Oct. 31, 1939. P. L. BINZ 2,178,198

CLEANING DEVICE

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Fig-1

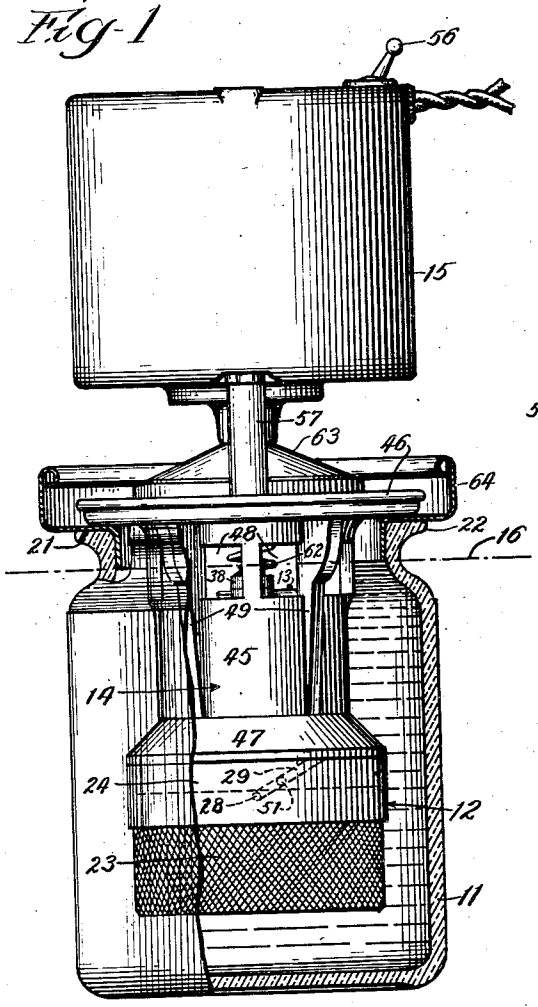
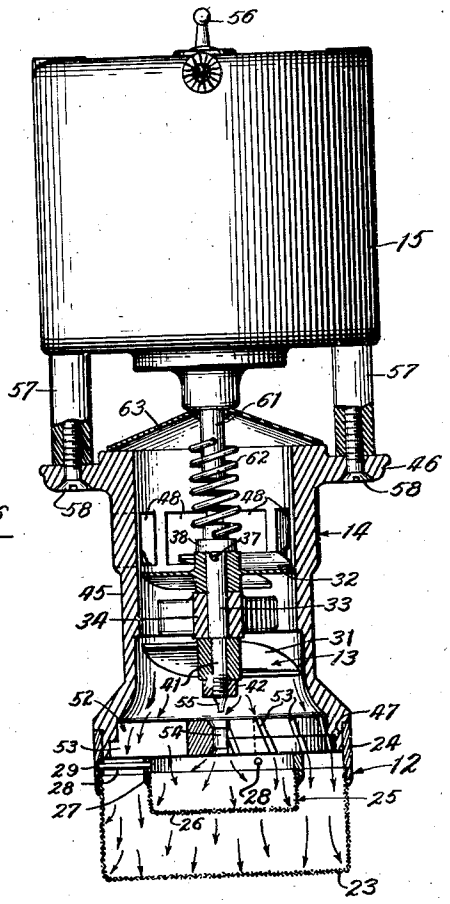


