

April 26, 1966

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3,247,690

CLOTHES AND FABRIC PROCESSING MACHINE

Filed April 11, 1962

4 Sheets-Sheet 1

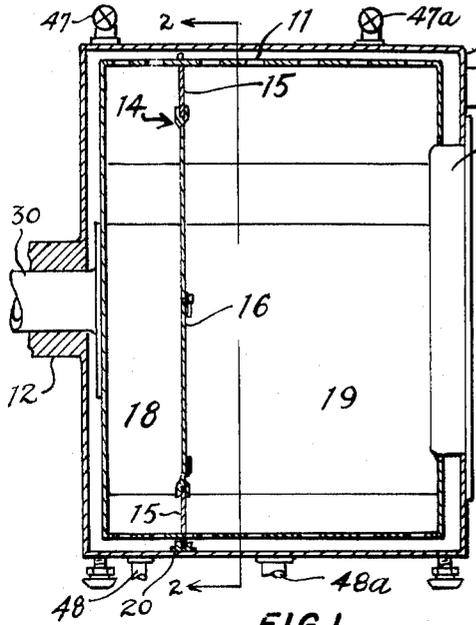


FIG. 1

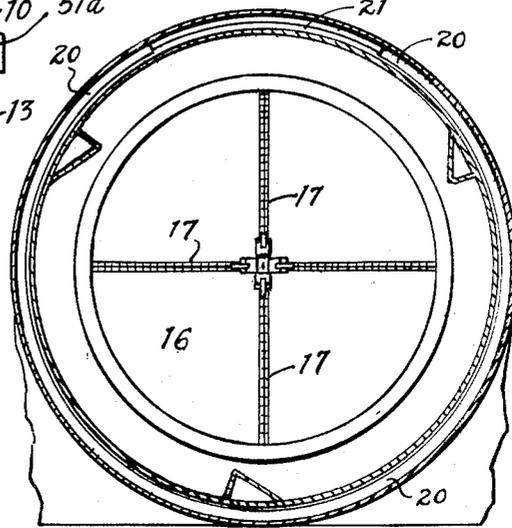


FIG. 2

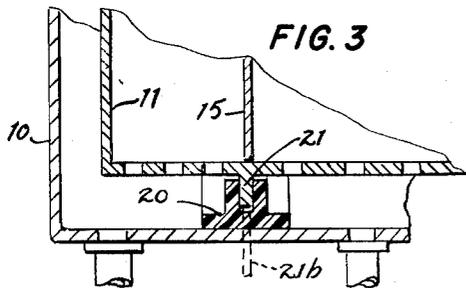


FIG. 3

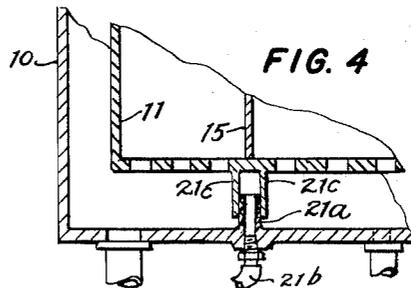


FIG. 4

