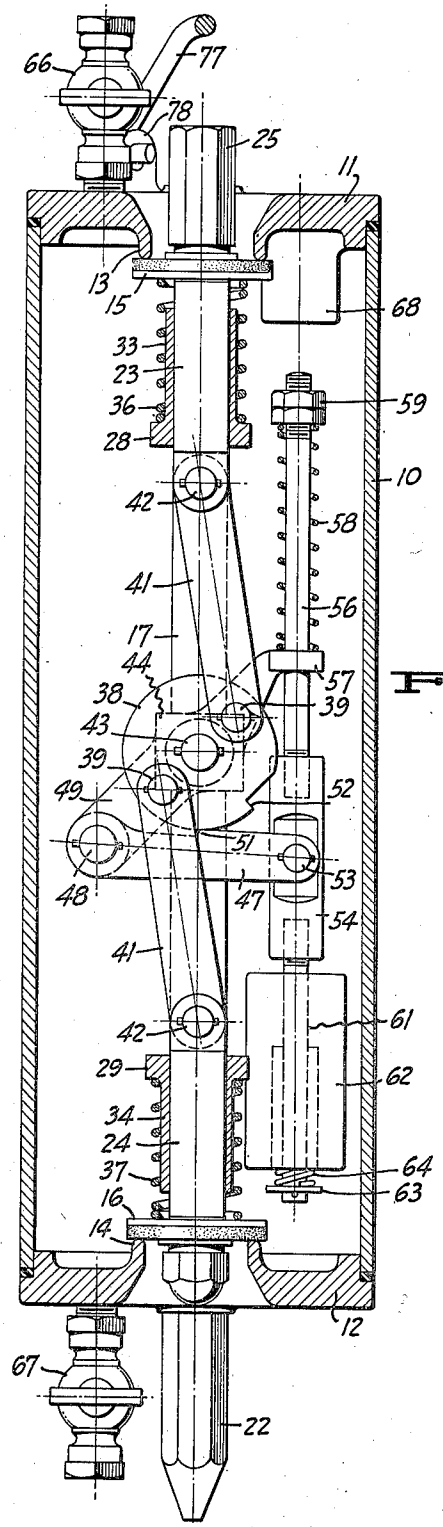
Nov. 6, 1945. A. E. JURS, JR 2,388,548

LIQUID SAMPLING DEVICE

Filed Aug. 4, 1943 2 Sheets-Sheet 1



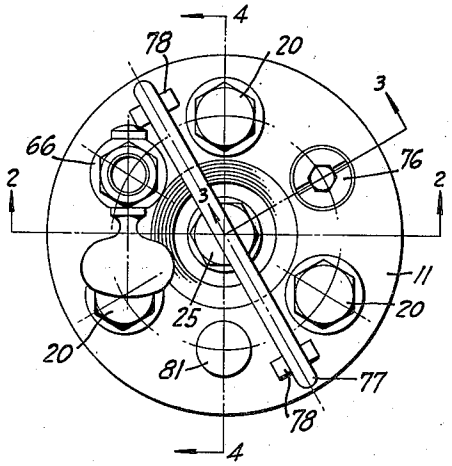
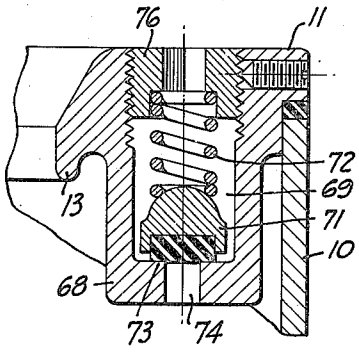


