

Jan. 17, 1939.

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2,144,157

DRY CLEANING APPARATUS

Filed Aug. 14, 1935

3 Sheets-Sheet 1

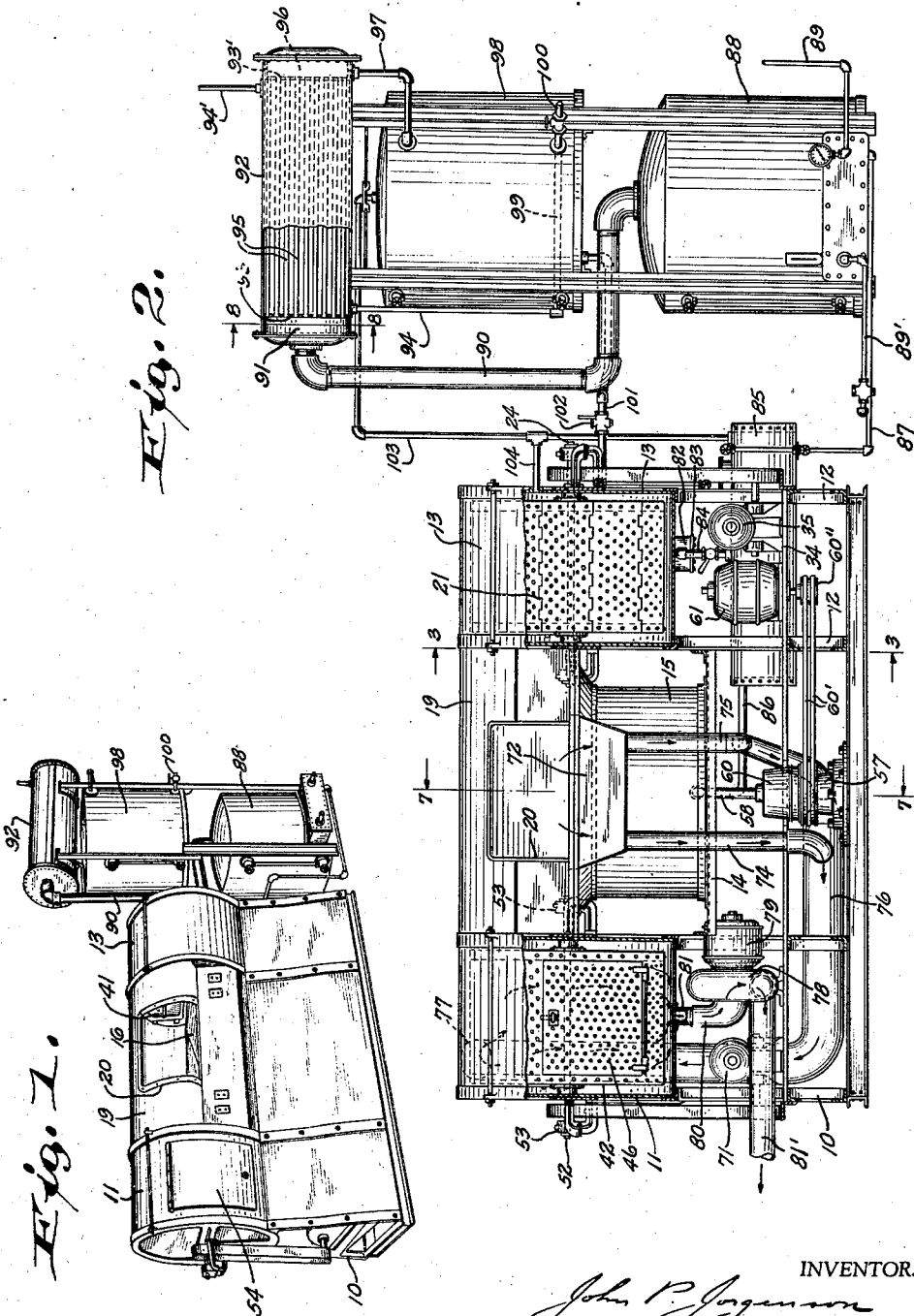


Fig. 2.

