

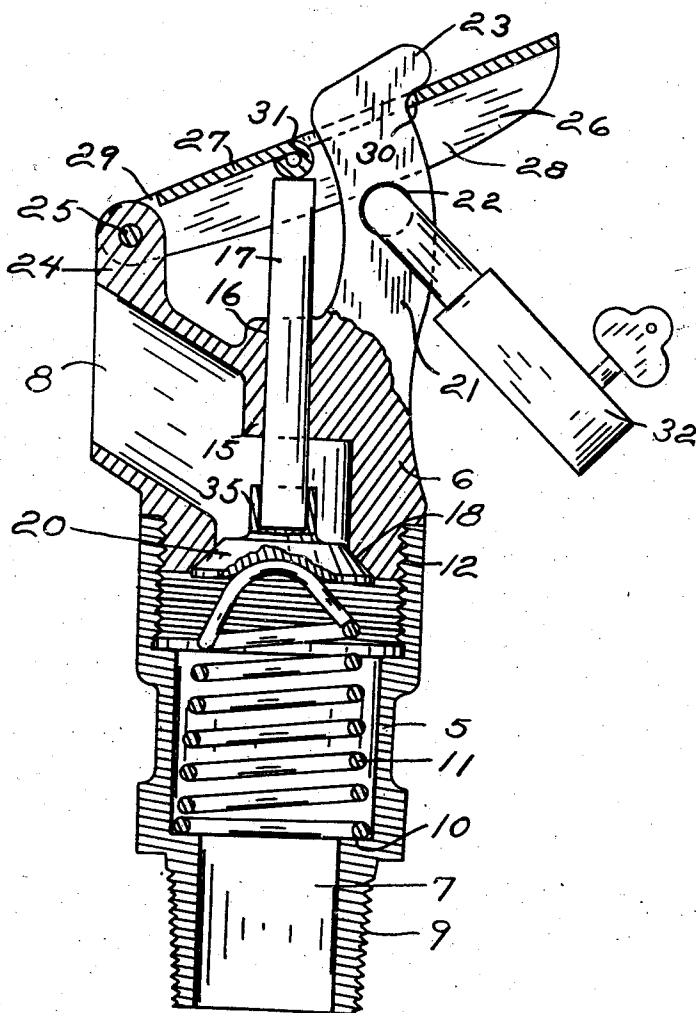
Sept. 1, 1925.

F. SETTE

1,551,853

VALVE

Original Filed Nov. 3, 1923



Friederick Sette INVENTOR.

BY

Ewin, Wheeler & Woolard
ATTORNEYS.

UNITED STATES PATENT OFFICE.

FRIEDERICK SETTE, OF IRON RIDGE, WISCONSIN, ASSIGNOR OF ONE-FOURTH TO MADIA SETTE AND ONE-FOURTH TO FRANCES SETTE, BOTH OF MILWAUKEE, WISCONSIN.

VALVE.

Continuation of application Serial No. 672,696, filed November 3, 1923. This application filed December 29, 1924. Serial No. 758,564.

To all whom it may concern:

Be it known that I, FRIEDERICK SETTE, a citizen of the United States, residing at Iron Ridge, county of Dodge, and State of Wisconsin, have invented new and useful Improvements in Valves, of which the following is a specification.

This invention relates to improvements in valves such as are particularly adapted to control the flow of liquids. This application is a continuation of a prior application filed by me November 3, 1923, Serial No. 672,696, and entitled "Valves."

It is one of the primary objects of this invention to produce a novel and simplified valve construction with few parts and adapted for manufacture at comparatively small expense. More specifically stated, it is my purpose to provide a valve needing no packing, and in which the valve spring is fitted directly between the casing and the valve, whereby cross heads, pins, or the like to receive the spring are dispensed with and the construction is simplified.

