Aug. 17, 1965 B. L. BRUCKEN 3,200,622

DRY CLEANING APPARATUS

Filed May 24, 1961 2 Sheets-Sheet 1

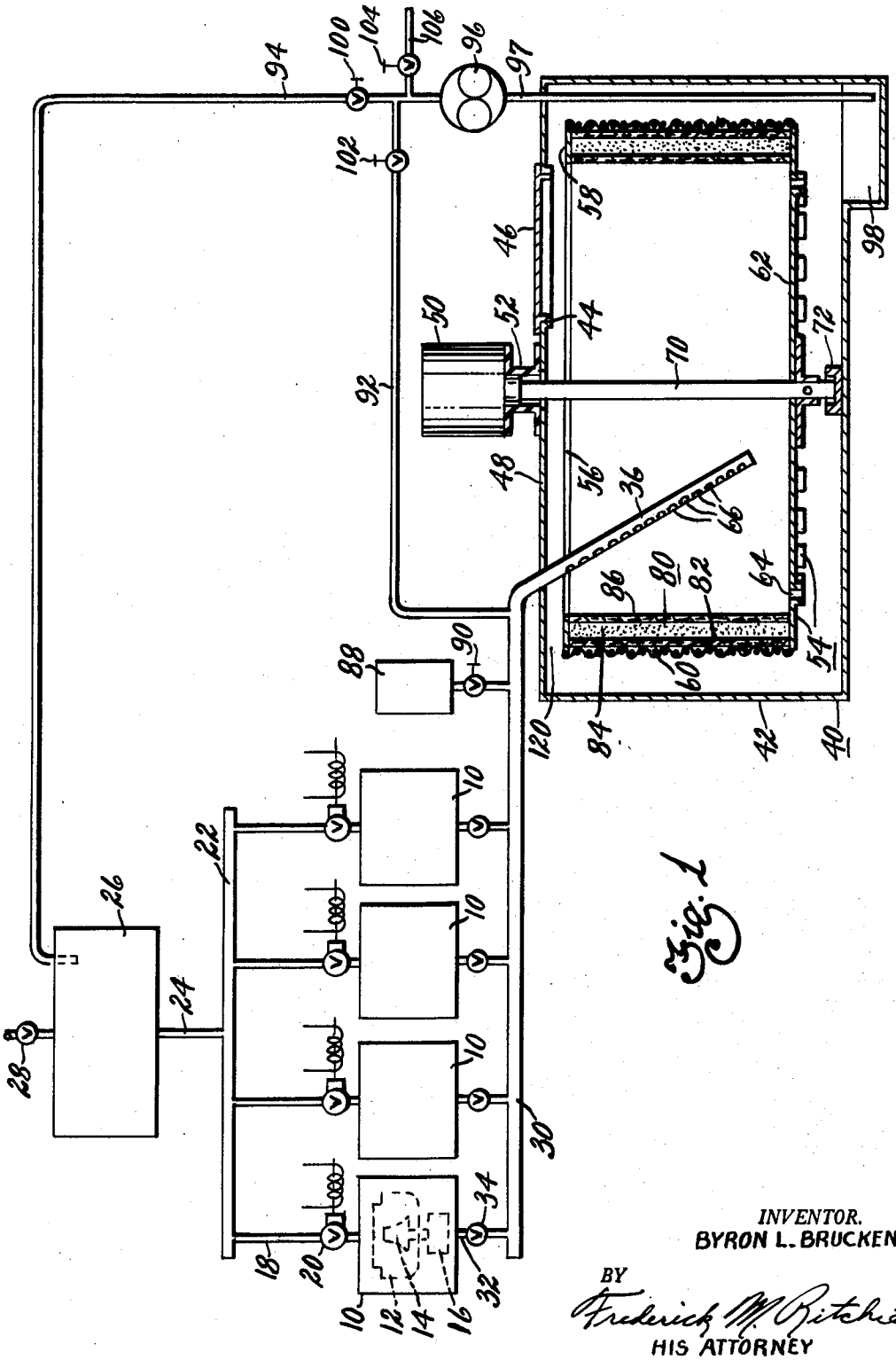


Fig. 1

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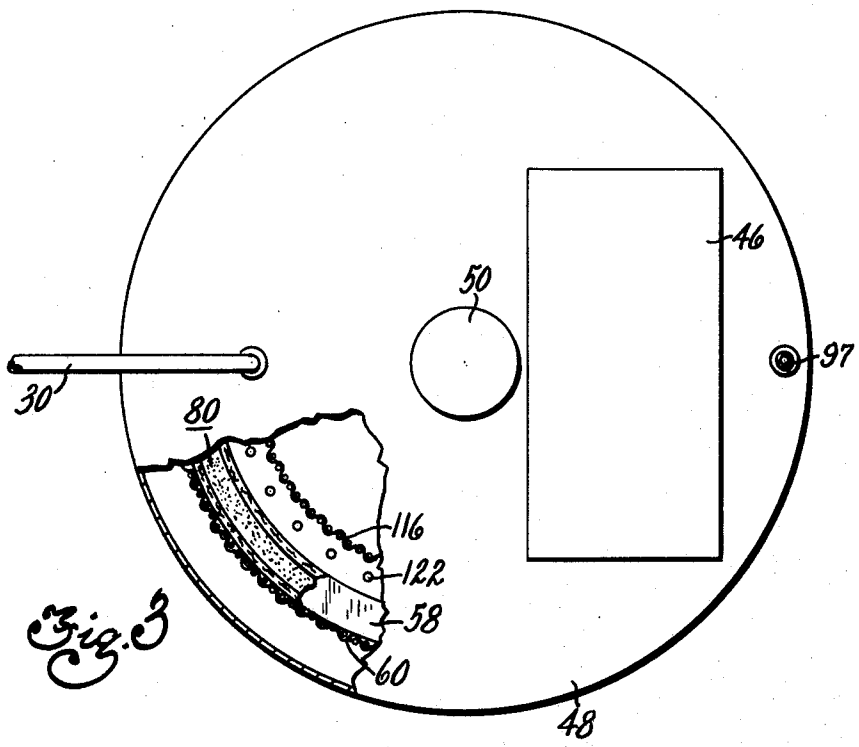


Fig. 3

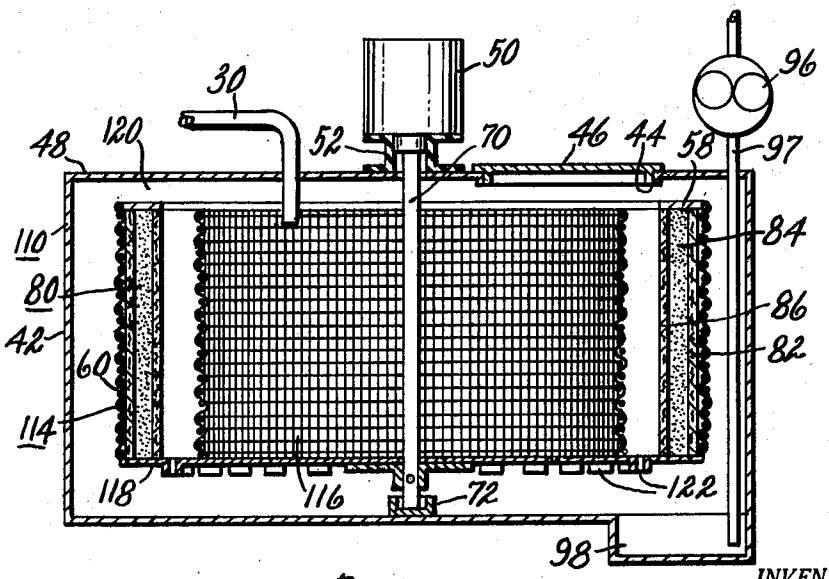


Fig. 2

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DRY CLEANING APPARATUS

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1 Claim. (Cl. 68—18)

This invention relates to a domestic appliance and more particularly to a system for filtering dry cleaning solvent.

In the dry cleaning art, it is necessary to provide means for filtering the dry cleaning solvent in order to maintain the solvent in an uncontaminated condition. Prior art equipment for performing this filtering function has been rather complicated and costly and has required frequent maintenance. Further, considerable technical know-how is necessary to maintain such equipment at top operating efficiency.

Accordingly, it is an object of this invention to provide a simplified filter arrangement for dry cleaning solvent which incorporates a centrifuge for filtering the solvent.

Another object of this invention is the provision of a low pressure solvent system for a dry cleaning apparatus.

More particularly, it is an object of this invention to provide a dry cleaning solvent system with a gravity fed centrifuge incorporating a rotatable wire basket for supporting a built-up filter medium—the solvent being filtered as it moves radially outwardly from the inside of the basket to the outside before returning to the dry cleaning apparatus.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein preferred embodiments of the present invention are clearly shown.

