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DEVICE FOR REMOVING SCALE, ETC., FROM LIQUID CONTAINERS

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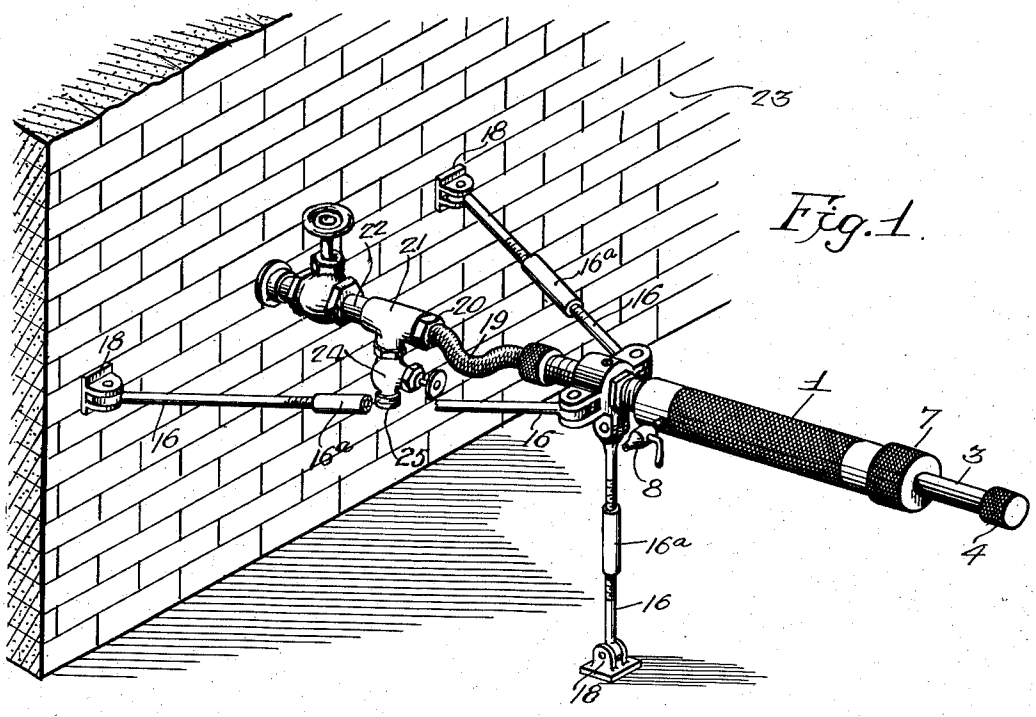


Fig. 1.

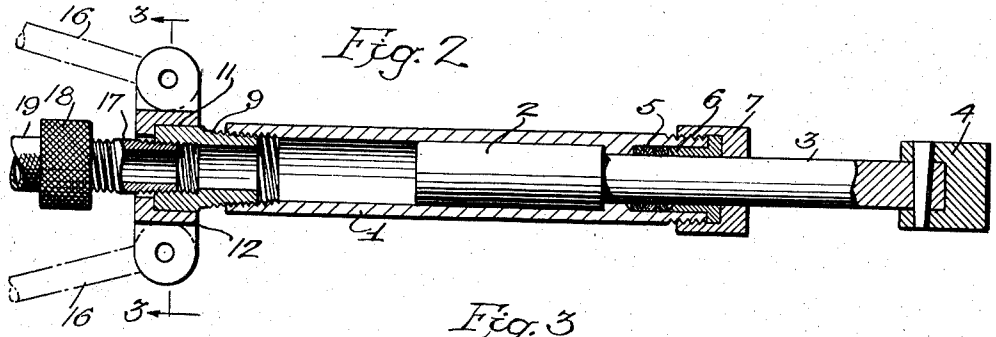


Fig. 2.

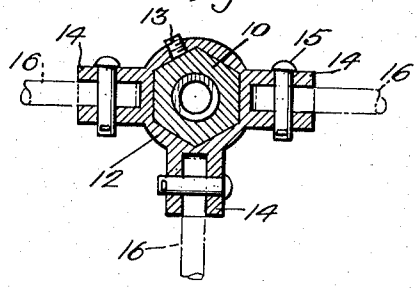


Fig. 3.

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DEVICE FOR REMOVING SCALE, ETC., FROM LIQUID CONTAINERS

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4 Claims. (Cl. 15—104.07)

This invention relates to devices for loosening and removing rust, scale and other encrustations from pipes, tanks or vessels filled with water or other liquid, and a principal object of the invention is to provide a generally improved and commercially practicable device of this character.

