

April 14, 1959

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2,881,610

APPARATUS FOR CLEANING MATERIALS

Filed April 19, 1956

2 Sheets-Sheet 1

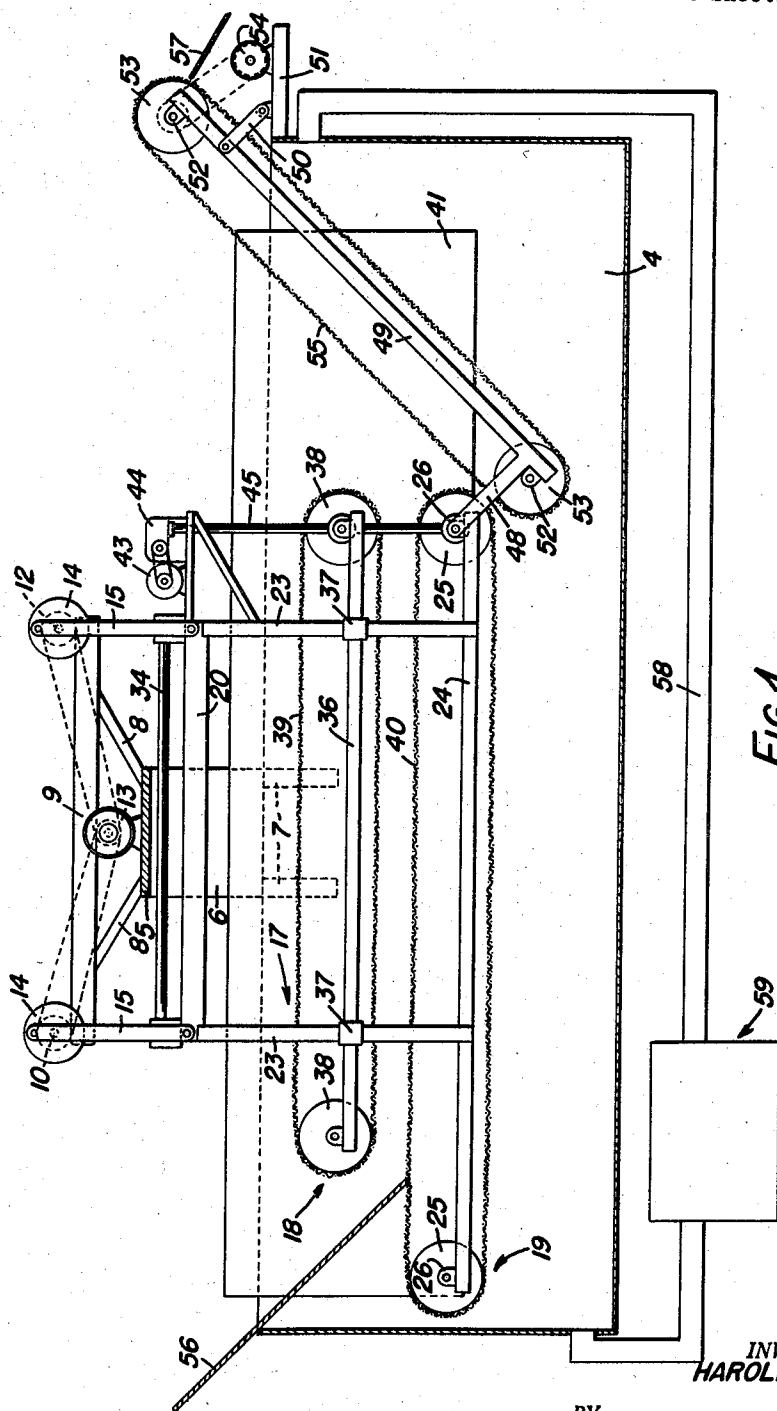


FIG. 1.