In the drawing:

FIGURE 1 is a schematic representation of a dry cleaning system suitable for use with this invention;

FIGURE 2 is a sectional view of a modified form of the centrifuge filter of this invention; and

FIGURE 3 is a top elevational view of the filter shown in FIGURE 2 with parts broken away to show the centrifuge basket.

In accordance with this invention and with reference to FIGURE 1, a plurality of clothes or fabric agitating machines **10** are shown manifolded together to form a group of dry cleaning machines. Each of the dry cleaning machines **10** could be a conventional washing machine having a vertical spin tub **12** such as shown in the patents to Sisson 2,758,685, issued August 14, 1956, or Clark 2,366,236 issued January 2, 1945. A conventional washing machine of this type, in addition to the spin tub **12**, may include an agitator **14** and an agitating and spinning mechanism shown generally at **16** selectively to spin the tub **12** or oscillate the agitator **14**. Each of the washing machines **10** is connected through a supply or fill conduit such as **18** which overlies the top opening of the spin tub **12**. In each of the supply conduits is located a solenoid actuated valve such as **20** which is operated from a conventional timer mechanism and coin box (not shown). In other words, the valve **20** is opened when the proper amount of money is placed in the coin mechanism of the selected machine **10**. The supply conduits **18** are manifolded into a fill conduit manifold **22** which is in turn connected by way of a conduit **24** with a clean solvent storage tank **26**. Makeup solvent for the storage tank **26** may be supplied the tank through a makeup line **28** overlying the storage tank.

Since the spin tub **12** is adapted for rotation, any solvent which enters the top of the tub may be spun or centrifuged therefrom when the agitate and spinning mechanism **16** is properly energized. Such solvent will be

thrown from the spinning tub and will enter a drain manifold **30** through a drain conduit **32** extending from each machine to the drain manifold. In each of the drain conduits **32** is located a check valve such as **34** to prevent back flow into any one of the non-operating machines **10**. The drain manifold is closed at one end and connects at its other end into an elongated nozzle **36** which distributes contaminated solvent over the face of a centrifuge filter **40** as will be described next following.

The centrifuge filter **40** of this invention is comprised of an outer imperforate cylindrical filter container or casing **42** which includes a top opening **44** closed by an access door **46**. A top wall **48** of the filter container serves to support a motor **50** which is connected by a resilient support **52** to the filter container. Within the container **42**, is located a spin filter basket **54** having a top opening **56** defined by an annular radially inwardly directed ledge **58**. The circumferential or peripheral wall of the spin filter basket **54** is comprised of a reticulated screen **60** which extends between the ledge **58** and a bottom wall **62** of the filter basket, the bottom wall having a plurality of outflow ports **64**. Note that the drain manifold nozzle **36** extends into the spin basket **54** and has a plurality of orifices **66** which are directed in a manner to spread the solvent over the entire inner surface of the screen **60** and also to direct the solvent toward the screen tangentially or angularly in the direction of spin basket rotation. This angular impingement on the rotating basket keeps the jets of solvent from breaking up or disturbing the filter bed.

The motor **50** is connected through a shaft **70** with the bottom wall **62** of the spin basket **54** and thus the spin basket is rotated whenever the motor **50** is energized. A shaft retainer **72** is positioned on the bottom wall of the drum **42** to limit the amplitude of the oscillations of the spin shaft when the basket is spinning with an unbalanced load.

An annular filter bed shown generally at **80** is caused to be built up on the radially inner side of the cylindrical screen wall **60**. Such a filter build-up is conventional in nature and is comprised of a fine filter medium **82**, a carbon filter portion **84** and a coarse radially inner portion **86** which serves as a protective shield to prevent the force of the solvent jets from the nozzle **36** from breaking up the annular laminations of the filter bed. In building the filter **80** the ingredients for the filter may be placed sequentially within a filter slurry container **88** which includes a manually operated valve **90** for admitting the filter slurry to the drain manifold **30**. To effect the rebuilding of a filter bed, a by-pass conduit **92** is connected at one end into the drain manifold and at its other end to a return conduit **94**. A sump pump **96** serves to withdraw filtered solvent through a suction line **97** from a sump or low portion **98** in the filter container drum **42**. A manually operated valve **100** is disposed between the pump **96** and the clean solvent storage tank **26**, a valve **102** between the pump **96** and the by-pass conduit **92** and a valve **104** in a drain or waste conduit **106**.

