United States Patent

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[73] Assignee The United States of America as represented by the Secretary of the Army

[54] LAYOUT FRACTION COLLECTOR

8 Claims, 2 Drawing Figs.

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[50] Field of Search ..... 141/7, 11, 65, 66, 82, 130, 284, 329, 387, 388, 51; 23/259; 73/422 GC, 423 A

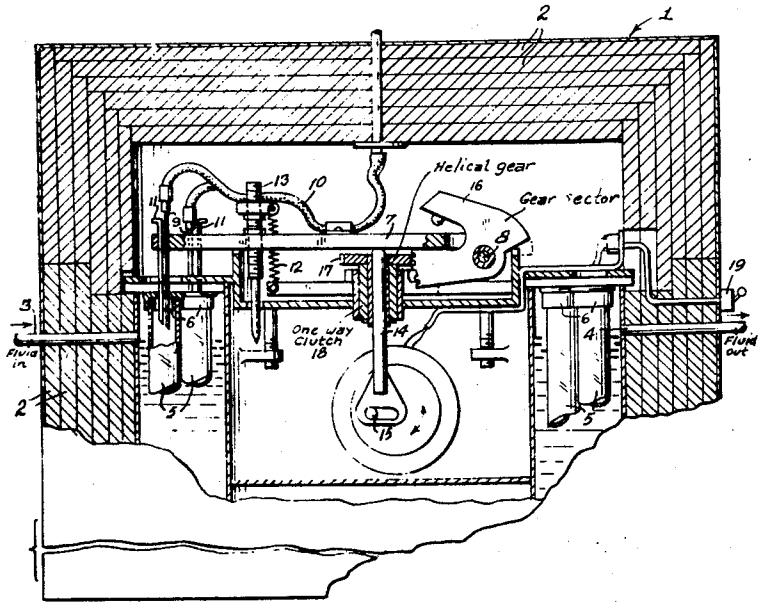
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ABSTRACT: A circular base unit supports a plurality of small containers in a circle about the center. An arm is pivoted on a first pivot to rotate about the center of the base unit and is pivoted about a second pivot to swing up from and down toward the small containers. A hollow needle mounted on the arm vents a container while another feeds fluid to it or extracts fluid from it.



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Fig. 1.

