Jan. 17, 1956 J. A. BRENNER 2,730,959

GUARD AND GUIDE FOR FOOT VALVE OR THE LIKE

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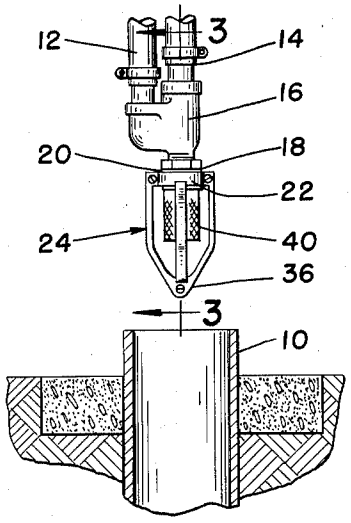


Fig. 1

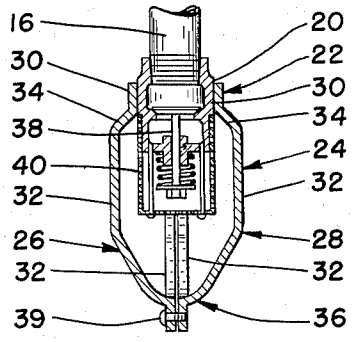


Fig. 3

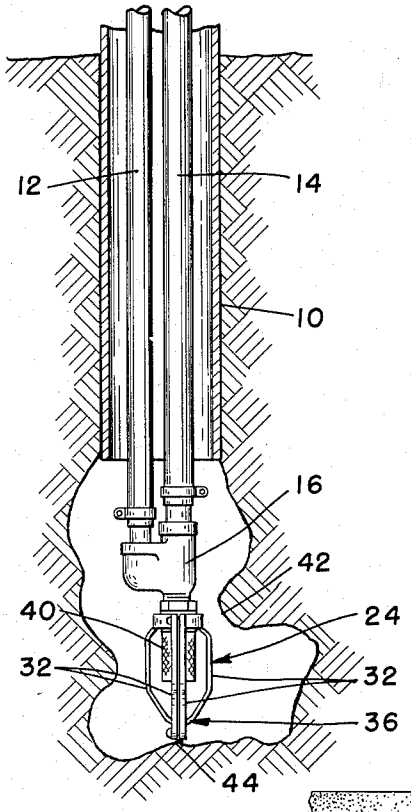


Fig. 2

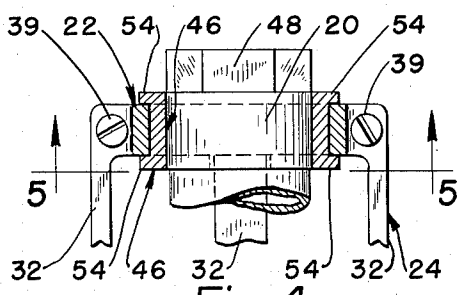


Fig. 4

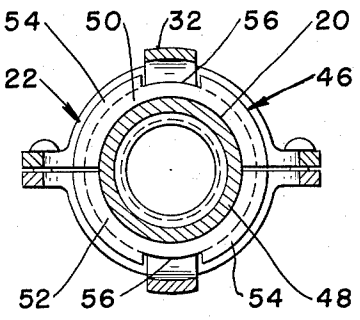


Fig. 5

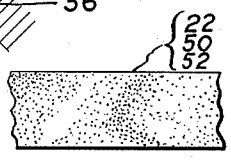


Fig. 6

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GUARD AND GUIDE FOR FOOT VALVE OR THE LIKE

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8 Claims. (Cl. 103—202)

This invention relates to a guard and guide particularly adapted to protect, as well as guide, either the foot valve, jet, or other lowermost type of valve on a well piping installation, said valves and the like usually being covered by a screen or strainer. Usually such valves are not particularly rugged and the screens or strainers covering the same likewise are somewhat fragile. At least, they are not readily susceptible to withstanding rough treatment or engagement with obstructions such as projecting rocks in a well opening. Frequently, when well piping installations are lowered into a well casing or other form of well opening, the foot valve, jet, or screen or strainer thereover will either be banged into the side of the well casing or will hit a projecting rock or other obstruction, especially in the well cavity below the end of the well casing, and considerable damage usually is sustained by the valve, jet or strainer. Further, when the well piping is lowered into either clay substances or mud at the bottom of a well cavity, the strainer on the end of the piping installation will drop into such clay or mud and the openings of the strainer become clogged so as to reduce the capacity thereof.