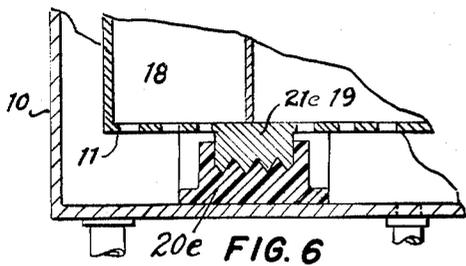


FIG. 5

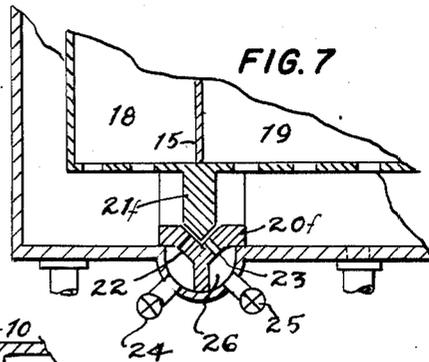


FIG. 6

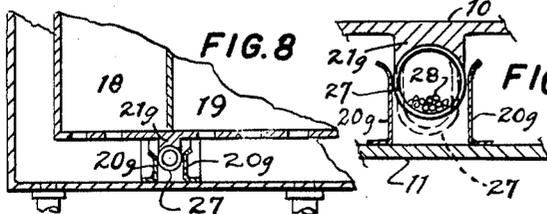


FIG. 7

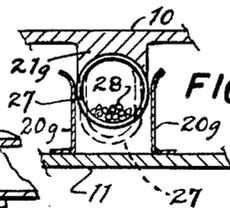


FIG. 8

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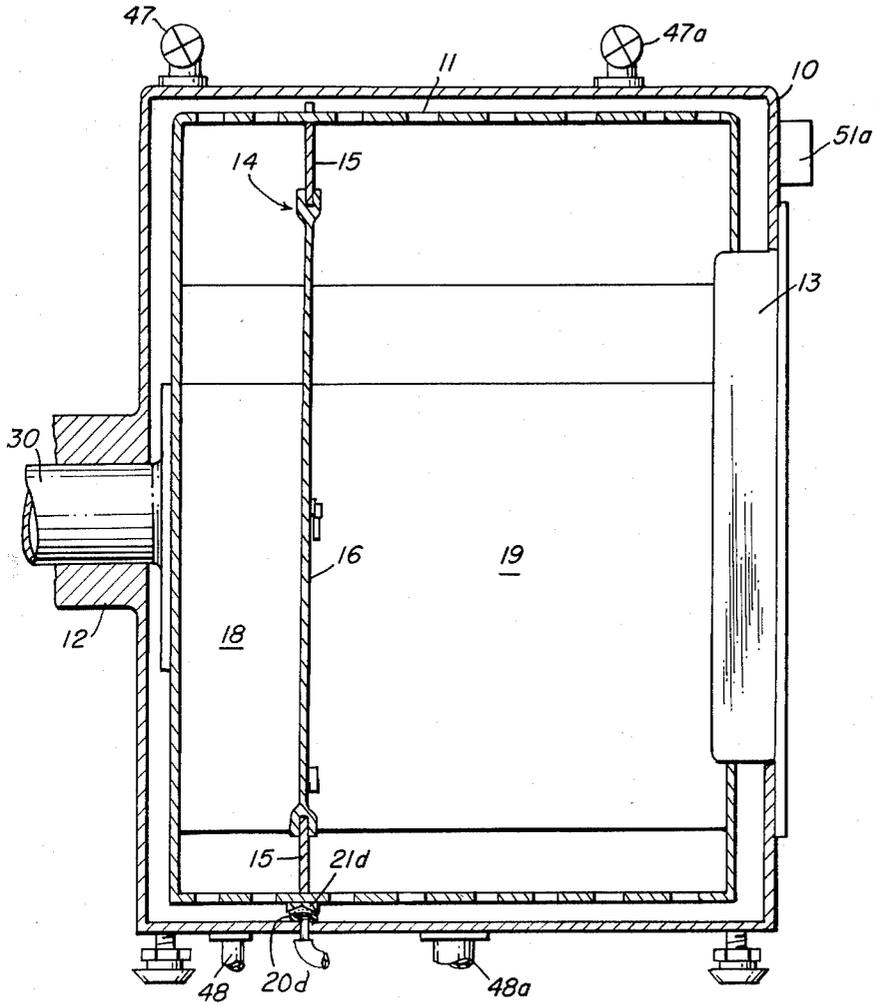


FIG. 5

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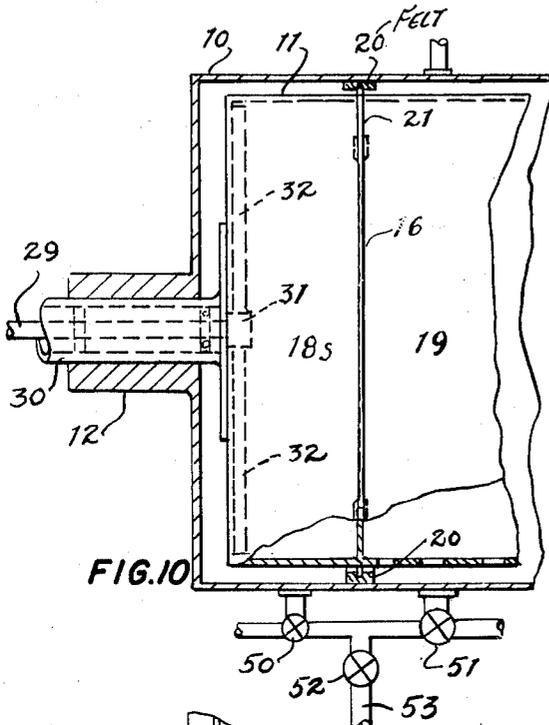