FIG_1_

FIG_2_

FIG_3_



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LIQUID SAMPLING DEVICE

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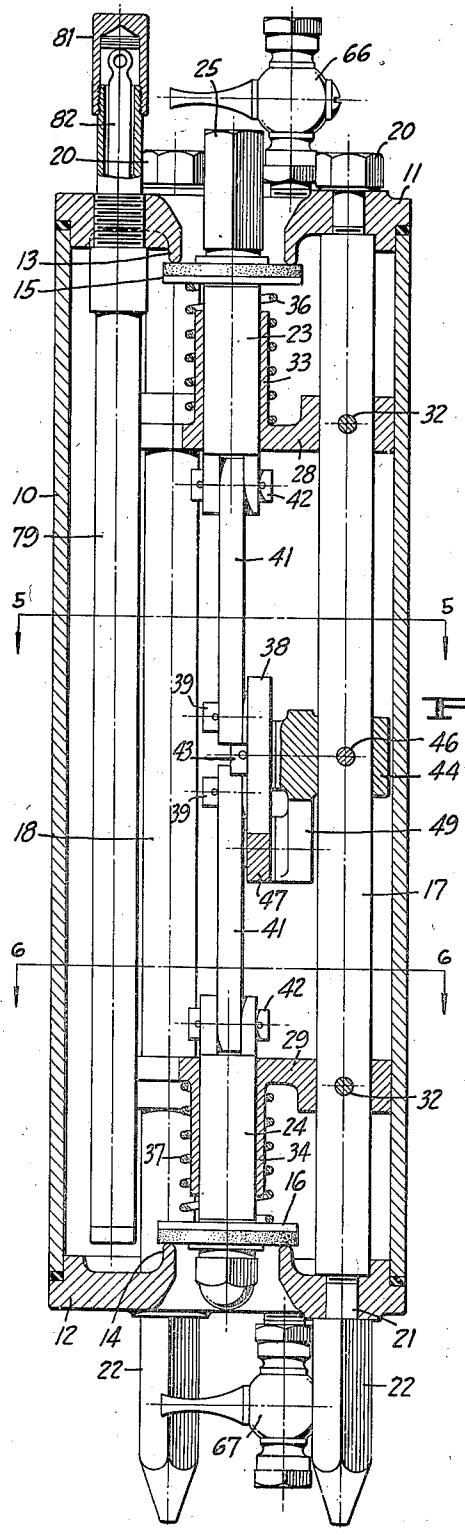


FIG. 5.

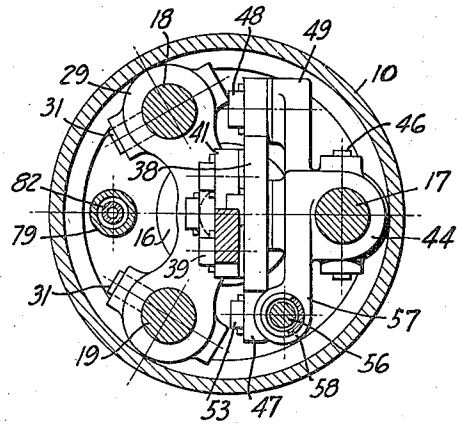
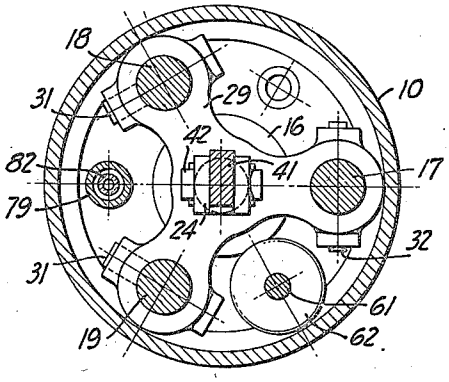


FIG. 4.

FIG. 6.



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UNITED STATES PATENT OFFICE

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LIQUID SAMPLING DEVICE

Albert E. Jurs, Jr., Berkeley, Calif., assignor to Shand and Jurs Company, a partnership

Application August 4, 1943, Serial No. 497,323

7 Claims. (Cl. 137—18)

This invention relates generally to devices of the type adapted to be lowered into a body of liquid for the purpose of taking liquid samples. Such devices have many useful applications, as for example in the petroleum and chemical industries for the taking of samples of oil or other liquids from storage tanks, tank cars, or other containers. In the petroleum industry such devices are frequently referred to as sampling bombs, or when equipped with temperature indicating means, they are frequently referred to as temperature thieves.