In situations where the jet, foot valve, or strainer thereover become damaged or clogged with mud, clay, and the like, it is necessary to remove the piping installation from the well, either clean or repair the parts on the lower end of the piping installation, and then re-insert the same into the well with the the hope that the same situation will not recur. The problem of inserting foot valves and jets into wells without damage has been rendered more acute in recent years since the introduction of so-called "plastic" pipe. Such pipe actually constitutes reasonably flexible tubing formed principally from non-hardening synthetic resins of various kinds. Such tubing is merchandised in large coils which are more readily handled than rigid metallic pipe. Further, such plastic pipe does not rust or corrode and it is possible to introduce quite long lengths thereof into well casings without making joints. Its use has been widely accepted because of these advantages but, after attaching a foot valve or a jet to the bottom of such flexible plastic pipe, and the same is lowered into a well casing, the flexibility of the pipe precludes any effective amount of guiding of the pipe within the well casing. Hence, the possibility of the foot valve, jet, or any strainer covering the same, striking obstructions in the bottom of the well cavity, hitting the side of the well casing, or becoming clogged from contact with clay, mud, and the like, is equally great as when such valves are connected to the end of stiff metallic piping, or more so.

The present invention has been developed to obviate the above described difficulties and insure that, particularly when a foot valve or jet, and the strainer covering the same is lowered into a well casing, there will be substantially no possibility of the same contacting either the side of the well casing, obstructions in the lower portion of the well cavity, or mud and clay in the bottom of the well.

In the most preferred form of the present invention, a combination guard and guide of very simple and inexpensive nature is provided which readily is attachable to a suitable surface on a foot valve or jet and the guard and guide comprises a plurality of longitudinally extending fingers or arms which are spaced laterally a substantial distance from the valve or strainer and also extend below the same in a tapering or pointed manner to form a guiding end on the guard so as to skid or cam the lower end of the piping assembly, including a jet or foot valve, away from contact with the well casing as well as any projections or obstructions in the well opening. Further, and equally important, the guard and guide operates to contact the bottom of a well and not only prevent the strainer as well as the jet or foot valve from striking the bottom of a well but also spacing these members from the bottom of a well and thereby insuring full capacity of the valve structure as well as the perforated strainer enclosing the same.

The guard and guide preferably is formed from corrosion resistant material such as a suitable synthetic resin of a firm and rugged nature, phenolic condensate products being satisfactory for this purpose, or appropriate metal such as aluminum, bronze, brass, and otherwise. Further, the most preferred embodiment of the invention contemplates the formation of the guard and guide in a plurality of complementary, similar sections which can be cast and then connected together by some simple means such as a plurality of bolts. The same mold cavity may be used to form the several complementary sections which are joined together to form a complete guard and guide assembly. Hence, manufacturing costs may be maintained at a minimum.

The average well for domestic use utilizes piping of a limited number of different diameters and sizes. The jets and foot valves used with such piping also generally have external diameters which fall into a rather limited range of sizes. Hence, the present invention may be manufactured so as to have clamping collars or attaching bands of a limited range of diameters, thus maintaining the required inventory of stock at a minimum. To still further minimize such requirements, the present invention contemplates the use of adapting bushings which may be used, for example, with a standard size of guard and guide and, when inserted in the clamping collar thereof, the guard and guide may be adapted to a foot valve or jet having a smaller diameter than that for which the guard and guide originally was intended. Such adaptor bushings also preferably are composed of several parts and means are included thereon to facilitate the positioning of the bushings relative to the guard and guide. Further, such bushings are formed from corrosion resistant material.