Fig-2



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Fig-3

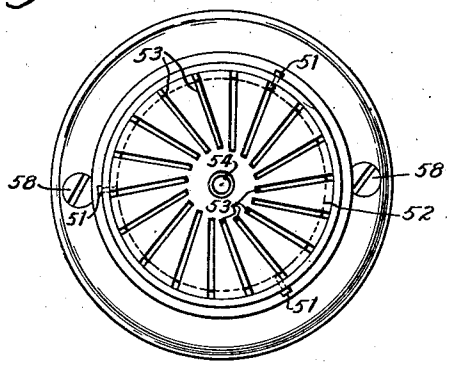


Fig-6

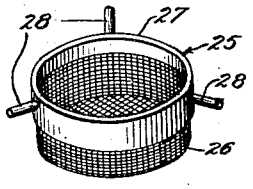


Fig-4

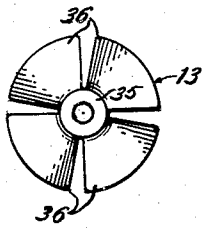


Fig-7

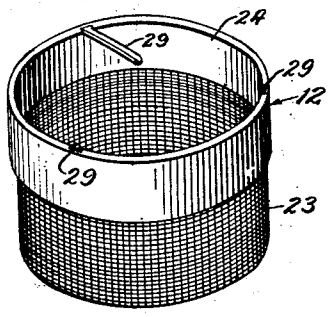
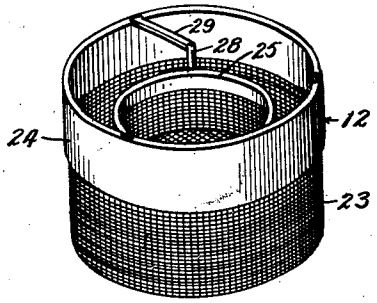


Fig-5



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UNITED STATES PATENT OFFICE

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CLEANING DEVICE

Paul L. Binz, St. Louis, Mo.

Application September 5, 1935, Serial No. 39,319

12 Claims. (Cl. 141—1)

This invention relates in general to a cleaning device and more particularly to such a device which is particularly adapted for cleaning small and delicate articles or objects, such as the mechanical parts of watches or similar devices.

An important object of the invention is to provide such a device wherein the articles to be cleaned will not be subjected to rolling or tumbling action and wherein the cleaning is effected by means of a forced circulation of a fluid or liquid over and about the articles to be cleaned.

Another important object of the invention is to provide such a device in which delicate objects or articles to be cleaned, such as the balance wheel and hair spring assembly of a watch mechanism, may be segregated from the more rugged parts of the mechanism, such as the gears, levers and plates, and cleaned in the same operation.

Other objects such as the economy of construction, efficiency and economy in operation, the interchangeability of certain parts, and the compact arrangement of the parts will be apparent as the invention is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings:

Figure 1 is an elevational view of a device embodying my invention, broken away in part to show certain details of construction.

Fig. 2 is an elevational view, viewing Figure 1 from the right, with certain parts broken away to the plane of the longitudinal axis to illustrate details of construction, the receptacle 11 being omitted and the jet plate 52 being partly shown in elevation.

Fig. 3 is a bottom plan view of the device shown in Fig. 2, with the article carriers removed and illustrating the jet plate.

Fig. 4 is a plan view of a suitable impeller.

Fig. 5 is a perspective view of the nested article carriers illustrated in Fig. 2, as they appear when detached or when ready for attachment, and;

Fig. 6 and Fig. 7 are perspective views of the separate carriers shown assembled in Fig. 5.

To illustrate my invention I have shown a cleaning device, particularly adapted for cleaning the works or mechanism or the several parts of the mechanism of a watch and similar devices, including a fluid receptacle 11, an article carrier 12, and impeller means 13, carried in a body or support frame 14, and actuated by means of a motor 15.

The fluid receptacle 11 may be any suitable container for containing a sufficient quantity of cleaning or rinsing fluid or liquid to cover the carrier, when submerged, to a level indicated by line 16, Figure 1, and is preferably a glass jar of the character illustrated, having an opening in the top thereof for receiving the carrier 12 and body 14, and having an upwardly faced shoulder 21, formed by an annular flange 22.