It has previously been proposed to remove scale and encrustations from the walls of pipes and other liquid containers by means of impact transmitted through the contained liquid, but prior to my invention and so far as I am aware, no one had provided a device operating on this principle which was practical in the commercial sense and which while operating efficiently also adequately safeguarded the liquid containers from damage arising either from excessive hydraulic or mechanical blows imposed in the normal operation of the device.

A specific object of the present invention, therefore, is to provide a device of this character that shall be so constructed that the pipe or vessel to be cleaned may positively be relieved of all mechanical impact in the operation of the device.

Still more specifically, an object of the invention is to provide a means for adequately supporting and bracing the device so that the mechanical blows may be transferred to a structure remote from the pipe or other container to which the device may be connected and which shall have the strength to adequately support the mechanical forces developed during the operation of the device.

Still another object of the invention is to provide in a device of the stated character means including a resilient connector between the impact-producing mechanism and the pipe or container to which the device may be connected for relieving said pipe or container of any character of mechanical impact or blow.

Still another object of the invention is to provide in a device of the stated character means whereby the force of the hydraulic vibrations may be throttled to any desired extent, thereby affording a close regulation and control of the amount of impact transmitted to the liquid column or body.

A further object of the invention is to provide a device of the stated character having novel means for, in effect, priming the device, as hereinafter more specifically described.

The invention further resides in the structural details hereinafter described and illustrated in the attached drawing, in which:

Figure 1 is a view in perspective of a device made in accordance with my invention;

Fig. 2 is a longitudinal sectional view through the device, and

Fig. 3 is a section on the line 3—3, Fig. 2.

With reference to the drawing, the device comprises a cylinder 1 in which is fitted a plunger 2, the stem 3 of the plunger projecting from one end of the cylinder as shown and having at its outer extremity a suitable impact tip 4. As shown in Fig. 2, the stem 3 projects through a suitable packing box 5 in the end of the cylinder, said packing box comprising a gland 6 which is confined under pressure by a screw cap 7, this cap having an aperture for passage therethrough of the stem 3 of the plunger. The outer surfaces of the cylinder 1, of the cap 7, and of the impact tip 4 are shown knurled in the present instance.

The cylinder 1 has adjacent to its opposite end a threaded opening in which is installed a pet cock 8, the function of this pet cock being hereinafter described. This same end of the cylinder 1 is internally threaded for reception of a nipple 9, and this nipple has a hexagonal outer end portion 10 which in assembly is received in the hexagonal socket 11 of a sleeve 12, the sleeve being secured to the nipple by means of a set screw 13, see Fig. 3. The sleeve 11 is provided with a series of outstanding lugs 14 arranged in pairs, there being three sets of said lugs in the present instance. Between the lugs of each pair is inserted and pivotally secured by means of pins 15 the inner end of a brace rod 16. Each of these rods, as shown in Fig. 1, contains a turnbuckle 16a through the medium of which the effective length of the rod may be adjusted. The outer end of each of the rods 16 carries a pivoted shoe 18 affording relatively extended surface contact with a supporting surface. In the present instance, the sets of lugs are so arranged on the sleeve 12 that the rods extend in planes at right angles to each other.

The outer end of the nipple 9 is internally threaded for reception of the externally threaded end of a second nipple 17, and the outer end of this nipple is also threaded for reception of a threaded coupling sleeve 18 carried at one end of a flexible hose connector 19. The opposite end of this flexible connector is adapted by means of a suitable coupling 20 for threaded connection with a T fitting 21, which in the present instance is secured to the end of a service pipe 22 the end of which projects from a wall 23. Normally this service pipe 22 is connected in conventional manner to a household water supply system (not

shown), and in the use of the device, the pipe is disconnected from the system. The T 21 carries at its under side a valved fitting 24, the lower end of which is threaded, as indicated at 25, for attachment thereto of a hose or other suitable duct extending to a source of water supply (not shown). It has been found in some instances where the service pipe is badly clogged that insufficient water is obtainable from that source to fill the cylinder 1, and in the fitting 24—25, I have provided a means whereby water from another source may be injected into the cylinder 1 under these conditions for the purpose, in effect, of priming the device. When the cylinder 1 and the ducts, including the open end of the service pipe 22, have thus been filled with water and the valve 24 closed, the device may then be put into operation, as hereinafter described, to clear the service pipe of the obstructing solid materials.