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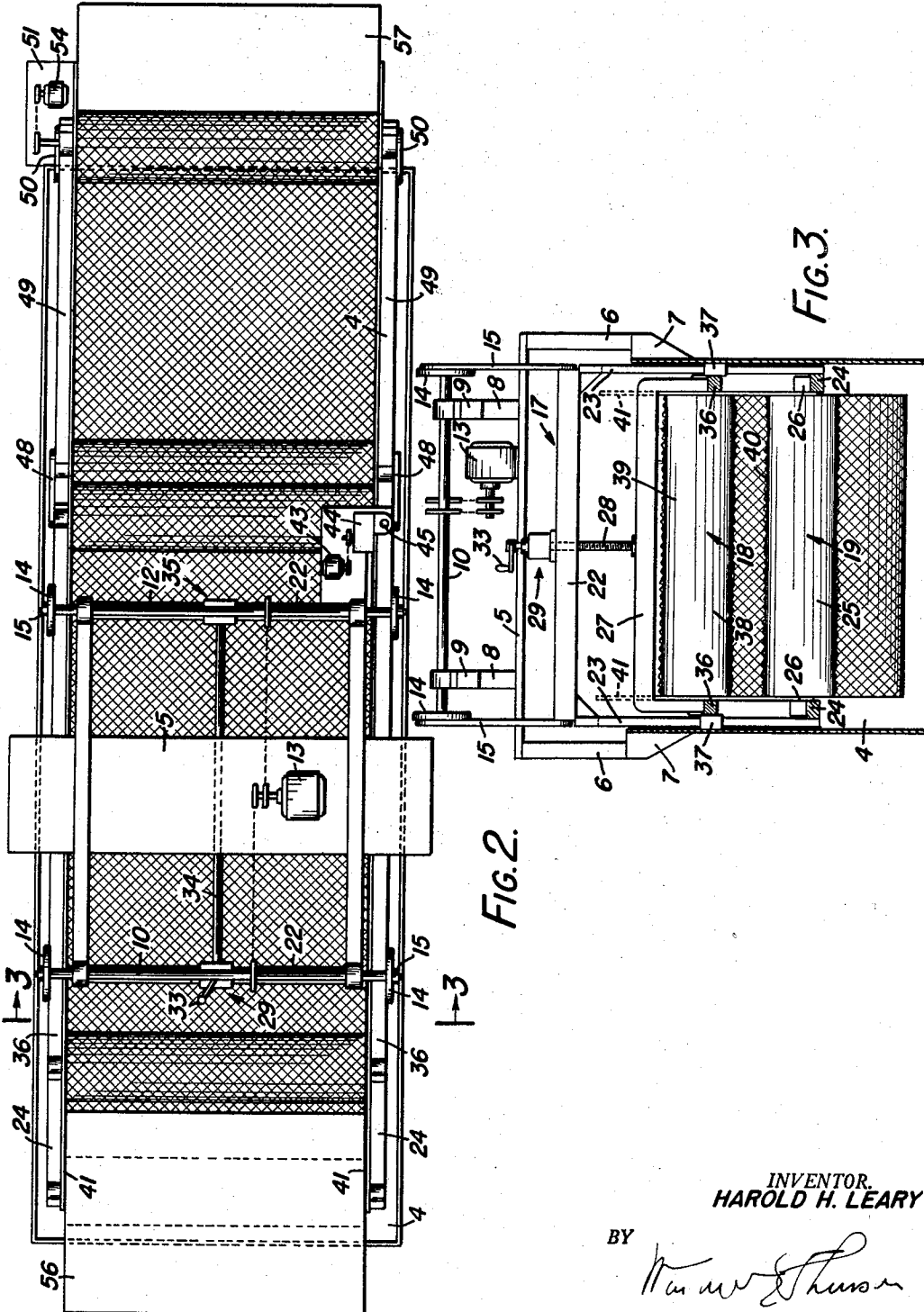


FIG. 2.

FIG. 3.