It is an object of the invention to provide a device of the above character having improved structural and operating characteristics. More particularly the present invention provides a sampling device which is more reliable and positive in its operation, and one having operating parts mounted in such a manner that they can be readily removed from the enclosing shell for adjustments and for cleaning.

A further object of the invention is to provide a relatively simplified structure having improved means for releasing the valve members to effect a closure, after the device has been lowered into a body of liquid. This improved releasing means operates by a hammerblow action which serves to release a latch mechanism.

Another object of the invention is to generally improve upon devices of the type disclosed in Albert E. Jurs Patent No. 2,198,116.

Further objects of the invention will appear from the following description in which the preferred embodiment has been set forth in detail in conjunction with the accompanying drawings.

Referring to the drawings:

Fig. 1 is a plan view showing a sampling device incorporating the present invention.

Fig. 2 is a side elevational section taken along the line 2—2 of Fig. 1.

Fig. 3 is a cross-sectional detail on an enlarged scale taken along the line 3—3 of Fig. 1.

Fig. 4 is a side elevational view in section taken along the line 4—4 of Fig. 1.

Fig. 5 is a cross-sectional view taken along the line 5—5 of Fig. 4.

Fig. 6 is a cross-sectional view taken along the line 6—6 of Fig. 4.

The device illustrated in the drawings consists of a shell 10 which can conveniently be cylindrical in form. The upper and lower end walls 11 and 12 for this shell have inwardly faced valve seats 13 and 14. Movable valve members 15 and 16 cooperate with the valve seats to either permit liquid to enter and fill the interior of the shell, or to trap liquid within the shell when the valve members are closed. Extending longitudinally through the shell are the tie rods 17, 18 and 19, which serve to carry the internal working parts, as will be presently explained. The upper ends of these rods are shown attached to the end wall 11 by cap screws 20, and the lower ends are similarly secured to the lower end wall 12 by means of studs 21. Studs 21 also serve to mount the lower projecting legs 22.

The valve members 15 and 16 are of the disc type, and are secured to the valve stems 23 and 24. Stud 25 is secured to the outer face of the upper valve disc 15, to facilitate applying manual forces as will be presently explained.

Intermediate their ends the rods 17, 18 and 19 are connected together by the upper and lower spiders 28 and 29. Rods 18 and 19 can be retained to the spiders by suitable means such as the set screws 31, while rod 17 connects with the spiders by means of tapered pins 32, which serve to definitely locate the spiders with respect to rod 17. Spider 28 has a sleeve 33 forming a guide for the valve stem 23, while the spider 29 similarly has a sleeve 34 for guiding the stem 24. Compression springs 36 and 37 surround sleeves 33 and 34 and urge the valve members 15 and 16 in opposite directions towards closed position.

The valve stems 23 and 24 are connected together by simple mechanism for unison movement of the valve members. Thus intermediate the two valve members there is a crank wheel 38 having diametrically opposite crank pins 39. These pins form pivotal connections with the links 41, and the links in turn are connected by pivot pins 42 to the valve stems 23 and 24. Thus rotation of wheel 38 clockwise as viewed in Fig. 2, serves to move valve members 15 and 16 towards open position. In order to mount the crank wheel 38 upon the rod 17, it is shown carried by the journal pin 43, which in turn is secured to the mounting block 44. A tapered pin 46, like the pins 32, serves to retain this block 44 in a definite predetermined position on rod 17.

Latching means is employed to releasably retain the crank wheel 38 in a position corresponding to open position of the valve members, and consists of a latch lever 47 having its one end carried by the pivot pin 48, with this pin in turn being secured to an extension arm 49 of the mounting block 44. A shoulder 51 formed on the upper edge of lever 47 is adapted to engage a shoulder 52 formed upon the periphery of the crank wheel 38.