FIG. 10

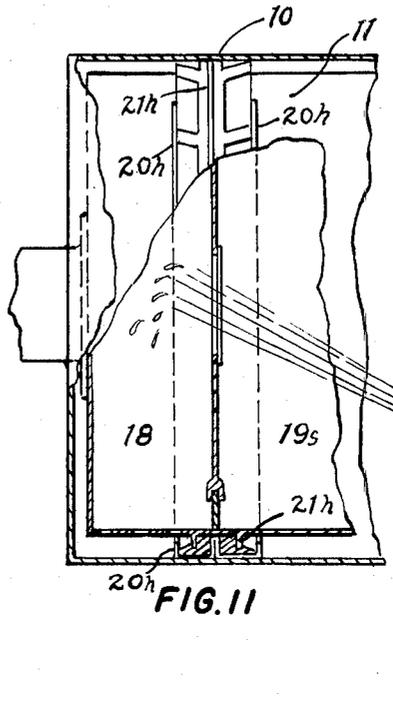


FIG. 11

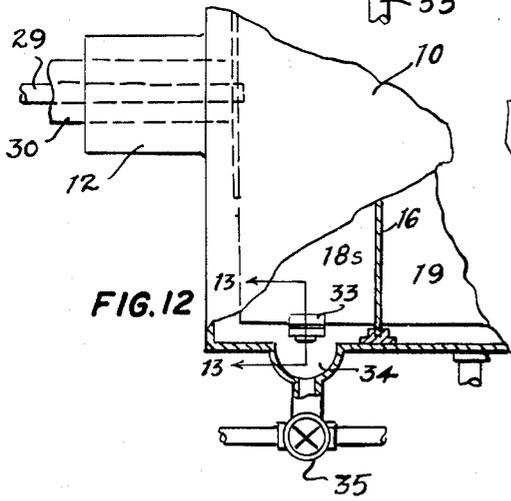


FIG. 12

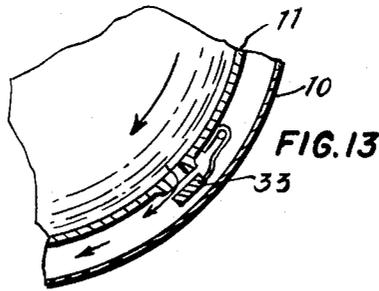


FIG. 13

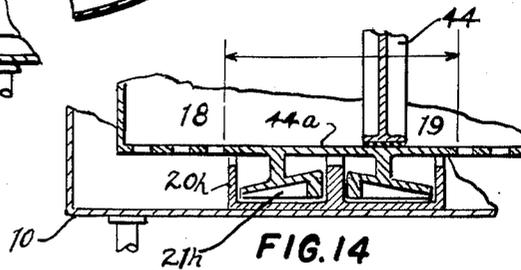


FIG. 14

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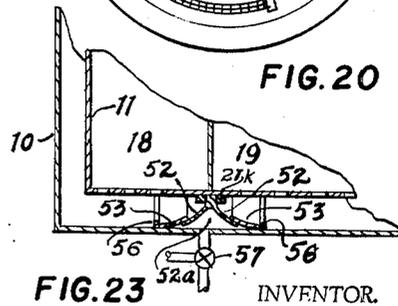
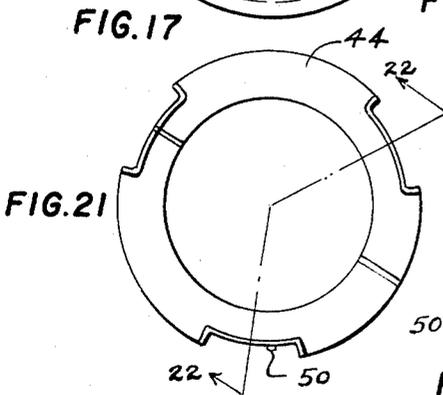
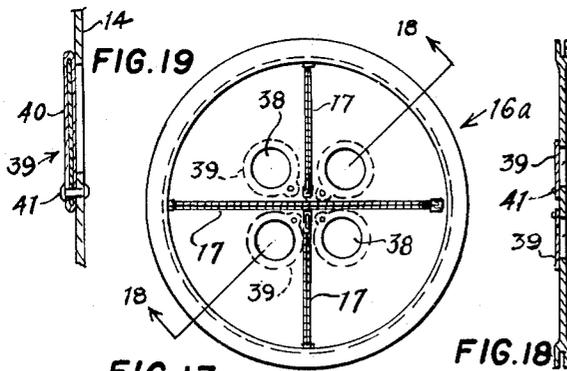
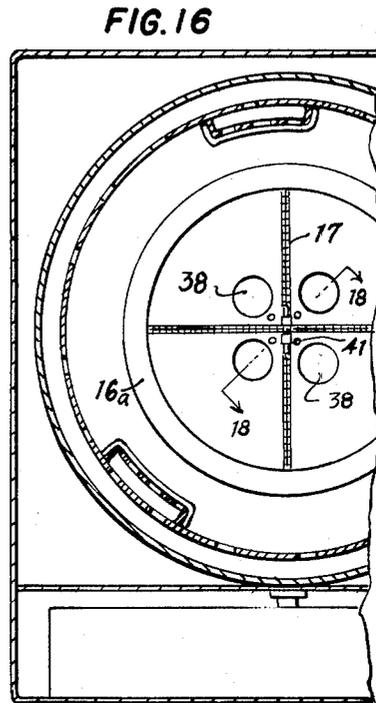
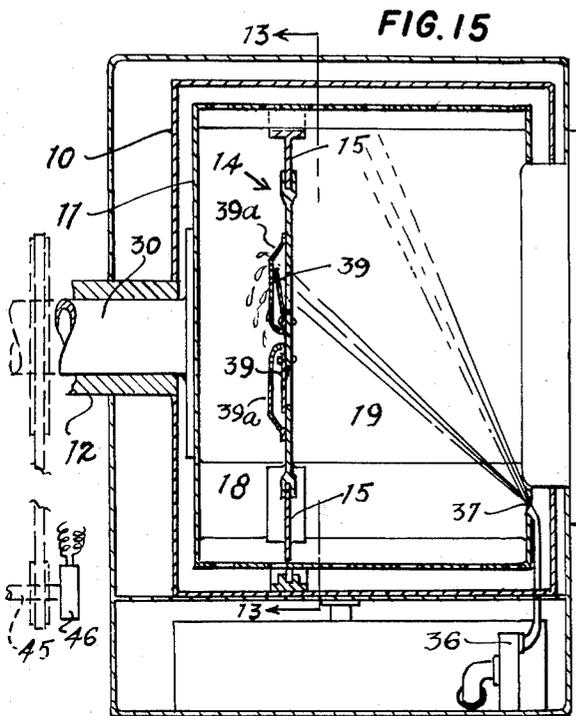
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CLOTHES AND FABRIC PROCESSING MACHINE

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4 Sheets-Sheet 4



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CLOTHES AND FABRIC PROCESSING MACHINE
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 Filed Apr. 11, 1962, Ser. No. 186,806
 4 Claims. (Cl. 68—27)

The instant invention relates to mechanical means for separating both fluids and articles to be handled in one cleaning and washing machine of the type known as the horizontal open drop or open end cylinder for loading simultaneously in one operation. The present invention provides for the introduction, use and extraction of two separate and distinct fluids, such as dry cleaning fluids in one instance and wet washing solutions in another, with means for maintaining these fluids separate both in washing operation and extraction and complete drying operation.

It also provides for the introduction of varied articles, for example, white garments in one compartment of the cylinder and the introduction of colored articles in the other compartment of the cylinder permitting either the use of one solution consisting of one formula for washing both types of articles or the use of dissimilar solutions for dissimilar loads and at the same time preventing damage to white or delicate articles by contact with rough or colored articles. This invention also permits the simultaneous use of washing solutions in one compartment of the cylinder and dry cleaning solutions in the other compartment. It provides means for disposing of the solutions where all-loss is desired and salvaging the cleaning solutions for filtration and re-use or disposing of both solutions where all-loss is indicated. Selective compartments can be used singly, thus saving supplies.

This invention may also be used for the operation of hot air dryers commonly called clothes tumbling machines for air drying the clothes after the usual washing and damp-drying process. It has been generally accepted as necessary for drying certain delicate fabrics and certain synthetic material used in wash and wear garments to use separate treatment, such as lower temperature and a shorter drying cycle than that required for drying garments made of heavier materials, such as cotton or woollens. With my invention these articles can be treated as desired by separating them into two classifications one for each compartment as they are loaded. The temperature as well as the time of treatment is controlled in the usual manner for each compartment by the well known timing and temperature devices now in general use.

The main feature of this invention provides for the use of a seal between the revolving cylinder and the stationary shell to contain the air or washing solution, as the case may be, in their respective compartments.

This application also discloses a novel means of jogging or shaking the clothes free from the inner periphery of the cylinder after high speed extraction for more efficient fluff or tumble drying.

The application of these various principles of my invention to different and preferred types of washing apparatus is shown in the accompanying drawings. I have shown preferred embodiment of my invention, but it is obvious that numerous changes and omissions may be made therefrom without departing from its spirit. For example, while I have described the features as applied to a horizontal type washing machine, the concept may be applied as well to a so-called vertical type machine, top loading type.