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APPARATUS FOR CLEANING MATERIALS

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Application April 19, 1956, Serial No. 579,181

10 Claims. (Cl. 68—158)

My invention relates to an apparatus for the continuous cleaning of garments, bedding, and other textile articles usually washed or dry cleaned. Although the apparatus herein disclosed is described with reference to the dry cleaning industry, the novel apparatus would also be applicable to the general laundering of wearing apparel, dyeing of materials and other analogous operations.

An object of my invention is to provide an apparatus for continuous dry cleaning materials as distinguished from batch cleaning, such as clothing, bedding and the like, wherein the materials are conveyed through a bath of cleaning solution in which the solvent is forced through the materials in a direction substantially perpendicular to the movement of the materials in the bath.

A further object of my invention is to provide an apparatus for continuous dry cleaning wherein the cleansing action is produced by reciprocating the materials to be cleaned in a substantially vertical direction in a bath of cleaning solution, while the materials are being conveyed in an essentially horizontal direction through the bath.

Another object of my invention is to provide an apparatus, of the type described, wherein the cleaning solution is caused to flow in a direction countercurrent to the direction of movement of the materials to be cleaned.

A still further object of my invention is to provide an apparatus of the type described, wherein a pair of reciprocating conveyor systems are employed, one superimposed above the other in a bath of cleaning fluid together with means for driving the conveyors in a manner such as to transport the materials to be cleaned therebetween continuously from a materials entrance to a materials discharge.

Other objects and advantages of my invention will be set forth in the claims and will be apparent from the following description when taken in connection with the accompanying drawings, in which:

Fig. 1 is a side view of the apparatus of my invention showing the tank unit in section in order to more clearly illustrate the more important parts of the machine;

Fig. 2 is a plan view of the apparatus shown with some of the parts thereof removed for purposes of clarity; and

Fig. 3 is an end section taken along the line 3—3 of Fig. 2.

The cleaning apparatus constituting my invention comprises a preferably open tank 4, on which is mounted a platform 5 by means of supporting members 6 and 7 secured in any suitable manner to the sides of the tank. The platform 5 supports a suitable framework such as may consist of members 8 and 9, which are arranged so as to support the bearings of a pair of rotatable shafts 10 and 12. The shafts 10 and 12 are disposed in a parallel relationship with respect to each other and are spaced away from the platform 5. A motor unit 13 is secured to the platform 5 and drives the shafts 10 and 12 by suitable means which may be chains and sprockets.

A wheel or eccentric disc 14 is secured to each end of

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each of shafts 10 and 12 and each disc has a rod 15 eccentrically and pivotally attached thereto. A framework, generally designated as 17, is carried by the rods 15 for the purpose of supporting an upper and a lower conveyor, generally designated as 18 and 19, respectively.

The framework 17 may include a pair of longitudinal members 20 which are disposed in horizontal, parallel, spaced relation. The members 20 are pivotally secured to the transversely lower ends of the rods 15. Transverse member 22 connects the ends of the members 20. To each of the four ends of members 20 is rigidly secured the upper end of a vertical rod 23. A pair of lower conveyor supporting bars 24 are rigidly secured to the lower ends of the vertical rods 23. The bars 24 support a pair of lower rollers or transversally elongated pulleys 25 by means of suitable bearings 26. The rollers 25 drive the lower conveyor 19.

The upper conveyor 18 is supported by means of a pair of yokes 27 (Fig. 3), each of which is suspended from one of the transverse members 22 by means of a threaded rod 28. The threaded rod 28 is operatively connected to a suitable gear unit diagrammatically shown at 29, equipped with a handle 33. The gear unit 29 is operatively connected by means of a longitudinally extending rod 34 to a similar gear unit 35 located opposite therefrom. The gear unit 35, of course, functions to operate a threaded rod (not shown) similar to the rod 28.

The yokes 27 are secured at their lower ends to a transversely spaced longitudinally extending pair of upper conveyor supporting bars 36. The bars 36 are preferably attached to sleeves 37 which are slideable on the vertical rods 23. A pair of upper rollers 38 or transversely elongated pulleys are supported at the ends of the rods 36 in a manner similar to the mounting of the lower rollers 25.