Fig. 1.

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3 Sheets-Sheet 2

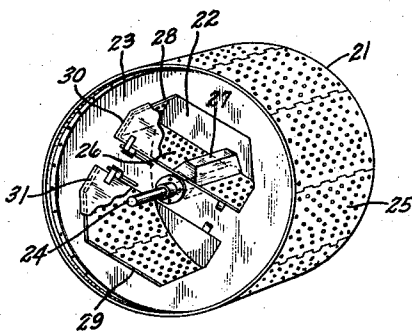
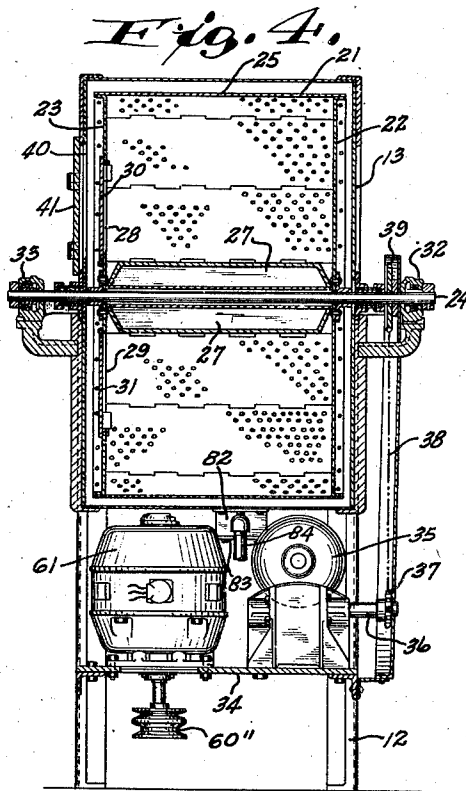
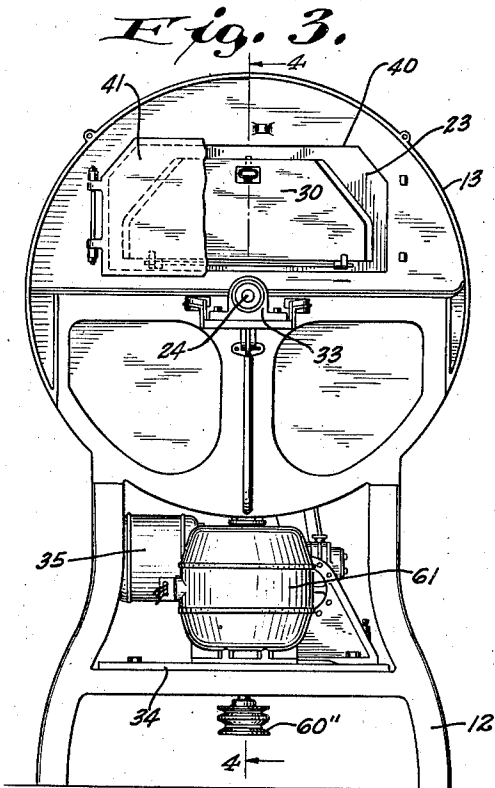


Fig. 5.

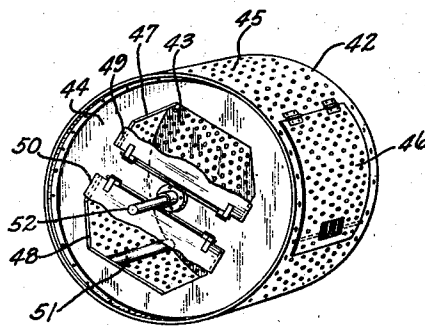


Fig. 6.