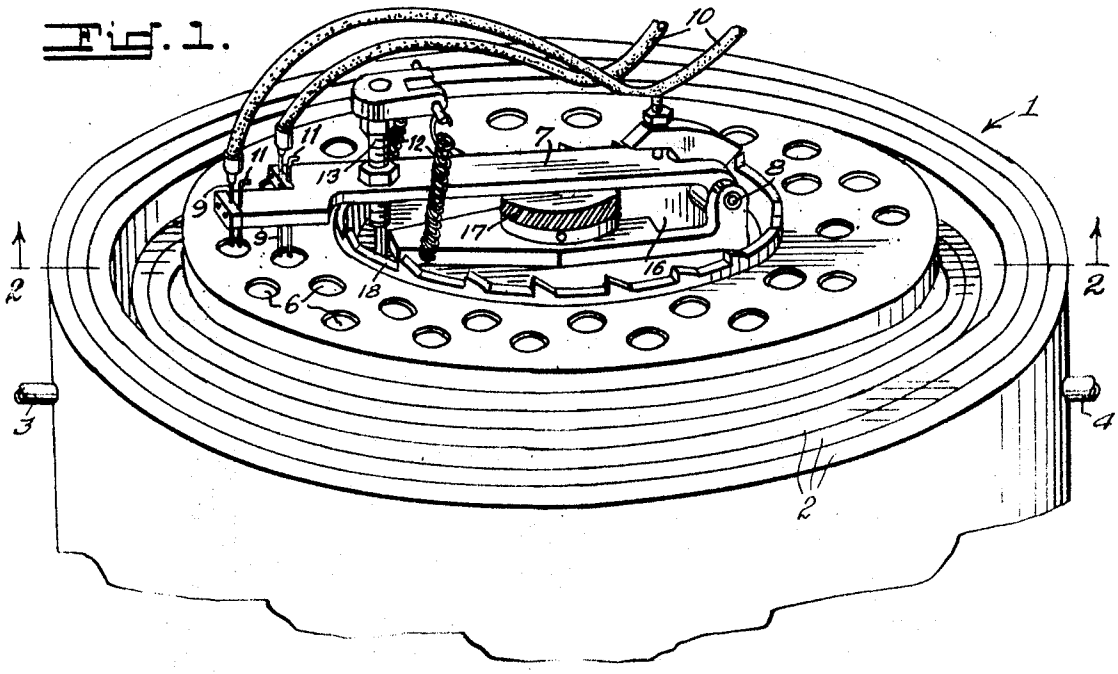
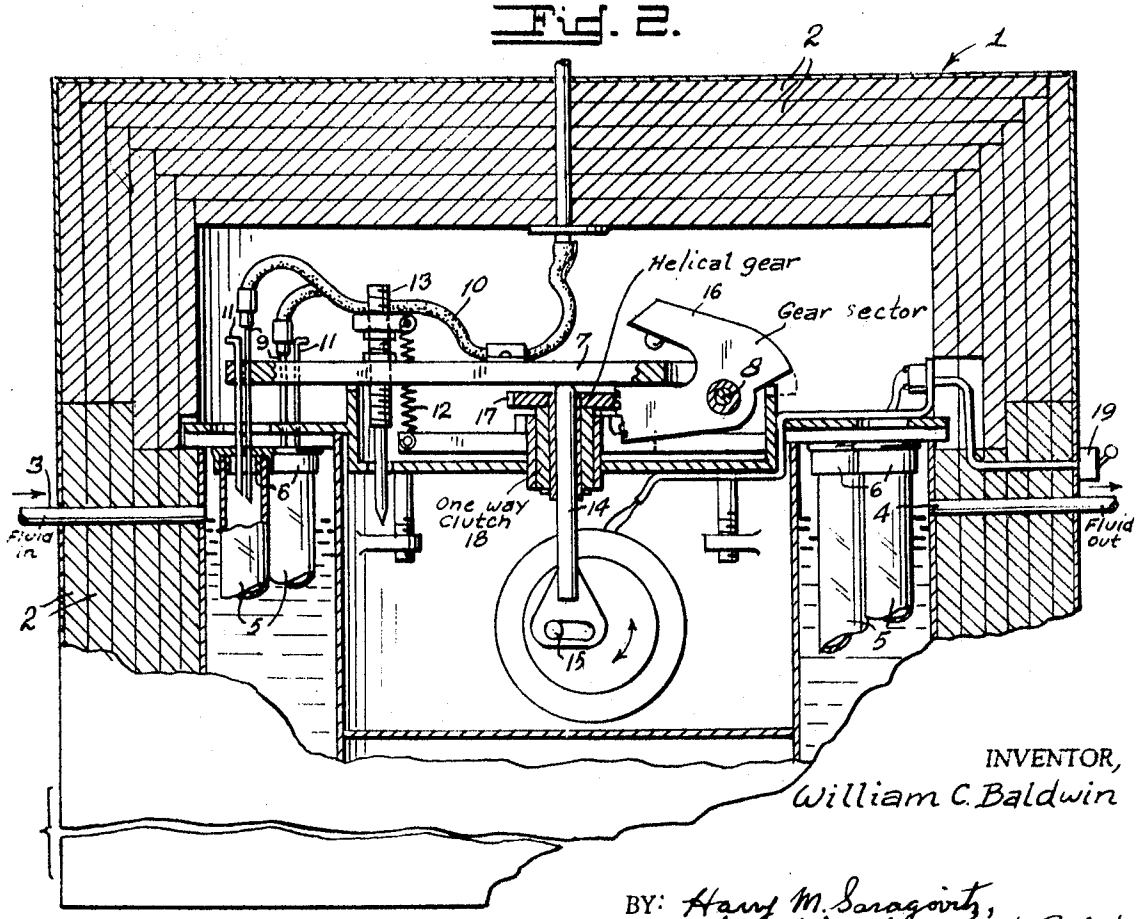


Fig. 2.



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LAYOUT FRACTION COLLECTOR

BRIEF DESCRIPTION

The present apparatus can be used, by remote control if desired, to collect and store a large number of samples of fluid in a plurality of containers. The containers and samples may be maintained cold, warm or hot by circulating fluid therearound at the desired temperature. The samples are maintained in a sterile condition in the containers, which are sealed by rubber gaskets at their tops. These gaskets are punctured as hollow needles pierce them and they automatically reseal in a clean sanitary sterilized condition.

It is an object of this invention to provide apparatus which permits circulation of fluid at a predetermined temperature through a stationary insulated circular base unit, such apparatus supporting a plurality of sample tubes in a stationary manner in a sealed condition, and said apparatus having fluid sample inserting or extracting means which visit the sample tubes sequentially for filling or withdrawal of the contents thereof.