FIGURE 1 is a longitudinal section of a conventional machine for article handling, embodying the separation and jogging features of this invention, both inside the cylinder and the shell, and provides for these features during washing, extracting and drying cycles.

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FIGURE 2 is a cross section of the same machine along lines 2—2.

FIGURE 3 is a part section of the machine showing the means used to separate the liquids, in the area surrounding the cylinder within the stationary shell.

FIGURE 4 is a modification of the sealing method, using compressed air supplied as an additional liquid transfer deterrent.

FIGURE 5 shows a sealing means operable by dilating a flexible member with compressed air during the washing or sealing period.

FIGURE 6 is a modification of the sealing method.

FIGURE 7 is another modification of the sealing method.

FIGURE 8 is still another method of liquid seal.

FIGURE 9 is an enlargement of the method in FIGURE 8.

FIGURE 10 is a longitudinal part-section of the machine showing a solid section of the rotating cylinder as one article container, and the separation of the other section of the rotating cylinder having the conventional perforated cylinder for free flow of fluid in and out of the cylinder from the area of the surrounding shell.

FIGURE 11 is a section showing a means of introducing fluid into the remote compartment from the door side of the machine, and also an additional means of sealing.

FIGURE 12 is a part section showing means for extracting fluid from the solid section or compartment of the cylinder to salvage or disposal by centrifugal force.

FIGURE 13 is a section showing the operation of the extracting valve controlled by centrifugal force indicated in FIGURE 12.

FIGURE 14 is also an enlarged section of the sealing structure used in FIGURE 11.

FIGURE 15 is a longitudinal section showing means for introducing fluid to each or both compartments in a re-circulating system.

FIGURE 16 is a cross section showing the construction used to permit fluid to pass through into the remote compartment.

FIGURE 17 is a front view of the partition and sealing plate used in FIGURES 15 and 16 showing flap valves to permit passage of liquid.

FIGURE 18 is a cross section through the sealing plate shown in FIGURE 17.

FIGURE 19 is a cross section through the valve used in the sealing plate in FIGURE 17.

FIGURE 20 shows a screen type of sealing plate as part of the partition without the use of valve means.

FIGURE 21 shows an axially moveable vertical partition.

FIGURE 22 shows a cross section of the movable sealing plate used in FIGURE 21.

FIGURE 23 shows another form of the sealing member to avoid metal to metal contact.

Referring to FIGURE 1, the outer stationary shell 10 is disposed around a rotating cylinder 11 which is supported on trunnion bearing 12 and rotates upon it as an axis. Door 13 provides access to the rotating cylinder for the purpose of loading and unloading articles to be handled. Processing solution sometimes referred to as fluid, air or liquid is introduced to this machine from any outside source by a timer 51a through inlets 47 and 47a to the respective pockets. In this machine, for various purposes drainage is accomplished by centrifugal force, suction or gravity through outlets 48 and 48a in the bottom of the shell, all well known in the art.

The invention also consists in the use of a divider or partition shown in one form in FIGURE 1 at 14 and provided with a metal section or ring 15 which may be made integral with the cylinder 11 or designed to suit machines already built. At the inside circumference of

this ring, a disc of flexible and non-porous material 16 is rigidly fastened to portion 15. This flexible disc is one form of door suitable for use with the conventional zippers 17 set radially to permit convenient loading of articles into compartment 18. After articles are loaded into compartment 18, the zippers are closed separating and sealing off compartments 18 and 19.

For the inlet and outlet of the air the control for each compartment is practically the same for liquid except for minor changes. In the use of air drying in the majority of household type machines the air enters and returns through the rear back-plate of the cylinder the periphery of which is not perforated, the back-plate, therefore, which is perforated for this purpose instead of having separate inlets for each compartment, I provide a novel method of transferring the air or fluids as the case may be, by the use of a pipe or vent leading from one section of the compartment to the other circumventing the seal at the lowest portion of the seal preferably from compartment 18s to 19, and such pipes or ducts being at the lowest portion of the shell as shown in FIGURE 10. The valves 50 and 51 remain open and the valve 52 closed for the above purpose. When either valve 50 or 51 is opened separately or together the material used can be directed through valve 52 as desired; in some cases a two-way valve may be preferred. In FIGURE 5 two outlets are shown, one on each side of the solid portion used with the seal. In place of number 20, a tube member 20d is used for part of the seal. This member is round in cross-section and may be inflatable. It contacts member 21d lightly to form the seal.

Although the balance of water pressures due to practically identical levels on both sides of the cylinder divider and seal minimizes the tendency of liquid to travel from one side to the other, several means are shown for separating and sealing the liquids or air in their respective compartments, both when static and in each of the several cycles of operation.