It is a further object of this invention to provide a valve in which the stem and head are made of different materials, and the valve proper or head being of relatively soft metal in order that it may seat effectively against the hard metal of the casing. The attachment of a soft metal head to a relatively harder valve stem involves difficulties which, so far as I am aware, have not been heretofore solved in a satisfactory manner. Other objects will appear more fully from the following detailed description of the construction of the valve and the process by which the valve head is attached to the valve stem.

The drawing is an axial section through a valve casing and disclosing a valve in a device constituting one embodiment of this invention.

The valve casing is made up of two parts 5 and 6 which include respectively inlet port 7 and outlet port 8. The casing portion 5 includes an externally threaded sleeve 9 within which inlet port 7 is disposed in the manner indicated. Between ports 7 and the body of casing portion 5 is disposed a shoulder 10 against which the valve spring 11 is arranged to seat. The casing portions

5 and 6 are in threaded engagement at 12 and are thereby made easily separable for inspection, cleansing, or replacements of the internal parts of the device.

The casing portion 6 is provided at 15 with a boss within which there is a bearing opening 16 for the valve stem 17. Centrally disposed with reference to opening 16 is a frusto-conically formed valve seat 18 arranged to receive the valve body 20 which is connected with stem 17 in a manner hereinafter to be more particularly set forth. It will be noted that the spring 11 has an extension which contacts directly with the inner face of valve body 20 and preferably comprises a compression spring, whereby to urge the valve body in the direction of the seat. One end of the spring will preferably conform in diameter substantially to the interior chamber of casing portion 5 in order that spring 11 may be confined against lateral displacement. Since the valve body 20 is of less diameter than the chamber within which the spring is disposed, the spring is preferably tapered as indicated.

The casing portion 6 preferably includes, integrally cast therewith, a segment element 21 apertured at 22 and provided with a stop at 23. Casing portion 6 is also provided with an ear 24 which carries a transverse pivot pin 25. By means of the pivot pin an actuating lever is fulcrumed in connection with ear 24. This lever is designated in its entirety by reference character 26 and may comprise a piece of channel iron of which 27 represents the web and 28 one of the flanges. The flanges embrace and protect the valve stem, rendering it inaccessible and securing it against unauthorized operation when the lever is locked as hereinafter described. It will be noted that a portion of the web 27 is cut away at 29 to receive ear 24, and it will be understood that the flanges 26 may be apertured for bearing upon the pivot pin 25. The web is also provided with an opening at 30 which may conveniently be formed by cutting away a portion of the material of the web upon three sides of the opening and bending such material to the arcuate form in which it is illustrated at 31, thereby providing in-

nally of lever 26 a cylindrically curved surface adapted to abut the end of stem 17 for the actuation of the valve.

For the purpose of maintaining the valve in either its open or closed positions, the opening 22 in the segment portion 21 of the casing may be utilized to receive and support a padlock 32 in the manner indicated. If the padlock is inserted in said opening when the handle lever 26 is in the position illustrated, the lever will abut the padlock, and it will be impossible to move said lever to open the valve until the padlock has been removed. If the padlock is removed and lever 26 is manipulated about pivot pin 25 to a position at the inner end of segment 21, the valve will be open and the padlock 32 may be replaced in aperture 22 to retain the handle lever 26 in this position. The stop 23 is adapted also to retain the bail of a pail hung from segment 21 and when a pail is so supported the lever 26 will be held in such a position as to maintain the valve open.

The material of which the valve casing portions 5 and 6 may be cast will preferably be some hard metal such as iron, steel, brass or bronze. Thus, the valve seat 18 is very hard. The valve stem 17 will preferably be constructed of some similarly hard metal, preferably brass, whereby very slight wear can occur between the valve stem 17 and the bearing opening 16 in the casing. It is desired, however, that the valve head or body 20 shall be constructed of some relatively very soft metal, thereby ensuring a perfect seat against the casing.