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3 Sheets-Sheet 3

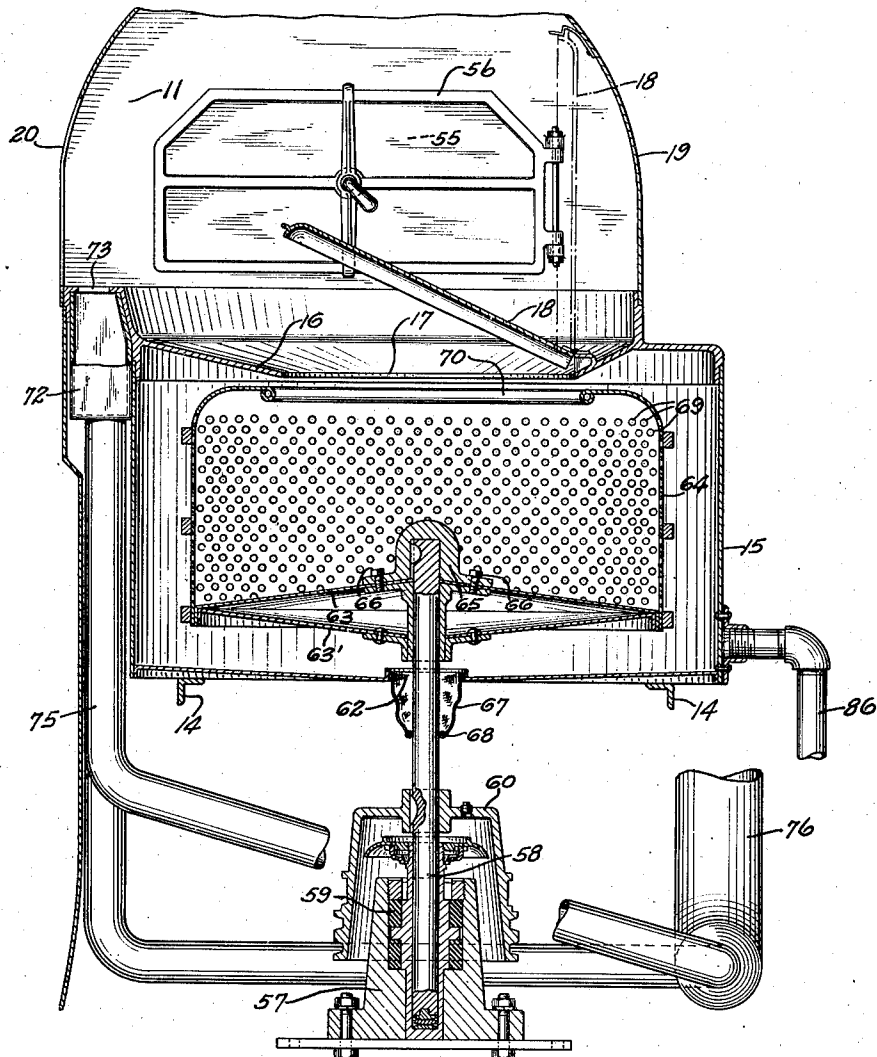


Fig. 7.

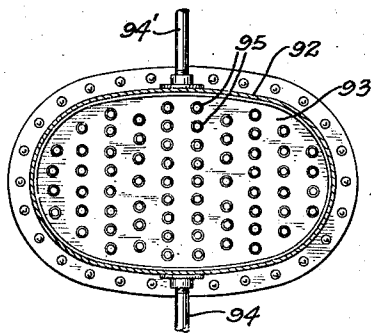


Fig. 8.

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UNITED STATES PATENT OFFICE

2,144,157

DRY CLEANING APPARATUS

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Application August 14, 1935, Serial No. 36,068

7 Claims. (Cl. 68—209)

This invention relates to improvements in dry cleaning apparatus.

In the dry cleaning industry, there are two principal cleaning fluids employed—naphtha and carbon tetrachloride. While naphtha throws off no toxic fumes, it is, nevertheless, objectionable because of its explosive and highly combustible characteristics. Carbon tetrachloride is a fire-proof fluid, is more efficient in cleaning than naphtha, dries more rapidly, and leaves no odor on the garments. The principal drawback to the wide-spread use of carbon tetrachloride, however, has been the fact that during use it emits fumes which are obnoxious to the workmen and which frequently cause illness. It is usual practice in the dry cleaning industry to employ three independent units—a washer, an extractor, and a tumbler, and the garments are transferred at the proper time from the washer to the extractor, and from the latter to the tumbler. During each transfer the garments are necessarily exposed to the room so that the latter soon becomes permeated with the toxic fumes of the carbon tetrachloride. This is objectionable not only from a health standpoint, but also from the standpoint of economy, as the loss of fumes results in appreciable loss of expensive cleaning fluid.