Conveyor belts 39 and 40 are respectively mounted upon and driven by the rollers 38 and 25. The conveyor belts are preferably made of relatively large mesh wire, as shown, so that cleaning fluid may freely pass therethrough while the textile materials being cleaned are retained. A pair of plates 41 extend longitudinally of the conveyors, one on each side thereof. The plates encompass both conveyors for the purpose of confining the materials within the conveyor system.

A motor unit 43 (Fig. 1) and a gear assembly 44 are carried by a transverse member 22 in a conventional manner and are attached in driving relation to a rotating shaft 45 which, through suitable gearing, drives rollers 38 and 25.

A pair of links 48 on opposite sides of the lower roller 25 are pivotally connected to the lower conveyor 19 at any convenient location, such as to the axis or shaft of the lower right hand roller 25 (as viewed in Fig. 1). The links 48 support the lower ends of transversely spaced bars 49. The upper ends of the bars 49 are suitably supported by links 50 pivoted to the bars and pivoted to a platform 51. A pair of rollers or transversely elongated pulleys 53 are rotatably mounted on bushings 52 carried by the bars 49, and are driven by means of a suitable motor and sprocket and chain unit, generally indicated by the numeral 54. An open mesh wire conveyor belt 55 is mounted on and driven by the rollers 53.

The tank 4 supports in any suitable manner a feed plate 56, the lower conveyor extending to the left (Fig. 1) beyond the upper conveyor to receive the materials. A discharge plate 57, supported in any suitable manner, receives materials discharged by the conveyor 55. The tank 4 is further provided with a recirculation system consisting of a duct 58 and a pump unit diagrammatically illustrated at 59.

In operation, materials to be cleaned are fed into the system on the plate or discharge chute 56, which directs the materials onto the moveable conveyor belt 40. The rollers 38 and 25, which are driven by the motor unit 43, function to move the lower run of the upper belt 39 and upper run of the lower belt 40 to the right (Fig. 1). The materials to be cleaned are transported between these runs of the belts. The motor unit 13 drives the shafts 10 and 12 which, by means of the eccentrics 14 and eccentric rods 15, reciprocate the frame 17. Vertical reciprocation of the frame 17, of course, also reciprocates the materials which are located between the runs of belts 39 and 40 above described.

The reciprocation of the conveyors 18 and 19 causes the cleaning solution to be forced back and forth through the materials as they are being conveyed in a horizontal direction from left to right (Fig. 1). The materials drop from between the belts 39 and 40 on to the moveable belt 55 and from there are discharged onto the plate 57. It is desirable that the space between the active runs of the conveyors be reasonably full of clothes, without undue packing, so that they do not float in the space but instead the conveyors, as they reciprocate, act as means for actively urging the materials to be cleaned through the cleaning fluid or vice versa.

The distance between the conveyors 18 and 19 may be adjusted by means of lowering or raising the yokes 27. The latter may be vertically adjusted by rotating the handle 33, which functions through the medium of suitable gear arrangements 29 and 35 to operate the threaded rods 28. A vertical movement of the yokes 27 causes the vertical movement of the upper conveyor supporting rods 36 which support the rollers 38. The conveyors can thus be adjusted to accommodate the bulk of the materials being cleaned. For example, heavy blankets would require a wide spacing of the conveyors. For any particular loading of the conveyors there is an optimum spacing of the conveyors to avoid "floating" of the materials and avoid matting or blocking the free flow of the materials under the urging of the conveyors.

It is therefore seen that as the materials to be cleaned are moved horizontally, they are reciprocated in a substantially vertical direction. Thus, the cleaning action is produced by causing the cleaning fluid to travel through the materials not only in a horizontal direction, but also in alternate vertical directions. The cleaning fluid which may be any conventional fluid ordinarily used in cleaning textile materials, is injected into the tank at the materials discharge end thereof and is caused to flow in a direction opposite to the movement of the materials. Thus, a greater relative movement between the materials and the cleaning fluid is produced.