Since the perforated cylinder revolves in the shell 10, which is stationary and holds the liquid solution for both sections or compartments, it is necessary to further seal off the fluid or liquid used in compartment 18 from compartment 19, there is provided a seal placed on the outside circumference of the cylinder 11. This sealing ring 21 interlocks with a continuous metal channel or circular U-shaped rib or ring 20 on the inside periphery of shell 10. Sealing ring 20 extends either around the shell or about 300 degrees leaving an open portion of 60 degrees more or less spaced equilaterally across and above the top of cylinder 11, as shown in FIGURE 2 and is preferably left open for reasons hereinafter disclosed.

Referring to FIGURE 3, the sealing ring 20 is shown enlarged in its relation to the external cylinder ring 21, the dividing wall 15 and the outer shell 10. Sealing unit 20 may be made of plastic, metal or a flexible material.

FIGURE 4 shows a modification of the sealing ring 21 which extends annularly around the cylinder and rotates with it. A coating member 21a, extending around the lower portion of the shell and fixed to it, provides a further seal with annular groove 21c to prevent liquid flow between compartments 18 and 19. This coating annular projection 21a may be composed of a soft felt-like material. A volume of air pressure is introduced through pipe 21b into the cavity formed by 21b and 21a, which may take the form of a soft felt-like material, resulting in sufficient pressure inside the seal ring 21c to overcome the slight liquid pressure on the outside portions of the seal. It should be noted here that air volume under pressure can be used similarly to advantage as a sealing and liquid separating agent without the use of close fits to seal. In these cases, the compressed air is lost and must be supplied constantly during the sealing required during the washing cycle. It should be noted that where highly volatile and expensive cleaning fluids are to be used, such

as perchlorethylene made in various forms by several manufacturers, the introduction of air as a sealing medium may not be desirable. This special condition could be taken care of by using the same cleaning fluid instead of air in the supply pump, introducing it into the cleaning fluid side (or both sides if for dry cleaning solution only) of the split ring seal as shown in FIGURE 14. Any leakage or overflow from one side of the seal to the other is confined to a limited area such as 26 in FIGURE 7 and separate drainage is provided for thereby separating and making the re-use of the same or different solvents possible.

FIGURE 5 shows a type of seal using contained air pressure. Here, a normally oval-cross sectioned rubber or plastic tube 20d is fastened in close contact and forms a stationary seal with the shell 10. This tube may extend entirely or partially around the interior of the shell. One or more air inlets may be provided for air under pressure to inflate the fixed tube 20d extending to the sealing position shown in the dotted lines. A light friction seal is thus obtained during the washing cycle. Upon release of the air pressure, the tube 20d returns to its normal shape, opening the seal for the free passage of liquid between compartments 18-19. This is especially desirable for fast filling of both sides of the shell with liquid from one inlet source where the same liquid is used for both compartments. It is to be especially noted that on account of the liquid being the same level in both compartments, pressure from one side to the other is in balance, and little or no air pressure is needed to insure separation of the liquid in the two compartments.

FIGURE 6 is still another form of sealing ring showing the rib member 21e having a serrated periphery and introduced into a similarly serrated sealing ring 20e. This construction provides for greater resistance with or without the use of air pressure to leakage of liquid between compartments 18-19 for use where two distinctly different solutions might be used, such as dry cleaning solvent in one and washing solutions in the other.

FIGURE 7 shows additional means of complete separation. Here, projecting rib 21f has a V-shaped periphery which is introduced into a correspondingly shaped section sealing ring 20f. Sealing ring 20f has holes 22 and 23 which drain off any leakage separately into a collector pocket 26 for separate salvage or disposal.

Valves 24 and 25 are provided for the return of such leakage to its respective section or washing compartment, by any well known means such as pump, suction or gravity.

FIGURES 8 and 9 show another type of seal where rib 21g carries a hose-like member 27 on its outer periphery forming a seal against a rigid metallic sealing ring 20g, thus providing a minimum friction seal. Very thin rubber or similar material comprises base 27 and is loaded with any heavy movable material such as buckshot which exerts no distorting force on base 27 while cylinder 11 is rotating at washing speeds of 45 to 50 r.p.m. and where friction is not a factor. However, at extracting speeds approximately 200 r.p.m. or more, the loading material 28 would exert a centrifugal force sufficient to deform tube 27 as shown in FIGURE 9, and reduces friction to a minimum still maintaining a seal although not needed during this short time, as such extracted liquid is directed through drain valve 48 and 48a in FIGURE 1.