The article carrier 12 may be any suitable perforate or pervious container in which articles to be cleaned may be positioned and through which a fluid or liquid may pass without undue resistance or obstruction. In the present embodiment I have shown a cylindrical or cup shaped carrier, a cup portion 23 of which is formed of wire mesh or fabric and may be welded or suitably secured to an annular sleeve 24. To provide means for segregating delicate parts from more substantial and rugged parts, during cleaning as above mentioned, a secondary carrier 25, which is or may be of similar construction is provided and arranged for support within the carrier 12, or to form a part thereof in assembly. The carrier 25 illustrated includes a mesh or fabric cup portion 26, similar to that of the carrier 12, and an annular sleeve 27, similarly secured thereto. Laterally disposed pins 28 are rigidly mounted in the sleeve 27 and are spaced approximately one hundred and twenty degrees apart about the sleeve to engage in suitable bayonet slots 29, formed in the sleeve 24, for supporting the carrier 25 within the carrier 12, substantially as illustrated (Fig. 5).

The impeller means 13 may be any suitable device or devices for effecting circulation of fluid or liquid over and about articles arranged in the carrier 12 for cleaning, such as a cleaning fluid for cleaning, another fluid or liquid for rinsing and atmospheric air for drying or for evaporation of the cleaning and rinsing fluids.

In the present embodiment I have shown screw impellers 31 and 32, Figs. 2 and 4, arranged in tandem and secured to a shaft 33, which is rotatably mounted in a bearing 34, formed in the body 14. The impellers 31 and 32, each include a hub 35, and a plurality of radially spaced and suitably pitched impeller blades 36. The hub of the impeller 32 is suitably notched or slotted to receive a drive pin 37, mounted in the shaft 33, and registers against a collar 38, formed on said shaft. The hub of the impeller 31 is pressed onto a portion 41, of the shaft 33, of reduced diameter and is secured thereto by means of a nut 42.

The body or support frame 14, illustrated, includes a central body portion 45, of substantially tubular form, in which the bearing 34 is formed

or arranged, having a laterally disposed annular support flange 46, at one end, and an enlarged annular collar or sleeve 47, at the other end thereof. Above the bearing 34 and below the flange 46, circumferentially disposed openings 48 or ports are formed in the body portion 45, to admit fluid or liquid to the interior of the body and above the impellers 31 and 32, which are pitched and rotated to impell or drive downwardly, Figs. 1 and 2. Suitable reinforcing ribs 49 may be formed on the exterior of the body 45.

The collar or sleeve 47 is turned down to fit and extend into the sleeve 24, of the carrier 12, as shown, (Figs. 2 and 3), and suitable pins 51 are rigidly mounted in the periphery of this reduced portion of the sleeve 47 to engage in the bayonet slots 29, of the sleeve 24, to form a detachable or bayonet connection between the carrier 12 and the body 14.

While the mere circulation of a cleaning fluid over and about the parts or articles to be cleaned will effect satisfactory cleaning thereof, to improve the cleaning efficiency and to reduce the time required for cleaning, I prefer to impart a whirling or circular movement to the cleaning fluid acting coincidentally with the movement thereof over and through the parts in the carrier 12, and to direct the flow of the cleaning fluid toward the parts to be cleaned in a series of jet streams, directed to effect the whirling motion. This is accomplished in the present embodiment by means of a jet plate 52, of circular form which is constructed and arranged to fit within the collar or sleeve 47 of the body 14, substantially as shown, (Figs. 2 and 3), directly below the impeller means 13, and is secured to the sleeve 47 by means of the pins 51, which extend through the sleeve 47 and into the jet plate 52.

A series of substantially radially extending slots 53, may be cut at an angle, as shown (Figs. 2 and 3), to form the jets for imparting increased velocity and rotary motion to the cleaning fluid. A central jet 54, may be provided for improving the cleaning action within the carrier 25. This jet is formed by an aperture, counterbored from both ends to form a short shot flared jet, which operates to produce velocity and distribution. A nipple 55 may extend from the shaft 33, for the purpose of breaking an obvious vacuum pocket.