A difficulty heretofore encountered in attempts to use soft metal plugs has been the oxidation or corrosion of the valve plug. Some alloys and unalloyed metals will become so corroded as to be porous and leaky after relatively short periods of use. It has been found, however, that if the valve plug 20 is made of a metal comprising three parts lead and one part tin very good results can be obtained. Such a valve plug will not corrode in ordinary usage with linseed oil, gasoline, alcohol, or fluids of a similar nature. The indicated proportions may be varied within fairly wide limits, and hence the preferable proportions stated may be considered as approximate.

By using a soft metal plug, the valve is thereby adapted and fitted for use in handling liquids which contain foreign matter, such as might interfere with the operation of an ordinary valve and prevent the valve from closing. Experiments with a valve constructed of the materials above indicated have demonstrated that an article as large as the head of a pin can be inserted between the valve and its seat and will initially hold the valve open. If spring 11 is relatively strong, the sudden release of handle lever

26, after the operator is aware that the valve is being held open, will imbed an article of the size of the head of a pin deeply in the soft metal plug 20 to such an extent as to permit the valve to close to a perfect seat.

The most serious difficulty heretofore encountered in the use of soft heads or plugs has been that if the plug is sufficiently soft to serve the purposes of this invention it will become loosened on its stem through impact with the valve seat. The impact deforms the soft metal to such an extent that threads, nuts, or other securing devices, on the stem cannot be depended upon for a secure and leak-proof connection.

To overcome this serious difficulty I prefer to bond the plug and stem with tin or soft solder. This may be done in a variety of ways, but the preferred method of assembling the hard stem and soft plug involves the casting of the plug about and upon the stem. The stem is preferably tinned preparatory to the casting operation.

I have found that the bonded joint results in the production of a substantially integral connection of such a nature that it does not become loosened under impact. The rigidity of the connection may be enhanced by the extent to which sleeve portion 35 of the plug is extended along the stem.

The only reason why it is preferred to bond the plug upon the stem by casting it thereon lies in the fact that the melting point of the preferred alloy composition for the plug is so close to that of the solder used as to tend to soften the plug if the latter is precast and is subjected to heat sufficient to flux the solder.

In operation, the threaded portion 9 of the valve casing will be inserted in a corresponding aperture in the receptacle or conduit through which it is desired to regulate liquid flow. The valve plug 20 will be urged to its seat by a relatively strong spring 11 and will thereby control fluid flow between the inlet port 7 and the outlet port 8 of the device. When desired, the handle lever 26 may be manipulated to open the valve and permit the flow of fluid therethrough. The handle lever is so arranged as to act with considerable leverage upon the valve stem and friction is minimized through the provision of the arcuately formed bearing element 31 upon the handle lever. As heretofore explained, the handle lever may be secured to maintain the valve in either its open or closed positions through the use of padlock 32.

When the valve plug 20 is axially offset from seat 18 through the manipulation of lever 26, the fluid flow through the valve will be comparatively unobstructed. The outlet port 8 is of a size entirely adequate to handle such flow and there will be little, if any, back pressure tending to force fluid

outwardly along the bearing surface 16. Inasmuch as the bearing opening is on the outlet side of the valve seat 18, its axial extent will ordinarily prevent the emission of fluid therethrough despite the absence of packing.

As above indicated, this valve is well adapted for handling fluids containing foreign matter. The fact that the valve plug 20 is of soft material ensures that the valve will close to a perfect seat, such as will prevent the passage of light liquids like gasoline or ether, which might escape through a valve plug made of brass or the like. At the same time, the plug 20, being of metal, will not deteriorate to so great an extent as would a plug made of rubber or the like, which would become unusable under like circumstances. At the same time, even though the valve plug 20 is soft and has a tendency to pick up any grit or foreign matter in the fluid controlled by it, it is nevertheless a fact that with a relatively strong spring at 11 the valve will not be prevented from closing by any gritty material or foreign matter adhering to its face. If it is apparent to the operator that the plug 20 is not entirely closed he may, by the quick release, or "snapping", the valve lever 26, readily imbed the foreign matter within the face of the valve plug to such an extent that it will no longer interfere. In time, a valve plug having large quantities of foreign matter imbedded therein may become unsuitable for further use. In that event it will be particularly observed that it is only necessary to replace the valve plug and valve stem. The new valve plug, being of soft metal, will readily adapt itself to the seat and there are no further parts necessary for the mounting of the valve or the operative connection of the valve spring therewith. For such replacement it is only necessary to unscrew valve casing portion 6 from casing portion 5 and withdraw the valve from its seat. The spring 11 will remain within valve casing portion 5. A new valve plug and stem are simply substituted within casing portion 6 and the casing castings are reassembled, subjecting spring 11 to compression as portion 6 is threaded into portion 5. Immediately upon completion of this simple operation the valve device is again in condition for use.