To provide means for effecting release of the

latch lever 47 by hammerblow action, its free end is shown connected by the pin 53 to the member 54. A rod 56 has its lower end secured to member 54, and is slidably retained by an arm 57 formed as an extension of block 44. A compression spring 58 surrounds the rod 56, and has its lower end seated upon the guide arm 57, and its upper end engaging the lock nuts 59. Another rod 61 is attached to the lower end of member 54, and slidably carried on this rod there is a weight 62. This weight has limited vertical movement between spaced limiting stops formed by the lower end of member 54, and the washer 63 retained on the lower end of rod 61. Normally the weight is carried at a point intermediate the limiting stops by the compression spring 64. When the weight is caused to deliver a blow upon the washer 63, this blow is transmitted to the lever 47 to disengage shoulders 51 and 52, thus permitting rotation of crank wheel 38 in a counterclockwise direction.

In addition to the structural details described above, it is desirable to provide venting valves for manual operation, communicating with both the upper and lower ends of the shell. Cocks 66 and 67 are for this purpose, and communicate through the upper and lower end walls 11 and 12.

It is also desirable to provide a pressure relief valve which will permit escape of liquid from the interior of the shell when the internal liquid pressure exceeds a predetermined maximum value. A simple and suitable relief valve consists of a body 68 formed as an integral part of the end wall 11, and having a bore 69 to accommodate the small valve member 71. A compression spring 72 urges the valve member against the seat 73, whereby when the pressure exceeds a value sufficient to force the valve member from its seat against the pressure of the spring, liquid is free to vent through the valve port 74. The setting of this relief valve can be varied by changing the setting of nut 76 to vary the tension on spring 72.

When in operation the device described above is generally supported from the lower end of a rod or cable, to facilitate its being lowered into a tank. For this purpose the top wall 11 is provided with a simple bail 77 pivotally attached to the lugs 78.

In conjunction with taking samples of liquid it is generally desirable to take a temperature reading immediately after the sample has been withdrawn from the tank. For this purpose the device is provided with a thermometer well in the form of a metal tube 79 having a lower closed end, and extending downwardly from the end wall 11. The exterior end of this tube is closed by the removable cap 81, whereby the inner thermometer 82 can be removed for reading.

Operation of the device described above can be briefly reviewed as follows: Assuming that one wishes to take a sample of liquid stored in a tank, the device is attached to the lower end of a rod or cable, and is then lowered through the roof of the tank into the body of liquid. Assuming that the valve members 15 and 16 are in open positions with the latch shoulders 51 and 52 in engagement, the liquid is free to enter into the shell 10. When it is desired to trap a sample of liquid within the device, lowering movement of the device is abruptly interrupted, or the device jerked upwardly, thereby causing relative movement of the weight 62 toward the lower end of the rod 61. Such relative movement is arrested by striking of the weight 62 against the washer 63, and the force of this blow is transmitted to lever 47, to cause disengagement of latch shoulders 51 and 52. This is immediately followed by turning movement of crank wheel 38 in a counterclockwise direction, with closing of the valve members 15 and 16. After the device has been withdrawn from the tank the sample can be discharged by opening both the cocks 66 and 67. To prepare the device for taking a new sample, the operator presses downwardly upon the stud 25, thereby moving both the valve members to open position with clockwise rotation of crank wheel 38, until the latch shoulders 51 and 52 are again brought into engagement.

It will be evident that the device described above is relatively simple in mechanical construction, and is positive and reliable in its action. Should one desire to have access to the working parts for making repairs or for cleaning, the legs 22 are unscrewed from the studs 21, after which all of the working parts can be withdrawn as an assembled unit, together with the top wall 11.

I claim:

1. In liquid sampling devices of the type adapted to be lowered into a body of liquid, a shell having upper and lower end walls, a valve seat formed on one of the end walls, a movable valve member cooperating with the valve seat, means serving to carry the valve member for movement between open and closed position, spring means for urging the valve member towards closed position, latch means within the shell for retaining the valve member in open position, and means including a weight movably mounted within the shell for disengaging said latch means by hammerblow action, upon abruptly arresting downward movement of the device, said weight being separate from and movable relative to the valve member.