Details of the foregoing advantageous features of the invention and the objects thereof, as well as other objects, are set forth in the following specification and illustrated in the accompanying drawing comprising a part thereof.

Referring to the drawings:

Fig. 1 is a vertical elevation showing partly in section and partly in elevation, the upper end of a well casing and the lower end of a well piping installation including a jet to which is attached a guard and guide embodying the principles of the present invention.

Fig. 2 is a vertical elevation, showing in section the lower end of a well installation in which is positioned a well piping arrangement including a jet to which is attached a guard and guide embodying the present invention, the latter being illustrated as engaging the bottom of the well cavity so as to hold the lower end of the jet and strainer thereon out of contact with said bottom of the well.

Fig. 3 is a vertical sectional view, taken on the line 3—3 of Fig. 1 and illustrating details of the jet or foot valve and the manner in which the guard and guide of the present invention is attached to the same.

Fig. 4 is a fragmentary sectional view, on a larger scale than in Fig. 3, illustrating another feature of the invention comprising the use of an adaptor bushing to facilitate the attachment of the guard and guide to the lower end of a foot valve or jet.

Fig. 5 is a sectional view of the structure shown in Fig. 4 and taken on the line 5—5 of said figure.

Fig. 6 is a fragmentary elevation showing the rough interior of the clamping band and also one of the split bushing parts to illustrate the sand-mold finish produced thereon.

Referring to the drawing and particularly Figs. 1 and 2, the upper end of a well casing 10 is shown in Fig. 1 about to receive the lower end of a well piping installation or assembly comprising a pair of pipes 12 and 14, clamped or otherwise connected to an exemplary jet 16. Attached to the lower end of the jet is a valve 18. Most valves of this nature, as well as foot valves have a cylindrical outer surface portion 20 which affords an excellent means to be engaged by the clamping collar or attaching band 22 of the combination guard and guide 24 embodying the principles of the present invention.

In the preferred embodiment of the invention, the guard and guide 24 comprises a pair of similar frame-like sections 26 and 28 having complementary abutting surfaces which are best shown in Fig. 3. Each of these sections has a semi-circular portion 30 comprising part of the clamping collar 22. Extending longitudinally of the guard and guide is a plurality of preferably rigid fingers or arms 32 which, at their upper ends, have inwardly extending ends 34 which are connected to the semi-circular portions 30. Intermediately of the ends of the arms 32, they are bent inward and downward and are connected together to comprise a guiding point 36. The sections 26 and 28 are connected together by a plurality of bolts or screws 39 and such connection of the parts or sections simultaneously effects clamping of the clamping collar 22 to the cylindrical portion 20 of the jet or foot valve.

It will thus be seen that the guard and guide 24 preferably is composed of multi-partite castings 26 and 28 which may be formed from the same mold cavity, thus minimizing costs of production. The material used may be synthetic resin such as a phenolic condensate product, or suitable metal such as aluminum, bronze, brass, and the like. The mold casting surface is suitable as a finish surface and, except along the complementary abutting surfaces of the sections 26 and 28 which might be further finished by slight buffing or grinding if necessary, the guard and guide is completely finished as it is removed from the mold. Of course, it will be understood that holes should be drilled and tapped to receive the screws or bolts 39 but this is quite an inexpensive operation. The relatively rough sand mold surface provided particularly on the interior of the semi-circular portions 30 comprising the clamping collar 22, as shown in Fig. 6, are admirably suited to effect firmer engagement between such clamping collar and the cylindrical clamping surface 20 on the jet or foot valve.

