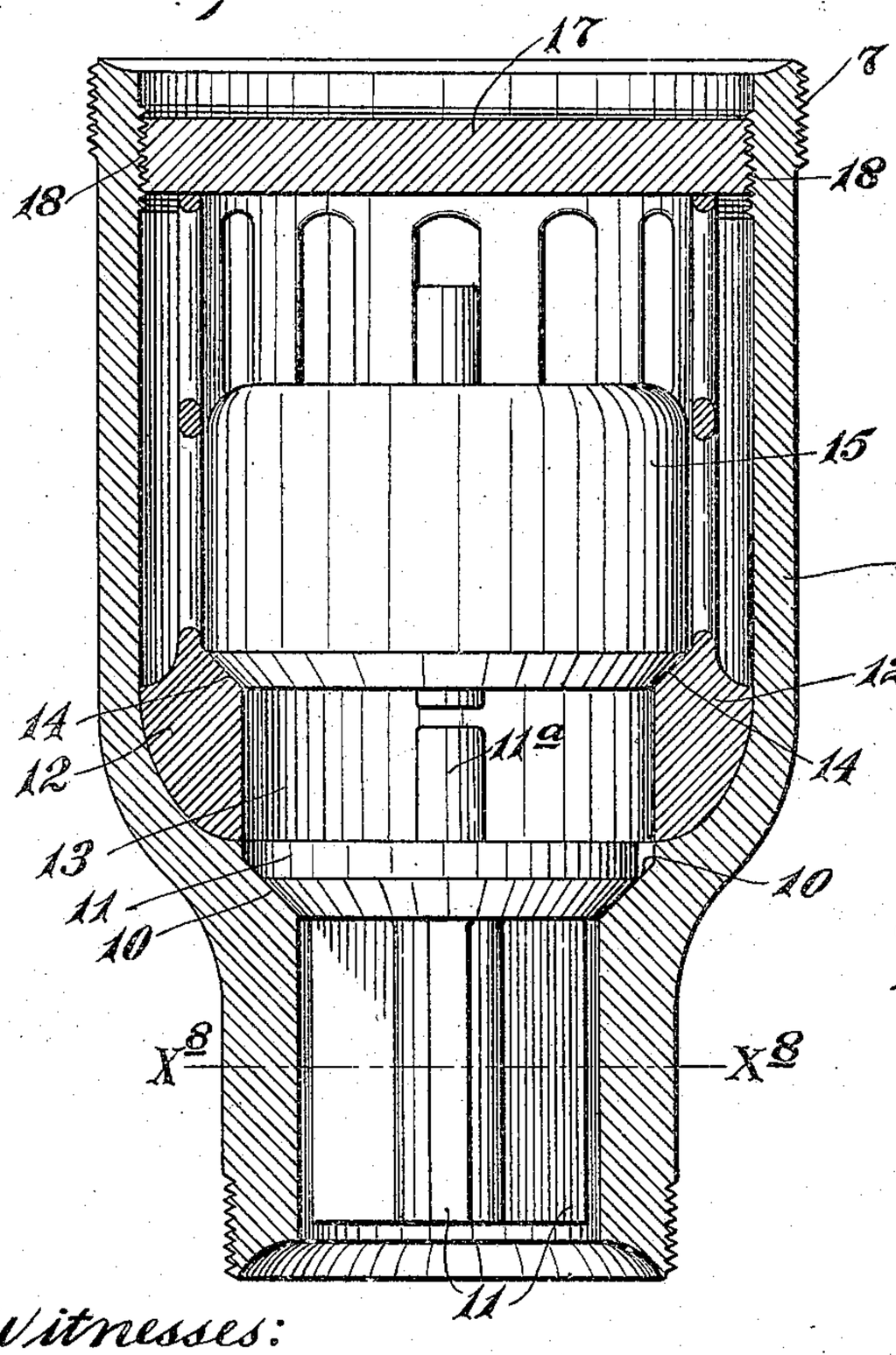


Fig. 6.