I claim:

1. In a device of the character described, the combination with a relatively hard valve stem guided for reciprocable movement, of a soft metal plug including tin and metallically bonded integrally to said stem, said plug being wholly dependent on said stem for guidance in reciprocation therewith and being substantially non-corrodible when subjected to the liquids recited in the specification.

2. A valve device comprising a casing having an annular seat in combination with a stem of hard metal guided for axial reciprocation with reference to said seat, tinning on the end of said stem, and a soft metal plug comprising an alloy of lead and tin cast upon said stem in integrally bonded relation to the tinned portion thereof and formed to be complementary to said seat, the metal of said plug being substantially non-corrodible when subjected to the liquids recited in the specification.

3. A valve device including a casing provided with an annular seat and with inlet and outlet portions upon either side of said seat, a valve stem reciprocably guided in the outlet portion of said casing and in substantially axial alignment with said seat, a valve spring disposed in the inlet portion of said casing, a valve plug of soft metal alloy in direct bonded relation to said stem and acted upon by said spring, said plug being dependent upon said stem for its guidance in movement to and from said seat and being of sufficient softness with reference to the compression of said spring to maintain operatively sealed contact with said seat irrespective of foreign matter which may be interposed in the form of grit between said valve and said seat as said valve moves toward said seat.

4. A valve device including a valve casing providing a valve seat and a bearing aperture in axial alignment therewith, a brass valve stem reciprocable in said aperture, a valve body composed of an alloy of approximately three parts of lead and one part of tin and providing a recess for said stem, and a solder bond connecting said stem with said body.

5. A valve device comprising the combination of a casing provided with an annular seat, a valve including a valve plug of soft metal alloy complementary to the seat, and a spring acting in a direction to maintain said plug upon said seat, said spring being of sufficient strength with reference to the softness of the plug to maintain said plug normally in operatively sealed contact with the seat irrespective of foreign matter which may be interposed in the form of grit between the plug and the seat as the plug moves toward said seat.

6. A valve device comprising the combination of a casing provided with an annular seat, a valve including a valve plug of soft metal alloy in bonded relation to the stem and complementary to the seat, and a spring acting in a direction to maintain said plug upon said seat, said spring being of sufficient strength with reference to the softness of the plug to maintain said plug normally in operatively sealed contact with the seat irrespective of foreign matter which may be interposed in the form of grit between the

plug and the seat as the plug moves toward said seat.

7. A valve device including the combination of a casing provided with an annular seat, a valve stem guided for reciprocation in substantially axial alignment with the seat, a valve plug of soft metal alloy in bonded relation to the stem and complementary to the seat, and a spring acting in a direction to maintain said plug upon said seat, said spring being of sufficient strength with reference to the softness of the plug to maintain said plug normally in operatively sealed contact with the seat irrespective of foreign matter which may be interposed in the form of grit between the plug and the seat as said plug moves toward said seat.

8. In a device of the character described, the combination with a valve casing and a valve stem reciprocably projecting therefrom, of a channel lever embracing the end of said stem and pivotally connected with said casing, and a limiting member connected with said casing and provided with means for limiting the oscillation of said lever away from said casing, said member being adapted to support the bail of a pail and to receive such bail when the lever is oscillated toward the casing from its extreme position.