2. In a liquid sampling apparatus of the type adapted to be lowered into a body of liquid for taking a sample, a shell having upper and lower end walls, valve seats formed on the end walls, a pair of movable valve members cooperating with the valve seat, means connecting said valve members for unison movement between open and closed position, spring means for urging said valve members towards closed position, latch means within the shell for releasably retaining the valve members in open position, and means including a weight movably mounted within the shell for disengaging said latch means by hammerblow action, said weight being separate from and movable relative to the valve members, said last means being responsive to abruptly arresting downward movement of the device.

3. In a liquid sampling device of the type adapted to be lowered into a body of liquid for taking a sample, a shell having upper and lower end walls, valve seats formed on the end walls, a pair of movable valve members cooperating with the valve seats, means connecting said valve members for unison movement between open and closed position, said means including a rotatable member, means for biasing said valve members toward closed position with respect to the valve seats, a pair of latch elements mounted within the shell for retaining said valve members in open position, one of said latch elements being formed upon said rotatable member, and means including a weight movably mounted within the shell for disengaging said latch means responsive to abruptly arresting downward movement of the device.

4. In a liquid sampling device of the type adapted to be lowered into a body of liquid for taking a sample, a shell having upper and lower end walls, valve seats formed on the inner faces of the end walls, a pair of movable valve members cooperating with the valve seats, means serving to mount said valve members for movement between open and closed position, a rotatable member mounted within the shell between the valve members, links pivotally connected to said rotatable member and to said valve members, whereby rotation of said member occurs in connection with movement of said valve members in opposite directions between open and closed positions, spring means for urging the valve members toward closed position, a latch arm within the shell adapted to have latching engagement with said rotatable member, when the rotatable member is in a position corresponding to open position of the valve member, a tripping weight within the shell, means for retaining said weight and for permitting limited vertical movement of the same, a spring serving to normally support the trip weight, and means whereby upon abruptly arresting downward movement of the device said weight continues downwardly for a limited distance to apply a hammerlike blow to the latch arm, thereby releasing said rotatable member to cause simultaneous closing of the valve members.

5. In a liquid sampling device of the type adapted to be lowered into a body of liquid for taking a sample, a shell having upper and lower end walls, valve seats formed on the end walls, one of the end walls being removable from the shell, a rigid mounting member extending longitudinally within the shell, one end of said mounting member being fixed to said removable wall, a pair of movable valve members within the shell and cooperating with the valve seats, guide means for said valve members carried by said mounting member and permitting movement of the valve members in opposite directions between open and closed position, mechanism carried by said mounting member and connecting said valve members together for unison movement, spring means for urging said valve members towards closed position, and means likewise carried by said mounting member for releasably retaining said valve members in open position, said last means being operated responsive to sudden arresting of downward movement of the device.

6. In liquid sampling apparatus of the type adapted to be lowered into a body of liquid for taking a sample, a shell having upper and lower end walls, one of the end walls being removable, valve seats formed on the end walls, a rigid mounting member extending longitudinally through the shell and having one end of the same fixed to said removable end wall, valve members within the shell for cooperating with the valve seats, guide means for said valve members carried by said mounting member, mechanism serving to mechanically interconnect said valve members for unison movement between open and closed position, said mechanism being carried by said mounting member, means for biasing said valve members toward closed position with respect to the valve seats, and means likewise carried by said mounting member for releasably retaining the valve members in open position, said last means including a latch mechanism and a movable weight adapted to deliver a hammerlike blow to said latch mechanism to release the same.

7. In a liquid sampling apparatus of the type adapted to be lowered into a body of liquid for taking a sample, a shell having upper and lower end walls, valve seats formed on the end walls, a pair of movable valve members cooperating with the valve seat, means connecting said valve members for unison movement in opposite directions between open and closed position, means for biasing said valve members toward closed position with respect to the valve seats, latch means within the shell for releasably retaining the valve members in open position, and means including a weight movably mounted within the shell for disengaging said latch means by hammerblow action, said weight being separate from and movable relative to the valve members, said means being operative responsive to abruptly arresting downward movement of the device.

ALBERT E. JURS, JR.