It will be particularly noted that the pivot connection of the bar 49 with respect to the roller 25 coupled with the pivot link 50 enables the conveyor to follow the reciprocations of the conveyors 18 and 19 so that the conveyor 55 is always in the proper position for receiving cleaned clothes.

It is obvious that the motor units 13, 43 and 54 are preferably all of the variable speed type so as to regulate the time required for the cleaning operation, which is dependent upon the character of the materials to be cleaned and the character of the cleaning fluid used.

While I have shown and described the preferred apparatus of my invention, it will be apparent that various changes and modifications may be made therein, particularly in the form and relation of parts, without departing from the spirit of my invention as set forth in the appended claims.

I claim:

1. Apparatus for cleaning clothes comprising, in combination, a tank for containing a cleaning fluid, a support above the tank, driving means carried by said support including a plurality of depending driven members, a motor

for operating said driving means, a frame carried by said depending driven members, an open mesh lower conveyor of the endless type and an open mesh upper conveyor of the endless type, the upper run of the lower conveyor and the lower run of the upper conveyor being spaced a substantial distance from each to accommodate clothes to be cleaned between them, means including spaced pulleys for supporting said conveyors, means for supporting said pulleys from said frame, and means for driving one pulley of each of said conveyors, both of said conveyors being reciprocated through said frame and depending driven members upward and downward through the cleaning fluid upon actuation of said driven members to force cleaning fluid through the clothes to be cleaned.

2. Apparatus for cleaning clothes in accordance with claim 1 in which said open mesh conveyors are unsupported substantially throughout their extent except by said pulleys so that said runs may flex away from each other should the feed of the clothes be uneven and they should tend to bunch on the conveyors.

3. Apparatus for cleaning clothes in accordance with claim 1 in which means are provided for varying the distance between said runs of the conveyors to accommodate bulky or light clothes.

4. Apparatus in accordance with claim 1 in which the supporting means for said conveyors includes a plurality of depending rods, one of said conveyors being fixed with respect to said rods and the other of said conveyors being movable with respect thereto.

5. Apparatus for cleaning clothes in accordance with claim 1 in which said open mesh conveyors are unsupported substantially throughout their extent except by said pulleys so that said runs may flex away from each other should the feed of the clothes be uneven and they should tend to bunch on the conveyors and in which means are provided for varying the distance between said runs of the conveyors to accommodate bulky or light clothes.

6. Apparatus for cleaning clothes in accordance with claim 1 in which side plates are provided encompassing the longitudinal and vertical extent of said conveyors to maintain the clothes being cleaned on the conveyors.

7. Apparatus for cleaning clothes comprising, in combination, a tank for containing a cleaning fluid, a pair of open mesh conveyors of the endless type operable in said tank, means including pulleys for supporting and driving said conveyors, means for reciprocating said conveyors in an upward and downward direction so that cleaning fluid is forced through the clothes, the runs of the conveyors between which the clothes pass being spaced apart a distance such that said runs both engage the clothes so that the clothes do not float between said runs and said runs of the conveyors being substantially unsupported throughout their length except by said pulleys so that said runs may flex away from each other should the feed of the clothes be uneven and they should tend to bunch on the conveyors.

8. Apparatus for cleaning clothes in accordance with claim 7 in which means are provided for varying the distance between said runs of the conveyors to accommodate bulky or light clothes.

9. Apparatus for cleaning clothes in accordance with claim 7 in which a conveyor is provided for receiving the clothes discharged from between said runs, said conveyor being located so that a major part thereof is in the tank, said conveyor being inclined upwardly so that the cleaning fluid drains back into the tank.

10. Apparatus for cleaning clothes in accordance with claim 7 in which a conveyor is provided for receiving the clothes discharged from between said runs, said conveyor having its lower end pivotally connected to the lower of said pair of conveyors and its upper end pivot-

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ally supported so that said conveyor may reciprocate with said pair of conveyors.

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