The power means or motor 15, may be any suitable device for actuating the impeller means 13, such as an electric motor of commercial design, preferably having a handy control switch 56, and wired for connection to a source of E. M. F. as shown. The motor 15 may be secured directly to the body or support frame 14 or to suitable spacers 57 secured to the body of the motor and attached to the flange 46 of the body 14 by means of suitable machine screws 58.

A shaft 61 of the motor 15 is preferably connected to the impeller shaft 33 through a flexible connection which is formed in the present embodiment by a helical spring 62, engaged in suitable apertures in the shafts 33 and 61, at its ends.

A frusto-conical guard or cover 63, may be provided to seal the top of the body 14, and may be centrally apertured to receive the shaft 61, and located thereby.

A suitable guard cup 64, formed of sheet metal or the like, may be positioned over the mouth of the container 11, to catch drippings and return same to the container.

In operation, the carrier 12 and its secondary carrier 25 are separated and arranged in convenient positions for loading as a watch mechanism is taken apart for cleaning. After loading, these carriers are assembled as shown, Fig. 5, and then attached to the sleeve 47, as shown in Figs. 1 and 2, for the cleaning operation.

A cleaning operation, for example, includes submerging the carrier or carriers with the contained articles to be cleaned, in a suitable cleaning fluid, then in a rinsing fluid, and finally drying by means of atmospheric air. When the carrier is submerged in any fluid and when air is to be moved therethrough for drying, the motor 15 is energized by means of the switch 56 to actuate the impellers 13. The impellers are allowed to operate in accordance with the time required for the particular operation being performed and when all operations have been completed the carriers may be detached and suitably positioned on a bench where the watch mechanism may be reassembled.

It will be noted that the device may be conveniently adjusted manually and that any number of containers such as the container 11, may be arranged in convenient positions, each containing a different fluid or liquid, and that the actual cleaning of articles may be accomplished by positioning and operating the cleaning device on the containers in succession and in accordance with the contents thereof.

It is thought that the invention and many of its attendant advantages will be understood from tthe foregoing description, and it will be apparent that various changes may be made in the form, construction, and arrangement of the parts without departing from the spirit and scope of the invention, or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. A cleaning device of the character described comprising, a fluid receptacle, a perforate cup shaped carrier for supporting articles to be cleaned, a supporting body of substantially tubular form arranged to support said carrier at an end thereof and having an annular flange forming a closure for said receptacle and a supporting surface whereby said body is supported on the fluid receptacle, impeller means arranged within said body, and means for actuating said impeller means to circulate fluid through said body, said carrier being detachably connected to and covering an end of said body.

2. A cleaning device of the character described comprising, a fluid receptacle, a supporting body of substantially tubular form having an annular flange forming a supporting surface whereby said body is supported on the fluid receptacle, impeller means arranged within said body, means for actuating said impeller means to circulate fluid through said body, and a plurality of nested perforate carrier devices for supporting and segregating articles to be cleaned having a detachable connection with an end of said body in the path of fluid discharged for the body at said end.

3. A cleaning device of the character described comprising, a substantially tubular body having a laterally disposed supporting flange and circumferential openings adjacent one end thereof and an annular collar at the other end thereof, impeller means rotatably mounted in said body, a perforate article carrier having a bayonet connection with the annular collar of said body, and power means for actuating said impeller means mounted on said body.

4. A cleaning device of the character described, comprising a substantially tubular body

having laterally disposed openings and a supporting flange adjacent one end and terminating in an annular collar at the other end thereof, impeller means and means for actuating same mounted on and arranged to circulate fluid to said other end of said body and through said annular collar, a jet plate arranged to circumfuse the fluid circulated by said impeller means and being mounted in the annular collar of said body, and a perforate carrier detachably connected to the annular collar and covering said other end of said body whereby articles to be cleaned are supported adjacent the jet plate for exposure to the washing or drying action of fluid discharged from said body through said jet plate.