FIGURE 10 is concerned with the matter of filling and extracting the washing solution used in a solid compartment 18s in which its portion of the cylinder 11 is not perforated. In this version, pipe 29 is carried into compartment 18f through trunnion 12 and through the hollow portion of shaft 30 connecting at its inner extremity to fitting 31 to which are connected two or more pipes 32 spaced equidistant and extending radially almost to the inside periphery of cylinder 11. The washing solution is thereby introduced by motor and pump under pressure and removed by reversing the pump and substituting suc-

tion or pressure. This means can also be used for the hot air or removing moisture in drying. A supply of hot air for drying can be supplied from any suitable source through a pipe 29 and can be withdrawn after absorbing the moisture either through pipe 29 or through use of the centrifugally operated valves 33 as shown in FIGURES 12 and 13. As in the case of liquid, if both cylindrical sections or pockets are designed with spaced perforations as shown in FIGURES 14-15, then the heated air for drying the clothes is removed by the spinning cylinder and in the case of dry cleaning using solvents, the fumes can be directed to a recovery system.

A novel feature of this invention provides for the following: it is well known that during the high speed spin cycle of the cylinder as in this type machine removing liquid to shorten time for drying with tumbling action, some articles stick to the inner periphery of the cylinder and do not fluff dry properly. By experiment, I have found that dislodging or shaking off such articles from the inner periphery may be done before or during the drying cycle by causing the cylinder to shake or joggle. This is best accomplished after high speed extraction after which the cylinder is revolving at washing or tumbling speed 40 to 50 r.p.m. depending on the diameter of the cylinder. At this point in the cycle, the cylinder is permitted to coast down to approximately 5 to 20 r.p.m., then speed is increased suddenly and this alternating process repeated several times. It is not necessary for this action to increase the speed over washing or tumbling speed. The mechanical means to accomplish the dislodging of the articles from this cylinder consists of either a cut-off of the current to the driving motor by any well known control device commonly used for disengagement of the clutch sufficiently to allow the cylinder to reduce speed from washing to approximately 5 to 20 r.p.m.

As indicated in the instant application by reference to FIGURE 15 where the centrifugal switch 46 is located on drive shaft 45 attached to the motor or from shaft 30 this switch acts only when the cylinder slows to approximately 5 to 20 r.p.m. or any set position below washing speed and is aided by gravity. At this speed, the centrifugal switch which is set to restore electric current to the driving motor, or any other means to produce a sudden on and off condition for a period of 30 to 60 seconds as desired, can be controlled by a time-control setting, well known in the art. The number of jogging periods required is reduced because the tumbling action of the clothes themselves tends to loosen the few articles that are stuck to the cylinder during this period. Such tumbling action can take place before or after the described jogging action.

FIGURE 10 shows valve arrangements using two-way valves 50 and 51, in conjunction with stop valve 52, can be used to dispose of the cleaning and drying fluids either separately or jointly through outlet 53 to reclamation or waste. Such valve arrangements are applicable to any of the units shown in this application.

FIGURES 11 and 14 show another type of sealing ring where the scoop 20h, which is attached to the shell, and rotating ring 21h attached to the cylinder and continuous with it for about 300 deg. circumference, scoops up any leakage that may enter its pockets and throws this leakage out during rotation at top portion of each revolution through the open part where the ring 20 is discontinued as shown in FIGURE 2 thereby returning such leakage to its respective compartment.

FIGURE 11 also shows the use of a jet of water for filling the remote compartment 18 from the open door side of the machine, through a screened opening shown further in FIGURE 15.

FIGURE 12 shows the filling pipe 29 introducing liquid to compartment 18s (in this case of non-perforated construction) as in FIGURE 10 through the hollow portion of shaft 30 but without radial arms 32. Compartment 19 is shown perforated, but could also be non-

perforated, in which case a seal is not needed except when extraction takes place to keep the liquid separated if desired. When compartment 19 is perforated a separate inlet 47a shown as in FIGURE 1, is provided so the liquid is free to enter the compartment 19 through the perforations. One or more spring-loaded valves 33 are placed on the periphery of the non-perforated compartment 18s, which valves remain closed at regular cleaning speeds of 45 to 50 r.p.m. However, at higher speeds for extracting, 200 r.p.m. or higher, valves 33 open by centrifugal force as shown in FIGURE 13 and permit fluid to be ejected centrifugally to grooved portion 34 for salvage to a reclamation unit, or waste disposal through valve 35, which can be a 3-way valve to lead solutions from both sections to a single receptacle as may be desired.