There have been attempts to prevent the escape of fumes into the room by use of a single cylinder which serves the treble purpose of a washer, an extractor and a tumbler, thereby eliminating the necessity of transferring the garments from one unit to another. This method, however, seriously affects the capacity and speed of the work, as when a washing cylinder, mounted on a horizontal axis, is used as an extractor, its speed is limited whereas extractors are usually of special construction for high speed operation on a vertical axis. Where the extracting is done at slow speed heat must be employed to hasten drying and to reclaim cleaning fluid, and heat is objectionable as it causes fading of colors, shrinkage, sets stains, injures furs and celanese products, slightly discolors white flannel materials, and generally deteriorates fabrics. Where a separate high speed extractor is employed, no heat is necessary and the above objections are obviated.

It is therefore one of the objects of the present invention to provide an improved dry cleaning apparatus capable of utilizing carbon tetrachloride wherein a separate washer, extractor and tumbler are employed to effect maximum capacity and high speed operation, and wherein said elements are so constructed and arranged in a unitary assemblage as to permit transfer of gar-

ments from one cleaning element to another, without subjecting the workers to toxic fumes, and without appreciable loss of cleaning fluid.

A more specific object of the invention is to provide a device as above described having an enclosed transfer chamber communicating with the washer, extractor and tumbler, and accessible from the exterior; and suction means operable within said chamber to prevent escape of fumes into the room during transfer.

A further specific object of the invention is to provide dry cleaning apparatus having washer and tumbler cylinders mounted on horizontal shafts and having an extractor interposed between said cylinders and mounted on a vertical shaft, there being a transfer chamber above the extractor, the bottom of which communicates with the extractor, one end of which communicates with the washer, and the other end of which communicates with the tumbler, the washer and tumbler cylinders being specially constructed to permit end loading from the common transfer chamber.

A further object of the invention is to provide an efficient, still arrangement cooperating with the cleaning apparatus to permit reclaiming and re-use of the cleaning fluid.

A further object of the invention is to provide dry cleaning apparatus wherein a "Pullman" type washer is employed which can be loaded from an end and which has a bisecting partition so arranged as to facilitate the removal of garments from the cylinder.

Other objects of the invention are to provide dry cleaning apparatus which has a novel form of tumbler capable of being loaded from an end and unloaded from the front; which as an extractor shaft capable of being readily removed for repair purposes; and which is relatively simple and inexpensive in construction, strong and durable, and well adapted for the purpose described.

With the above and other objects in view, the invention consists of the improved dry cleaning apparatus and all its parts and combinations as set forth in the claims and all equivalents thereof.

In the accompanying drawings illustrating one complete embodiment of the preferred form of the invention in which the same reference numerals designate the same parts in all of the views,

Fig. 1 is a perspective view of the improved dry cleaning apparatus;

Fig. 2 is a front elevational view thereof, housing parts being broken away to show interior mechanism;

Fig. 3 is an enlarged sectional view taken on line 3—3 of Fig. 2;

Fig. 4 is a sectional view taken on line 4—4 of Fig. 3;

Fig. 5 is a perspective view of the washer cylinder alone, parts of the doors being broken away;

Fig. 6 is a perspective view of the tumbler cylinder alone, parts of the doors being broken away;

Fig. 7 is an enlarged sectional view taken on line 7—7 of Fig. 2, parts being broken away; and Fig. 8 is an enlarged sectional view taken on line 8—8 of Fig. 2.

Referring more particularly to the drawings, suitable frame-work 10 at one end of the device supports an elevated tumbler housing 11. At the other end of the device, similar frame work 12 supports a washer housing 13. Horizontally disposed frame-work 14 extending between the frame-work 10 and 12 supports an extractor housing 15, and the upper wall 16 of the extractor housing is dished as shown in Fig. 7 and provided with an approximately central opening 17 adapted to be closed by hinged door 18 which swings rearwardly. Above the extractor is housing 19 for a transfer chamber. Said housing has its lower edges in sealed connection with the upper portion of the extractor housing, has one side portion in sealed connection with the side of the washer housing 13, and has the other side in sealed connection with the side of the tumbler housing 11. The front of the transfer housing is formed with an opening 20 (see Fig. 1).