In building a filter bed on the spin basket **54**, it is necessary first to close the valves or flow control means **100** and **104** and open the valves or flow control means **102** and **90**. The pump **96** is energized to withdraw solvent from the sump **98** where it flows by gravity and to circulate it to the nozzle **36**. Since the valve **90** is open, the filter slurry enters the center portion of the spin basket **54** by way of the nozzle **36** and is distributed or ejected toward the inner face of the screen **60**. The motor **50** is energized at this time to rotate the spin basket **54** so that the filter slurry will be slowly deposited on the radially inner side of the screen **60** in the form of an annular filter bed. When the filter has been built up, the valves **90** and **102** are closed and the valve **100** opened. Thus,

the system is in condition to recirculate filtered solvent from the filter 40 to the storage tank 26.

If it is desired to remove the filter bed 80 from the filter basket 54, the procedure is to deenergize the pump 96 so that the solvent in the system will flow by gravity into the filter container drum 42 and the sump 98 to a point where the screen 60 is substantially inundated in the solvent. The filter basket or screen 60 is then gently agitated manually through the access opening 44 to break up the filter medium and to permit it to form a slurry with the solvent in the drum 42. Then the pump 96 is energized and the valve 104 is opened so that the slurry may be pumped to a remote drain—the slurry leaving the basket 54 by way of the outlets 64.

It should be understood that the filter medium 80 disclosed hereinabove is only by way of example and may be formed of any suitable filter components.

Turning now to FIGURE 2, a modified centrifuge filter 110 is set forth, the same reference numerals being used for equivalent parts. Here also the filter 110 includes the outer generally cylindrical drum 42 which encloses a cylindrical filter basket 114. The basket 114 differs from that set forth hereinbefore in that it includes an inner cylindrical screen 116 supported from the bottom wall 118 to form a lint and button or particulate filter. In such an arrangement, the inner screen 116 minimizes the solvent impact on the built-up filter 80 to effect a longer filter bed life and also prevents sliming on the surface of the filter bed.

Note that both filters 40 and 110 provide a clearance such as 120 between the top of the filter drum and the basket, which effects a by-pass around the filter bed 80 when solvent flows to the spin baskets 54 or 114 faster than it can be filtered through the medium 80. Note also that the basket 114 includes a plurality of outflow ports 122 which permits the spin basket to be drained when the filter bed is being removed.

It should now be seen that an improved filtering arrangement has been effected for a solvent recirculating system which uses a centrifuge in addition to a filter medium for cleaning contaminated solvents.

While the embodiments of the present invention as herein disclosed, constitute preferred forms, it is to be understood that other forms might be adopted.

What is claimed is as follows:

In combination with a solvent storage tank and a dry cleaning machine having a spin tub adapted to receive clothes to be dry cleaned and connected to said storage tank for receiving solvent therefrom, means for agitating in said tub and means for selectively oscillating said agitating means to clean said clothes and for spinning said tub to remove the solvent from the clothes and the tub, a filtration system for said dry cleaning solvent comprising a centrifugal filter for simultaneously decontaminating the solvent of solid contaminants and dissolved contaminants, said filter having a closed, stationary filter drum and a rotatable cylindrical screen basket enclosed in said drum for supporting a filter bed including a radially inner layer of coarse filtering medium, a radially outer layer of fine filtering medium and a layer of carbonaceous medium sandwiched therebetween on a sidewall of said basket, said basket having an open top portion spaced from the top of said drum to permit solvent to overflow the top of said basket when flow through said filter bed is restricted and a plurality of outflow ports on the bottom thereof spaced radially inwardly from said filter bed and in communication with said filter drum, spray means in communication with the spin tub to receive contaminated dry cleaning solvent being removed therefrom and having an outlet end in spray relationship to said filter bed, inner screen means between said spray means and said filter bed to filter lint and buttons from the solvent, said inner screen means being spaced from said filter bed in intercepting relationship to the solvent from said spray means to minimize the impact of said solvent on said filter bed by breaking up the solvent sprayed toward said filter bed, means operative with said spray means for rotating said basket to centrifuge contaminated solvent from the radially inner portion of said basket through said filter bed to the filter drum on the radially outer side of said basket thereby to decontaminate the solvent, pump means connected to said filter drum and said storage tank for returning the decontaminated solvent from said drum to said storage tank, means adapted to contain a slurry of one of said filtering mediums and said carbonaceous medium, and flow control means for periodically connecting said spray means to said slurry containing means for spraying a new filter bed on said basket, said flow control means including means for disconnecting said pump means from said storage tank and for connecting said pump means to said spray means whereby to cause solvent pumped from said filter drum to mix with said slurry and facilitate the building of said new filter bed.

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