Referring to Figs. 1 through 3 particularly, it will be seen that the articulated unit comprising the combined guard and guide 24 has a plurality of fingers or arms 32 which are circumferentially spaced about the clamping collar 22 and, at their upper ends, extend somewhat outwardly from said collar and then downwardly, terminating in inwardly and downwardly directed lower end portions which are connected together to form the guiding point 36 of the guard and guide 24. This arrangement adequately spaces the fingers or arms 32 from the valve 38 as well as the covering screen 40. Thus, the pointed or tapering nature of the lower end of the guard and guide 24 permits it to skid the lower end of the well piping assembly and jet or foot valve downward along the sides of the well casing 10 and, referring to Fig. 2, if the guard and guide should encounter an obstruction in the lower end of the well cavity as shown at 42, the fingers 32 will cause the jet and screen to be skidded therepast without injury to any part thereof. Further, when the guiding point 36 encounters the bottom 44 of the well, downward or lowering movement of the jet or foot valve 16, as well as the piping 12 and 14, will cease. However, it will be seen that the strainer 40 and the valve enclosed thereby are substantially spaced from the bottom of the well cavity. Thus, any clay or mud present in the bottom of the well is prevented from contacting such screen and the valve therein in view of such substantial spacing afforded by the arms or fingers 32 of the guard and guide 24.

As has been explained above, in the introductory remarks, the guard and guide embodying the present invention may be formed in a limited number of standard sizes of clamping collar so as to minimize inventory requirements in a plumbing supply house for example. To further maintain inventory requirements at a minimum, it is contemplated that adaptor bushings 46 may be utilized to permit the attachment and firm clamping of the guard and guide 24 to a casing of a foot valve, for example, having a cylindrical outer surface portion 20 formed thereon. Referring to Fig. 5, it will be seen that the adaptor bushing 46 is composed of a pair of sections 50 and 52 which meet along a plane extending diametrically through the foot valve 48. Actually, there preferably is a certain amount of clearance provided between the opposing surfaces of the sections 50 and 52 so as to afford firm clamping of the sections 26 and 28 of the guard and guide relative to the bushing 46 and clamping surface 20 on the foot valve.

In order to prevent movement of the bushing sections 50 and 52 relative to clamping collar 22 of the guard and guide, the bushing sections are provided with laterally extending flanges 54 projecting radially from the top and bottom edges of said bushing sections as clearly shown in Figs. 4 and 5. In order to afford clearance for the intermediate arm or finger 32 of the guard and guide relative to the bushing sections, the lower flanges 54 may be provided with notches 56 which will receive the extending portions of the upper ends of the fingers or arms 32. Further, such notch will provide indexing means of the bushing sections relative to the clamping collar 22.

The bushing sections 50 and 52 may be inexpensively formed by molding from corrosion resistant materials such as that used and described above for forming the guard and guide 24. If, for example, these are cast from metal in sand molds, the sand mold surface formed on the molded sections will, with the possible exception of a slight amount of buffing, be suitable in the finished product. The rough inner surfaces, shown in Fig. 6, firmly engage the cylindrical surface 20 of the valve 18. It will be understood of course that the bushings may be provided in a limited range of different sizes which, in combination with a limited range of different sizes of clamping collars 22, can be used to adapt the combination guard and guide comprising the present invention to a relatively wide range of different sizes of jets, foot valves, and the like which are attached to the lower end of well piping for insertion into a well.

From the foregoing, it will be seen that the present invention provides a highly useful guard and guide attachable to the lower end of a piping installation to be inserted into a well cavity so as to prevent damage either to the screen or strainer covering the valve or jet attached to the lower end of the well piping. The invention is particularly useful in relation to the use of flexible or resinous tubing or piping used in the well installations described above. The articulated unit comprising the guard and guide is rugged and durable, yet light in weight and may

be manufactured at relatively low cost. Not only does it protect the elements enclosed thereby from damage but it also assures full capacity of the valve as well as the screen or strainer due to spacing the same from contact with clay, mud and the like in the bottom of a well cavity. The contractible nature of the clamping collar **22** about a jet or foot valve provides quick and simple attaching means for the guard and guide thereto.