A washing cylinder 21 is formed of end members 22, 23 which are mounted in spaced relation on a shaft 24. The periphery of the cylinder is formed of apertured metal 25 which may be of sectional construction as shown. The interior of the cylinder is divided into two parts by means of a bisecting apertured partition 26, and each side of the partition has a projecting rib 27 mounted thereon. The end wall 23 is formed with two openings 28, 29, one of which communicates with a chamber on one side of the partition 26 and the other of which communicates with a chamber on the other side of said partition; said openings are normally closed by hinged doors 30 and 31, respectively.

The washing cylinder shaft 24 has its ends journaled in the bearings 32, 33 so that the cylinder is supported for rotation within the washer housing 13 (see Fig. 4).

Below the washer housing 13 is a horizontal platform 34 on which is mounted an electric motor 35 which, through suitable gearing, drives a shaft 36 carrying a sprocket wheel 37. A sprocket chain 38 connects the sprocket 37 with another sprocket wheel 39 rigidly mounted on the washer shaft 24.

The inner end of the washer housing 13 is formed with an opening 40 (see Fig. 3) which is adapted to register with one of the openings 28, 29 of the washer. The opening 40 also communicates with the transfer chamber so as to permit access from said chamber to one or the other of the compartments of the washer. The hinged door 41 is adapted to close the opening 40.

A tumbler cylinder 42 (see Fig. 6) is generally of similar construction to the washer, but does not have a partition corresponding to the washer partition 26. Said tumbler comprises end walls 43, 44, and an apertured peripheral wall 45 having a peripheral door 46. The end wall 44 is formed with openings 47, 48 similar to openings

28, 29 of the washer, and said openings are adapted to be closed by hinged doors 49, 50. On the inner surface of the peripheral wall 45 there are preferably employed a plurality of spaced transverse ribs 51.

The tumbler shaft 52 has its ends suitably journaled in bearings 53 so that the tumbler cylinder can rotate in the tumbler housing 11. The tumbler housing has its front portion formed with a door 54 with which the door 46 in the periphery of the tumbler can be registered to permit removal of garments from the front of the dry cleaning apparatus. The inner end wall of the housing 11 is formed with an opening 55 identical to the opening 40 of the washer housing which opening is normally closed by the door 56 (see Fig. 7). This permits loading of the tumbler from the transfer housing and unloading of the tumbler through the door 54 to the exterior.

Below the extractor housing 15 is a bearing 57 within which the lower end of an extractor shaft 58 is journaled. The bearing 57 is constructed in any conventional manner with cushions 59 to provide for cushioned side play during rotation of the extractor. Above the bearing 57 an inverted cup-shaped pulley 60 is rigidly mounted on the shaft 58 and said pulley is connected by V-belts 60' with a pulley 60'' rigidly mounted on the drive shaft of a motor 61, the latter being supported on the platform 34 below the washer.

The upper end of the shaft 58 extends through an opening 62 in the bottom of the extractor housing 15 and through bottom plates 63 and 63' of the extractor cylinder 64. The extreme upper end of the shaft is keyed to a cap member 65 and said cap member is removably secured by bolts 66 to the plate 63. A flexible shield 67 surrounding the shaft 58 is secured to the edges of the opening 61 and to a ring 68 which loosely surrounds the shaft. This prevents escape of fumes through the opening 61 while permitting the cushioned side wobble of the extractor during rotation. The side walls of the extractor are apertured as at 69 and the upper end is provided with a large inlet opening 70 in registration with the opening 17 of the housing. Thus by opening the door 18, garments within the transfer housing can be pushed directly into the extractor cylinder.