5. A cleaning device of the character described comprising, a container for liquid having an open end, a body supported upon the open end of the container and having a hollow portion extending into the container, impeller means rotatably supported within the hollow portion of said body, means operable to cause rotation of said impeller means whereby liquid from the container is forcibly driven from an opening in the end of the hollow portion of said body, and a perforated article container having a detachable connection with the end of the hollow portion of said body and covering the opening therein wherein articles may be supported for cleaning.

6. A cleaning device of the character described comprising, a body adapted for support upon and to close the open end of a container, said body having a tubular portion arranged to extend into the container and having a discharge opening therein, impeller means rotatably supported within the tubular portion of said body and being operable to drive liquid through the discharge opening therein, means forming intake channels whereby liquid in the container may be admitted to said tubular portion back of the impeller means, and a perforated article container having a detachable connection with the tubular portion of said body and being supported in alignment with the opening therein wherein articles may be supported for cleaning.

7. A cleaning device of the character described, comprising a container for liquid having an open end, a body supported upon the open end of said container and having a tubular portion extending into said container for rigidly supporting and submerging a carrier in which articles may be arranged for cleaning, a basket type carrier having a detachable connection with the tubular portion of said body, impeller means operably mounted in the tubular portion of said body whereby liquid disposed in the container may be forcibly driven through the carrier, and baffle means arranged between the impeller means and the carrier whereby a whirling motion is imparted to liquid as an incident to movement thereof into said carrier.

8. A cleaning device of the character described comprising, a body having a tubular portion adapted to be partly submerged in liquid, a basket type carrier attached to the tubular portion of said body in which articles may be arranged for cleaning, impeller means operably mounted within the tubular portion of said body whereby liquid in which the carrier and the tubular portion of said body are submerged may be forcibly driven through the carrier, and a jet plate arranged between the impeller means and said carrier having radially disposed jet forming slots therein formed to deflect the flow of liquid in a common direction whereby a whirling motion is imparted to liquid as an incident to movement thereof into the carrier.

9. A cleaning device of the character described comprising, a body having a tubular portion adapted to be partly submerged in liquid and having inlet openings near the top thereof, a basket type carrier removably attached to and covering the bottom end of the tubular portion of said body in which articles may be arranged for cleaning, impeller means operably mounted within the tubular portion of said body whereby liquid in which the carrier and the inlet openings in the tubular portion of said body are submerged may be forcibly driven through the carrier, and jet means controlling the movement of liquid into said carrier and being constructed and arranged to circumfuse the liquid flow to effect distribution of cleaning action.

10. A cleaning device of the character described, comprising a container for liquid having an open end, a body supported upon the open end of said container and having a depending tubular portion arranged to extend into the container, a basket type carrier rigidly attached to the end of the depending tubular portion of said body for carrying articles to be cleaned, means for circulating fluid through said carrier and about articles carried therein including impeller means arranged within the tubular portion of said body and to drive liquid therefrom through said carrier, and a circumfusing device arranged between said carrier and said impeller means for controlling the flow of liquid into said carrier to augment the cleaning action thereof.

11. A cleaning device of the character described, comprising a container for liquid having an open end, a body supported upon the open end of said container and having a depending tubular portion arranged to extend into the container, a basket type carrier rigidly attached to the end of the depending tubular portion of said body for carrying articles to be cleaned, means for circulating fluid through said carrier and about articles carried therein including impeller means arranged within the tubular portion of said body and to drive liquid therefrom through said carrier, and a jet plate circumfusing device arranged between said carrier and said impeller means for directing the flow of liquid into said carrier to augment the cleaning action thereof.

12. A cleaning device of the character described, comprising a container for liquid having an open end, a body supported upon the open end of said container and having a depending tubular portion arranged to extend into the container, a basket type carrier rigidly attached to the end of the depending tubular portion of said body for carrying articles to be cleaned, means for circulating fluid through said carrier and about articles carried therein including impeller means arranged within the tubular portion of said body and to drive liquid therefrom through said carrier, and means disposed in the end of the depending tubular portion of said body and between said carrier and said impeller means for imparting spiral movement to the flow of liquid toward said carrier to augment the cleaning action thereof.

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