The spaces between the fingers or arms of the guard and guide greatly exceed the width of said fingers or arms, thus insuring efficient access of the well fluid to the valves and enclosing screen or strainer. Further, the spacing of the arms or fingers from the valve, as well as the screen or strainer, in both lateral and downward longitudinal directions is substantial and effectively guards such valve and screen or strainer from contact with the well casing, obstructions or projections within the well, and the bottom of the well.

While the invention has been shown and illustrated in its several preferred embodiments, and has included certain details, it should be understood that the invention is not to be limited to the precise details herein illustrated and described since the same may be carried out in other ways falling within the scope of the invention as claimed.

I claim:

1. A well piping having attached to the lower end thereof an inlet valve member provided with a substantially cylindrical external surface, in combination with a guard and guide enclosing said valve member and operable to protect said member and guide it while being lowered into a well casing, said guard and guide comprising an attaching band shaped to surround and be firmly secured to said cylindrical surface of said valve member, a plurality of rigid guide fingers connected at the upper ends thereof to said band and extending longitudinally downward therefrom, said fingers being circumferentially spaced around said band and extending downwardly past said valve member and substantially spaced laterally from the sides of said valve member, the lower portions of said fingers being directed downwardly and inwardly toward each other and connected together to define a tapered guiding end, the spaces between adjacent fingers being substantially wider than the width of said fingers to provide ample access of the well contents to said valve member.

2. The combination set forth in claim 1 further characterized by said attaching band having a rough interior and said band being contractible into firm clamping engagement with said cylindrical surface, the roughness of the interior of said band serving to increase such clamping effect.

3. The combination set forth in claim 1 further characterized by said well piping being formed from flexible synthetic resin, and said guard and guide fingers being slidably engageable with the inner walls of a well casing and any obstructions in a well opening to prevent contact of said foot valve or the like therewith while said piping and the latter are being lowered thereinto, the lowest

extremity of said guard and guide also being adapted to contact the bottom of said well and space said foot valve member therefrom.

4. A guard and guide cast from corrosion resistant material and attachable to the lower extremity of a well piping installation such as a foot valve and strainer thereon having a clamp receiving surface spaced above the lower end thereof, said guard and guide comprising in combination, a substantially circular rigid collar arranged to surround and be firmly connected to said clamp receiving surface, a plurality of rigid guarding and guiding fingers spaced circumferentially around said collar and at the normally upper ends thereof each arm having a relatively short inwardly directed extension connected to said collar, said fingers extending downwardly from said extensions in substantially parallel relationship and intermediate the ends thereof extending angularly inward and downward to a common point, the lower extremities of said fingers being connected together to define a tapered guiding lower end for said guard and guide, whereby said fingers are disposed in substantially spaced relationship to the sides and lower end of said foot valve and strainer or the like when attached thereto.

5. The guard and guide set forth in claim 4 further characterized by said guard and guide including means carried by said substantially circular collar and disposable between said collar and clamp receiving surface on said well piping installation, said means firmly engaging said clamp receiving surface when the guard and guide are operatively positioned on said well piping installation to hold said guard and guide securely attached thereto.

6. The guard and guide set forth in claim 4 further characterized by said guard and guide being longitudinally divided and comprising a plurality of similar castings having complementary abutting surfaces, and also including means operable to connect said castings together and simultaneously effect clamping of said collar to said clamp receiving surface on said foot valve.

7. The guard and guide set forth in claim 6 in combination with a split bushing comprising sections respectively disposed within the clamping collar portions of said complementary castings and engageable directly with said clamp receiving surface of said foot valve, thereby to render said guard and guide adaptable to a foot valve having a clamp receiving surface of a diameter smaller than that of the interior of said clamping collar.

8. The guard and guide combination set forth in claim 7 further including outwardly directed flanges on the ends of said bushing sections engaging the ends of said clamping collar portions and operable to prevent relative axial movement therebetween when being clamped to said foot valve.

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