It sometimes becomes necessary to remove the extractor shaft 58 in order to replace the rubbers 59 in the bearing 57 or to tighten the spindle. Inasmuch as it is undesirable to have to knock down the machine in order to perform this replacement or adjustment, the present invention makes it possible to remove the extractor shaft by merely loosening the bolts 66 whereby the cap 65 and spindle 58 can be lifted upwardly through the opening 70 of the extractor cylinder.

The tumbler cylinder is driven by an electric motor 71 from which power is transmitted to the tumbler shaft by means of sprocket wheels and a sprocket chain in the same manner as the washer is driven by the motor 35 and which is fully illustrated in Fig. 4.

An important feature of the invention resides in the mechanism for preventing escape of fumes from the door 20 during transfer of garments from one cleaning unit to another. Referring more particularly to Figs. 2 and 7, it will be seen that in front of the extractor housing is a suction header 72 communicating with an opening 73, which opening extends along the lower edge of the transfer housing opening 20. From the 75

suction header are two conduits 74 and 75 which bend over to the rear of the apparatus and connect with a larger conduit 76. The latter extends upwardly behind the tumbler and communicates with an opening 77 in the rear of the tumbler housing. A suction fan 78 of any conventional design driven by an electric motor 79 is mounted below the tumbler housing and said suction fan communicates through a duct 80 with an opening 81 in the bottom of the tumbler housing. An outlet duct 81' from the suction fan may extend to any convenient point of discharge. When the suction fan is operating, it will be seen that a curtain of suction is created in front of the opening 20 so that any fumes having a tendency to travel out of said opening will immediately be pulled downwardly into the suction header and into the pipes 74, 75 and thence into the tumbler housing. This suction travel is indicated by arrows in Fig. 2 through the apertures in the tumbler cylinder to complete the removal of the cleaning fluid from the garments, and the fumes are ultimately discharged from the outlet 81'.

Communicating with an opening in the bottom of the washer housing 13 is a button trap 82 having a removable lower plate 83. A liquid conduit 84 extends from the button trap to a sump tank 85 and is adapted to drain used liquid from the washer housing to the sump tank, there being a suitable valve in the conduit 84.

Thus, any buttons or heavy foreign matter is deposited on the bottom plate of the button trap while the dirty cleaning fluid is discharged into the sump tank. Another conduit 86 leads from the bottom of the extractor housing to the sump tank and is adapted to drain any liquid removed from the garments by the extracting process into the sump tank. In the sump tank, the used fluid travels through suitable screens or similar filtering devices to remove additional foreign matter, and then passes out of the sump tank through a pipe line 87 into a still 88. The still has the usual steam coil therein to which steam is admitted through an inlet pipe 89 and discharged from an outlet pipe 89'. The steam is adapted to heat the fluid to such a point that it changes into vapor, leaving all dirt not removed by the sump tank behind. The vapors then pass upwardly through a conduit 90 into a chamber 91 of a condenser 92. The condenser is formed with spaced partitions 93, 93' and in the space between said partitions, cold water is admitted through a pipe 94, said water having an outlet through a pipe 94'. The vapors entering the chamber 91 pass through pipes 95 to a chamber 96 at the other end of the condenser. Inasmuch as said pipes 95 are surrounded by cold water, the vapors are condensed so that the clean fluid passes out of the chamber 96 through pipe line 97 into a clean fluid tank 98. In order to maintain the fluid in the clean fluid tank at a proper temperature so that it will not vaporize too rapidly after it enters the washer, a cooling coil 99 is employed in the bottom of the clean fluid tank. Cold water enters said coil through an inlet 100 and the outlet of the coil 99 connects with the pipe 94 leading to the condenser. From the bottom of the clean fluid tank, the pipe line 101 extends, which is adapted to deliver clean fluid to the washer housing, there being a suitable valve 102 in said pipe line.

A vent pipe 103 is connected by a branch 104 with the washer housing and has its lower end connected to the sump tank and its upper end connected to the clean fluid tank. This provides

means for relieving the pressure in any one of the units without losing valuable vapors, as any vapors passing out of the washer through pipe 104 will be recaptured in the clean fluid tank. The same is true of any vapors escaping from the sump tank through excess pressure therein.