It is a further object to provide such apparatus which may be operated by remote control if desired to avoid possible exposure of operating personnel.

Other objects will become apparent to those skilled in the art as the description progresses.

IN THE DRAWING

FIG. 1 is a perspective view of the invention;

FIG. 2 is a cutaway view along line 2–2 of FIG. 1.

A base unit or receptacle 1 is provided with insulation 2, an inlet 3 and an outlet 4 for circulation of a cooling or heating fluid therethrough. Containers 5 are arranged in a circle about the center of receptacle 1, and there may be two or more circles of containers. Each container 5 is closed by a sanitary diaphragm cover 6.

An arm 7 is pivoted at 8 and carries a hollow needle 9, for each circle of containers 5, for supply fluid from line 10 to the containers, or extracting fluid therefrom if desired. A vent needle 11, also carried by arm 7, is provided for each circle of containers 5.

A pair of springs 12, adjustable by mechanism 13, urge arm 7 downward about pivot 8 to cause needles 9, 11 to puncture self-sealing rubber diaphragms 6. Arm 7 is returned upwardly by plunger 14, reciprocated by eccentric pin 15.

EAch time plunger 14 and arm 7 are raised a gear sector 16 is also raised. Gear section 16 is in engagement with a cog of helical gear 17. Gear 17 is held against rotation in one direction. Therefore, as gear sector 16 is raised along the teeth of gear 17, gear sector 16 and arm 7 are moved one step, to move needles 9, 11 to a new container or set of containers.

As arm 7 and gear sector 8 again descend gear 17 rotates backward one step as permitted by one-way or overrunning clutch 18.

A switch 19, (located at a remote safe point if desired), may be used to energize the drive unit for eccentric pin 15 as desired.

With the foregoing apparatus the operator may actuate

switch 19 repeatedly to fill containers 5 one-after-another, or may use other well-known control apparatus to automatically fill all of the containers in base unit 1. Cold, warm or hot fluid may be circulated through stationary base unit 1 to treat the fluid in containers 5, or to maintain such fluid at desired temperatures.

I claim:

1. Fluid transfer apparatus comprising a stationary substantially circular base unit, a plurality of containers in said stationary base unit arranged substantially equidistant from the center thereof, an arm mounted on a first pivot for rotation substantially about said center and mounted on a second pivot for movement toward and away from said containers, a fluid transfer device on said arm comprising a pair of hollow needles for venting and for transferring fluid, puncturable self-sealing closures for said containers, said needles puncturing one of said closures each time said arm is swung toward a container, said closure automatically sealing itself as the needles are withdrawn, and movement means to move said arm toward and away from said container and to advance said arm and fluid transfer device step-by-step from one container to another.

2. Apparatus as in claim 1 wherein said stationary base unit contains insulation and a fluid for maintaining said containers at selected temperatures.

3. Apparatus as in claim 1 wherein said movement means comprises a motor device and means reciprocable thereby to move said arm in one direction about its second pivot.

4. Apparatus as in claim 3 and biasing means to move said arm in the opposite direction about its second pivot.

5. Apparatus as in claim 4 wherein said biasing means comprises a pair of tension springs mounted on opposite sides of said arm and urging said arm toward a container to press the pair of hollow needles through said self-sealing closures.

6. Apparatus as in claim 1 wherein said movement means comprises a gear with helical teeth and held against rotation in one direction, and means on said arm to engage said teeth to step said arm about said first pivot each time said arm is swung toward and away from said containers.

7. Fluid transfer apparatus comprising a stationary substantially circular base unit, a plurality of containers in said stationary base unit arranged substantially equidistant from the center thereof and having self-sealing closure thereon, an arm mounted on a first pivot for rotation substantially about said center and mounted on a second pivot for movement toward and away from said containers, a fluid transfer device on said arm comprising a pair of hollow needles adapted to transfer fluid to or away from a container each time said arm is swung toward said containers, movement means to move said arm away from said containers, a pair of tension springs mounted on opposite sides of said arm urging said arm toward a container to press the pair of hollow needles through said self-sealing closures, a gear with helical teeth held against rotation in one direction, and means on said arm to engage said helical teeth to step said arm about said first pivot each time said arm is swung toward and away from said containers.

8. Apparatus as in claim 7 and one-way clutch mechanism holding said gear against rotation in said one direction while permitting rotation in the opposite direction.