In the present instance and for the purpose of illustrating the mode of attachment and operation of my invention, I have shown the latter connected to the service pipe of a household water system, the pipe as previously set forth being indicated by the reference numeral 22. One of the rods 16 extends downwardly directly below the collar 12, and the shoe 18 thereof rests upon the floor surface. The other rods extend diagonally from opposite sides of the collar and engage the wall 23 at opposite sides of the service pipe 22 as shown. The lengths of these rods are adjusted through the medium of the turnbuckles 16a to afford a tripod frame bearing solidly against the respective surfaces. In order to prevent slippage of the shoes 18, the latter may be provided with soft rubber facings or with short spikes or roughened surfaces.

When applied to the service pipe 22 as illustrated, water from the pipe (or admitted through the valved fitting 24) fills the cylinder 1 in front of the plunger 2 and forces the plunger to the rear end of the cylinder. By then striking the impact tip 4 with a hammer or other suitable implement, heavy impacts may be imposed upon the water column and will be transmitted by this column the entire length of the service pipe 22. The impact, or the vibrations thereby set up, will have the effect of loosening the rust, scale and sedimentary encrustations upon the inner surface of the service pipe. The valve 24 is now opened, which allows water to flow from the service pipe, carrying with it the loosened scale and sediment. This operation is then repeated until such time as the water withdrawn from the valve 24 will flow clear and free from sediment.

It will be noted that in my device and by reason of the insertion of the flexible connector 19 between the cylinder 1 and the service pipe 22, the mechanical blows imposed upon the cylinder cannot be transmitted to the service pipe, whereas the hydraulic blows are transmitted freely and without modification through the liquid medium. It will be noted further that by use of the tripod support, consisting of the three rods 16 connected as previously described, the impact cylinder 1 is solidly supported and braced against the mechanical blows, the latter being transmitted through the rods to widely spaced points on the wall surface. The impact cylinder may thus be operated at maximum efficiency and full advantage taken of the impact imposed upon the plunger 2. In those cases where it may be necessary to limit the force of the hydraulic impact in order, for example, to avoid rupture of relatively weak pipes or vesels to which the device may be connected, the cock 8 may be opened to permit escape from the cylinder 1 of predetermined quantities of the liquid, thus affording a throttling effect limiting the force of the hydraulic blow to any extent that may be required. It will be apparent that the structural details of the device as described above may be modified to some extent without departure from the principle of the invention as defined in the appended claims.

I claim:

1. A device of the stated character comprising in combination a cylinder adapted to be placed in liquid communication with a pipe or other container of liquid, a plunger in said cylinder projecting through one end of the latter and adapted to receive an impact to be transmitted through the said liquid to the walls of the pipe, and means including a flexible connector element attached to the opposite end of the cylinder for establishing said communication whereby the transmission of said impact to the pipe may be effected solely by way of the liquid column.

2. A device of the stated character comprising in combination a cylinder adapted to be placed in liquid communication with a pipe or other container of liquid, a plunger in said cylinder projecting through one end of the latter and adapted to receive an impact to be transmitted through the said liquid to the walls of the pipe, and rigid means attached to said cylinder and adapted for engagement with a remote structure for transferrence to said structure of the mechanical blows imposed upon the cylinder by way of the plunger, said rigid means being adjustable to accommodate said means to variations in the distance of said structure from the operating position of said cylinder.

3. In a device of the stated character, the combination with a cylinder, and a plunger mounted in said cylinder and projecting beyond one end of the latter, of means including a flexible duct for connecting the opposite end of the cylinder to a liquid container, whereby blows imposed upon said plunger tending to advance the latter in the cylinder may be transferred to the body of liquid in said container, said flexible connector preventing the direct transmission of the mechanical blows to the said container, and rigid means connected to said cylinder and adapted for engagement with a supporting structure for bracing the said cylinder against the aforesaid mechanical blows, said rigid means being adjustable to accommodate said means to different characters of supporting structure and to varying distances of said structure from the operating position of said cylinder.

4. In a device of the stated character, the combination with a cylinder, and a plunger mounted in said cylinder and projecting from the rear end of the latter and adapted to receive an impact, of means for connecting the forward end of said cylinder to the interior of a liquid container, a plurality of rods pivotally connected to said cylinder and adapted to project beyond the forward end of, and downwardly from the latter, the outer ends of said rods being adapted for engagement with remote surfaces to support the cylinder and to provide for transferrence of the mechanical blows resulting from said impact to a remote supporting structure.

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