Inasmuch as the still is connected to the condenser through the pipe 90 and the condenser to the clean fluid tank by the pipe 97, it may be seen that there is a complete circuit of connections whereby excess pressure in any one unit can be relieved through a duct leading to another unit.

In use of the device, the washer housing is first filled with clean fluid to the desired level; next, the attendant will push the garments to be cleaned in the front opening 20 of the transfer housing. He will then cause one of the openings 28 or 29 of the washer to be in registration with the washer housing opening 40 as shown in Fig. 3 and with the doors 41 and 30 opened, the garments can be pushed into one side of the washer cylinder.

Next, the cylinder is given half a revolution to cause the other side to register when the opening 40 and the other half of the cylinder is similarly filled. The washer is then operated to move the garments through the cleaning fluid, the latter entering the cylinder through apertures in the peripheral wall 25. When the garments have been subjected to the action of the washer for a sufficient length of time, the doors 41 and 30 are again opened and the clothes are removed from one section of the washer into the change-over housing. Due to the fact that the partition 26 is employed in the washer cylinder, the attendant will not have to reach way down into the bottom of the cylinder, but can quickly remove all of the garments. By closing the doors and rotating the washer half a revolution, the garments in the other section can be removed.

In view of the fact that the suction fan is operating, there is a curtain of suction in front of the opening 20 of the change-over housing, so that no fumes from the garments within said housing are permitted to escape into the room.

By opening the door 18 in the bottom of the change-over housing, the garments can be easily pushed into the extractor. This latter unit is rotated at high speed with a wobbling action against the cushions 59 in the bearing 57. This causes cleaning fluid remaining in the garments to be thrown out through the perforated wall of the extractor 64 by centrifugal force. The removed liquid will then drain out of the pipe 86 leading from the bottom of the extractor housing into the sump tank. While the extracting process is going on, a new set of garments can of course be inserted into the washer.

After the garments have been subjected to the extracting action for a sufficient length of time, the door 18 is again opened and the garments are removed from the extractor cylinder and pushed laterally through the opening to the tumbler which is normally closed by the door 56. In the tumbler cylinder, the garments are rotated while subjected to the suction currents passing through the perforated wall 45 of the tumbler, these currents serving to remove all remaining fumes from the garments. The clothes are ultimately removed from the tumbler by causing the peripheral door 46 of the latter to register with the outer door 54 and by opening said doors. At this stage, of course, all fumes are removed from the garments so there is no danger in exposing the clothes to the air in the room.

It will thus be seen that a compact apparatus is provided wherein a separate washer, extractor, and tumbler are utilized to effect maximum capacity and high speed operation. It will further be seen that a common transfer housing is provided which communicates in a convenient way with all three elements of the cleaning apparatus, and that a novel suction arrangement is utilized which permits the attendant to move the clothes from one unit to another without danger of fumes escaping into the room. It will further be seen that the tumbler and washer cylinders and housings are so formed as to permit end loading of said units and unloading of the washer through a common transfer housing, and that the extractor is so positioned that it can be loaded and unloaded from the same housing. In addition, it will be seen that a very efficient still arrangement is provided whereby excess pressure in any one of the units can be relieved without loss of valuable vapors and that the clear fluid tank is constructed in a novel manner to include a cooling coil so as to maintain the clean fluid at the most efficient working temperature.

Although only one form of the invention has been shown and described, it is obvious that various changes may be made without departing from the spirit of the invention, and all of such changes are contemplated as may come within the scope of the claims.

What I claim is:—

1. In a dry cleaning apparatus, a supporting frame, a washer cylinder rotatably mounted at one end of the frame, a tumbler cylinder rotatably mounted at the other end of the frame, an extractor cylinder rotatably mounted between said washer and tumbler cylinders, a common transfer housing positioned above the extractor cylinder and having one end in sealed communication with the washer cylinder, its opposite end in sealed communication with the tumbler cylinder and its bottom in sealed communication with the extractor cylinder, said transfer housing having a single exterior opening positioned to provide for manual access to all of said units through said single opening to thereby provide for manual transfer of garments from one cylinder to another under cover of the housing, and suction means having a part positioned to act locally along an edge of said exterior opening for preventing escape of cleaning fluid fumes from the housing opening while garments are being transferred.