FIGURES 15 and 16 show a conventional machine with cylinder portions 18 and 19 fully perforated and fluid being supplied to both by pump through split nozzle 37, one stream of fluid being directed to the cylinder circumference and the other to the center of sealing disc 16a. Disc 16a is constructed with holes 38 having flap valves 39 facing against the holes 38 on the inside of compartment 18. These valves are made as at FIGURE 15 with a disc of light spring steel encased in rubber or plastic and are riveted to disc 16 at 41. High pressure of washing solution against valves 39 will thus open valve 39 to permit its passage into chamber 18. A mesh screen 39a covers valves 39 to prevent clothes interfering with valve action.

FIGURE 17 shows a front view of sealing disc 16a and the relation of holes 38, valves 39 and zippers 17. These parts are shown additionally in FIGURE 18 in cross section.

FIGURE 20 illustrates another version of sealing disc 16b. Flexible disc 16b is here provided with a circular zipper 42 for loading and unloading chamber 18 and is also provided with a central screen portion 43 which is secured to flexible disc 16b and forms a part of the partition 14. Fluid is directed toward screen 43 under pressure from nozzle 37 (FIGURE 15) and passes through to compartment 18.

This screen need have no closure as being centrally located can remain open at all times, the fluid level in compartment 18 being always below the screen.

FIGURE 21 shows a partition having a split sealing ring 44 which is adjustable longitudinally in cylinder 11 and provides a movable divider so that compartments 18 and 19 can be increased or decreased to accommodate load requirements.

FIGURE 22 shows a cross section through ring 44 along lines 22-22. An important feature in the use of this invention provides for moving the dividing member for the purpose of garment and solution separation. For this purpose the cylinder should not be perforated in its entire length. A solid annular portion, 44a of cylinder 10, shown in FIGURE 14, should be retained so that when the movable divider member is adjusted to increase or decrease the size of the compartment, its outer periphery always bears tightly on a solid portion of the cylinder to insure liquid separation within the cylinder without blocking off the inlet of material from entering cylinder 11 through the remaining perforated part of the cylinder. This member may be locked in place in any well known manner, such as a set screw 50. When no separation of material is desired, the partition 14 can be moved to the rear cylinder 11.

FIGURE 23 shows a sealing member around the annular area between the rotating cylinder and the outer stationary shell, with or without using a coordinating member attached to the shell. This provides for a suitable plastic or cloth-like member 53 to seal the fluid from each compartment by riding in contact with the shell 10. This is held by ring member 21k similar to FIGURE 3, attached to the rotating cylinder. Contact with shell 10 is lightly maintained and thereby eliminates

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a possible source of noise and friction since there is no metallic contact. A rope-like member 56 attached to the top of member 53 and extending around its circumference, may be used for exerting a slightly greater pressure on member 53 against shell 10 to provide for better sealing against leakage. It is to be noted that space 22 is provided between the seal for each compartment to allow drainage through outlet 52a, however, member 52a can also be used to supply a continuous flow of air during the washing cycle, particularly where any slight leakage is undesirable in the drainage thereof such as when synthetics are used for dry cleaning in one compartment and water in the case of wet-wash in the other.

Having described my invention, what I claim and desire to secure by Letters Patent is:

1. A rotary clothes processing machine having a stationary cylindrical shell, a cylinder mounted in the shell and provided with a shaft which turns on the shell, said shell having end walls and one of said end walls being provided with an opening and a door closing said opening, a partition in said cylinder dividing the same into separated clothes processing compartments, an external ring flange on said cylinder, and a sealing ring in said shell which has frictional sealing engagement with said ring flange, said cylinder having openings in its wall and being spaced concentrically from the shell to provide an annular liquid chamber between the cylinder and the shell.

2. A clothes processing machine, comprising an outer shell, a cylinder mounted to rotate in the outer shell and provided with a wall having openings therein, a partition mounted within the cylinder for dividing the same into longitudinal clothes classifying compartments, the cyl-

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inder having a flange ring on the outside of the same corresponding to the position of the partition with the cylinder, and air pressure means for sealing the ring within the shell.

3. In a clothes processing machine comprising: an outer stationary shell; a cylinder mounted to rotate in said outer shell and provided with a wall having openings therein; a partition mounted within said cylinder for dividing the same into longitudinal clothes classifying compartments; sealing means between said cylinder and said shell substantially corresponding to the position of said partition; said partition and said sealing means adapted to prevent the flow of fluid from one of said compartments to the other.

4. The clothes processing machine of claim 3 wherein said sealing means comprises: a projecting member mounted upon the outer circumference of said cylinder and a recessed member mounted on the inner circumference of said shell, said recessed member adapted to receive said projecting member.

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WALTER A. SCHEEL, *Examiner.*