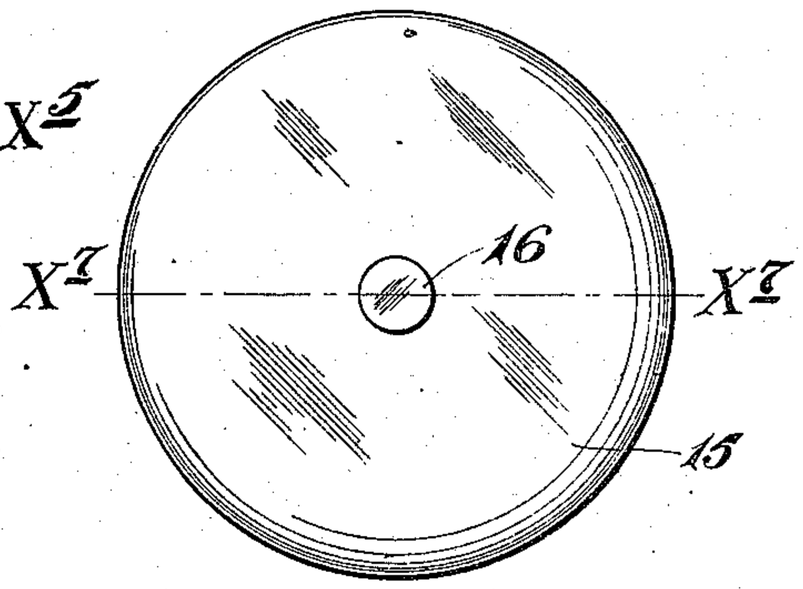


Fig. 7

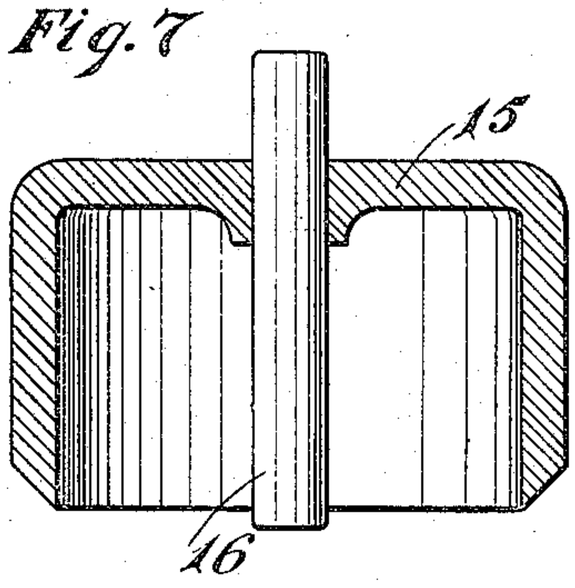
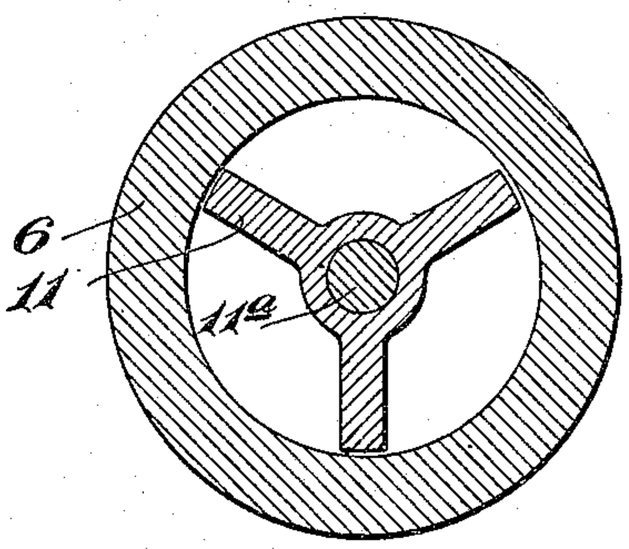


Fig. 8.



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UNITED STATES PATENT OFFICE.

FRANK SCHAFER AND HARRY C. HILLS, OF FARGO, NORTH DAKOTA, ASSIGNORS OF ONE-THIRD TO WILLIAM G. MAHON, OF FARGO, NORTH DAKOTA.

DOUBLE-VALVE BOILER-CHECK.

936,571. Specification of Letters Patent. Patented Oct. 12, 1909.

Application filed May 7, 1908. Serial No. 431,317.

To all whom it may concern:

Be it known that we, FRANK SCHAFER and HARRY C. HILLS, citizens of the United States, residing at Fargo, in the county of Cass and State of North Dakota, have invented certain new and useful Improvements in Double-Valve Boiler-Checks; and we 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.

Our invention has for its especial object to improve the construction and operation of the check valve mechanism for injector feed pipes, and to this end, it consists of the novel devices and combinations of devices hereinafter described and defined in the claims.

The improved valve mechanism is illustrated in the accompanying drawings, wherein like characters indicate like parts throughout the several views.

Referring to the drawings; Figure 1 is a view in side elevation showing a fragment of a boiler and illustrating the improved valve mechanism applied thereto. Fig. 2 is a view partly in front elevation and partly in section, of the same parts shown in Fig. 1. Fig. 3 is an enlarged detail showing in elevation a removable valve seating shell of skeleton form. Fig. 4 is a plan view showing the so-called double check valve of the improved valve mechanism. Fig. 5 is a vertical section, taken on the line x^5 x^5 of Fig. 4. Fig. 6 is a plan view of the uppermost of the two check valves. Fig. 7 is a section, taken on the line x^7 x^7 of Fig. 6; and Fig. 8 is a horizontal section, taken on the line x^8 x^8 of Fig. 5.