2. In a dry cleaning apparatus, a supporting frame, a washer cylinder rotatably mounted at one end of the frame, a tumbler cylinder rotatably mounted at the other end of the frame, an extractor cylinder rotatably mounted between said washer and tumbler cylinders, a common transfer housing positioned above the extractor cylinder and having one end positioned for communication with the washer cylinder, its opposite end positioned for communication with the tumbler cylinder and its bottom positioned for communication with the extractor cylinder, said transfer housing having an exterior opening positioned to provide for manual transfer of garments from one cylinder to another under cover of the housing, there being a suction opening extending along an edge of said transfer housing opening, a suction fan, and a connection between said suction opening and suction fan to provide suction directly adjacent the transfer housing opening so that fumes from the garments cannot escape into the room.

3. In a dry cleaning apparatus, a supporting frame, a washer cylinder mounted for rotation on a horizontal axis at one end of the frame, a tumbler cylinder mounted for rotation on a horizontal axis at the other end of the frame, an extractor cylinder mounted for rotation on a vertical axis between said washer and tumbler cylinders, a housing for each of said cylinders, a common transfer housing positioned above the extractor cylinder housing and having one end positioned for communication with the washer cylinder housing, its other end positioned for communication with the tumbler cylinder housing, and its bottom positioned for communication with the extractor cylinder housing, said transfer housing having an exterior opening positioned to provide for manual transfer of garments from one cylinder to another, there being a suction opening extending along the lower edge of said transfer housing opening, means connecting said suction opening to the tumbler cylinder housing, a suction fan, and means connecting said suction fan to the tumbler cylinder housing whereby operation of the suction fan will create suction in front of the transfer housing opening to prevent escape of fumes into the room and will create suction through the tumbler cylinder housing to extract remaining fumes from the garments.

4. In a dry cleaning apparatus, a supporting frame, a washer cylinder mounted for rotation on a horizontal axis at one end of the frame, a tumbler cylinder mounted for rotation on a horizontal axis at the other end of the frame, an extractor cylinder mounted for rotation on a vertical axis between said washer and tumbler cylinders, a housing for each of said cylinders, a common transfer housing positioned above the extractor cylinder housing and having one end positioned for communication with an end of the washer cylinder housing, its other end positioned for communication with an end of the tumbler cylinder housing and its bottom positioned for communication with the top of the extractor cylinder housing, said transfer housing having an exterior opening positioned to provide for manual transfer of garments from one cylinder to another, there being a suction opening extending along the lower edge of said transfer housing opening, means connecting said suction opening to the tumbler cylinder housing, a suction fan, and means connecting said suction fan to the tumbler cylinder housing whereby operation of the suction fan will create suction in front of the transfer housing opening to prevent escape of fumes into the room and will create suction through the tumbler cylinder housing to extract remaining fumes from the garments.

5. In a dry cleaning apparatus, a plurality of dry cleaning units, a common transfer housing communicating with said plurality of units, said housing having an exterior opening positioned to provide for manual transfer of garments from one unit to another under cover of the housing, there being a suction opening extending along an edge of said exterior opening, a suction fan, and a connection between said fan and suction opening for preventing escape of cleaning fluid fumes from the housing opening while garments are being transferred.

6. In a dry cleaning apparatus, a plurality of dry cleaning units, an individual housing for each unit, an additional housing for transfer purposes in direct connection with the housings of each of said several units whereby garments may be

moved from one unit to another while continuously under cover, said transfer housing having an opening therein in addition to the openings communicating with the individual housings to provide for manual control of said transfer from one housing to another, and means including a suction inlet extending along one edge of said manual opening for preventing escape of cleaning fluid fumes while garments are being transferred.

dry cleaning units, a common transfer housing communicating with said plurality of units, said housing having an exterior opening positioned to provide for manual transfer of garments from one unit to another under cover of the housing, there being a long and narrow suction opening extending along an edge of said exterior opening, a suction fan, and a connection between said fan and suction opening.

7. In a dry cleaning apparatus, a plurality of

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