9. In a device of the character described, the combination with a valve comprising a casing and a stem reciprocably projecting therefrom, of a lever of channeled section in pivotal connection with the casing, embracing the end of said stem, and provided with a slot; a segment connected with said casing and projecting through said slot; and an upwardly extending lug on said segment externally of said lever and positioned for engagement therewith in a manner adapted to limit the outward oscillation of said lever away from said casing, whereby to confine said lever in protective relation to the end of said stem.

10. In a device of the character described, the combination with a casing having a valved port and provided with an externally projecting segment, of a valve controlling said port and provided with a stem reciprocably mounted in the casing and projecting therefrom substantially parallel with said segment, and a lever in pivotal connection with the casing and provided with an opening encompassing said segment, material struck from said opening being arcuately bent to comprise a contact member disposed to abut the end of said stem.

11. In a device of the character described, the combination with a casing providing an internal port, of a valve arranged to seat about the margins of said port to control fluid delivery thereto, a compression spring confined within said casing and abutting the face of said valve, whereby to urge the valve

in the direction of its seat; a stem connected with said valve and reciprocably mounted in said casing to project therefrom, a segment connected with said casing adjacent said stem, and a valve lever pivotally connected with said casing and including a sheet metal web having a portion arcuately bent to comprise a bearing member for contact with said stem, the opening left by the portion so bent being adapted to receive said segment.

12. A valve device including the combination of a casing provided with an annular seat, a valve stem guided for reciprocation in substantially axial alignment with the seat, a valve plug of soft metal alloy in bonded relation to the stem and complementary to the seat, and a spring acting directly upon said plug in a direction to maintain the plug upon the seat; said spring being of sufficient strength with reference to the softness of the plug to maintain said plug normally in operatively sealed contact with the seat irrespective of foreign matter which may be interposed in the form of grit between the plug and the seat as said plug moves toward said seat.

13. A valve device comprising the combination of a casing, a valve including a plug of soft metal alloy in said casing, a seat in said casing for said valve, means guiding said plug for movement to and from said seat, and a spring acting in a direction to maintain said plug on said seat and being of sufficient strength with reference to the softness of the plug to maintain the plug normally in operatively sealed contact with the seat irrespective of interposed grit, said seat being formed substantially to snugly house the plug of soft metal alloy; and thereby resisting any tendency of the soft metal to spread under the pressure of said spring.

14. A valve device comprising the combination of a casing provided with a tapered seat, of a valve including a plug of soft metal alloy complementary to said seat, means guiding said plug for movement to and from said seat, and a spring acting in the direction to maintain said plug on said seat and being of sufficient strength with reference to the softness of the plug to maintain said plug normally in operatively sealed contact with the seat irrespective of interposed grit, the tapered form of said seat and plug being adapted to resist any tendency for the soft metal of said plug to spread under the pressure of said spring.

15. A valve device comprising the combination of a casing provided with a tapered seat having a smooth frusto-conical surface, of a valve operative within said casing and comprising a suitable guided stem and a valve plug of soft metal alloy directly bonded to said stem and complementary to said seat, and a spring acting on said plug in a direction to maintain it normally in oper-

actively sealed contact with said seat irrespective of foreign matter in the form of grit interposed between said plug and seat.

16. A valve device comprising the combination with a casing provided with a conically tapered seat and having inlet and outlet ports upon either side thereof, of a valve stem guided for reciprocation in substantially axial alignment with said seat and projecting from the smaller side of said seat toward the outlet side of said valve casing, a valve plug of soft metal alloy complementary to said seat and directly bonded to said stem, and a spring in said casing on the in-

let side of said port acting directly upon said plug whereby to tend to maintain the soft metal of said plug in intimate symmetrical relation to said stem under the increasing resistance of the tapering seat.

17. In a valve device, the combination of a stem of relatively hard metal, and a valve plug of a lead-tin alloy directly bonded to said stem, whereby to form an integral structure without the use of mechanical means for securing together the plug and stem, said alloy consisting of approximately three parts of lead and one part of tin.

FRIEDERICK SETTE.