The numeral 1 indicates a portion of a boiler shell, such as, for instance, the shell of a locomotive boiler, the same having in one side an inlet port 2 that is in communication with the inner end extremity of a tubular elbow 3, bolted or otherwise rigidly secured to the boiler and forming a water tight joint therewith. To the depending leg of the elbow 3 is secured a cut-off valve 4, preferably of the standard globe valve construction; and to the lower end of this globe valve is rigidly secured, by threaded engagement or otherwise, a cap plate 5 having an internally threaded depending annular flange.

A tubular check valve casing or shell 6 is provided with an externally threaded upper end 7 that is adapted to be screwed into the internally threaded flange of the cap 5. The contracted lower end of the shell 6 is connected by a pipe coupling 8 to one end of the injector pipe 9, which, of course, leads from the usual or other suitable water supply. In the lower portion of the casing 6 is an annular valve seat 10 that is normally closed by a gravity seated check valve 11 having, as shown, an upwardly projecting axial stem 11^a.

Seated within the enlarged upper portion of the shell 6, and having a water tight joint therewith at its lower portion, is a removable valve seating shell 12 formed in its lower end with a large axial passage 13 into which the check valve 11 may move when raised. At the upper extremity of the passage 13, said inner shell 12 is formed with an annular valve seat 14 that is normally closed by an upper or secondary gravity seated check valve 15. This check valve 15, as shown, is of inverted cup-like form and is provided with a rigidly secured axial stem 16, the lower end of which is adapted to be engaged by the stem 11^a of the lower or primary check valve 11 when said latter valve is raised or unseated by an upward flow of water. The upper portion of the inner casing 12 is of skeleton form so that the water may freely pass therethrough, and the said inner casing is tightly clamped in working position by a diametrically extended clamping bar 17 having threaded ends that engage with internal threads 18 cut in the upper end portion of the outer casing 6.

Operation: The operation of the improved check valve mechanism may be briefly summarized as follows:—Under an upward flow of water, the lower or primary check valve 11 will first be opened, and it will, while under momentum, strike the stem of the check valve 15 and assist in unseating the latter valve so that the water may freely pass upward through the passage 13, through the skeleton sides of the skeleton wall of the inner shell 12, and thence upward through the valve 4 and elbow 3 into the boiler. It will, of course, be understood that the valve 4 must be open when the injector is in action. The location of this cut-off valve 4 between the check valve mechanism and the boiler is important, because when the said valve 4 is closed, it permits the check valve mechanism

to be detached for the purpose of repairs, which repairs, as is well known to those familiar with the subject, are, with previous forms of the device, very frequent. In the customary injector connections, only a single check valve is employed, and in practice it has been found that leakage of this check valve will set in very quickly after it has been put in perfect condition. When the check valve leaks, hot water will run from the boiler, resulting in a waste of heat and a loss of running energy in the engine. By arranging several check valves to resist the escape of hot water from the boiler, the possibility of leakage is very greatly reduced, and the repairs required are made very infrequent, and, in fact, nearly eliminated. A certain amount of air will be caged in the inverted cup shaped valve 15, and this will act as an air cushion when said valve is raised and its stem 16 is pressed against the clamping bar 17.

The improved valve mechanism, above described, may be very easily applied to the injector pipes of locomotives, and other engines, and the cost of such application will be small.

What we claim is:—

1. A check valve mechanism, comprising a casing having a valve seat, a skeleton annular valve seating shell tightly seating in said casing above its valve seat and located circumferentially outward of the said valve seat, and provided with a valve seat of greater diameter than the valve seat of said casing, and check valves coöperating with said two seats and arranged to be opened by movements in the same direction.

2. A check valve mechanism, comprising a casing having a valve seat, an annular skeleton valve seating shell tightly seating in said casing at its inner end, a clamping bar screwed in the end of said casing and engaging said shell, said shell having a valve seat of greater diameter than the diameter of the said seat of said casing, and check valves coöperating with said valve seats, substantially as described.

3. In a check valve mechanism, the combination with a casing having a check valve seat, of an annular skeleton valve seating shell closely seating in the interior of said casing at its lower end, and provided with a check valve seat of larger diameter than the valve seat of said casing, lower and upper check valves coöperating respectively, with the valve seats of said casing and shell, and with the said lower valve arranged to assist in unseating said upper valve after the former is moved a predetermined distance, substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

FRANK SCHAFER.
HARRY C. HILLS.

Witnesses:
GEO. W. CLOTHER,
F. A. BALL.