

Aug. 9, 1938.

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2,126,426

DRYING APPARATUS

Filed June 19, 1937

2 Sheets-Sheet 1

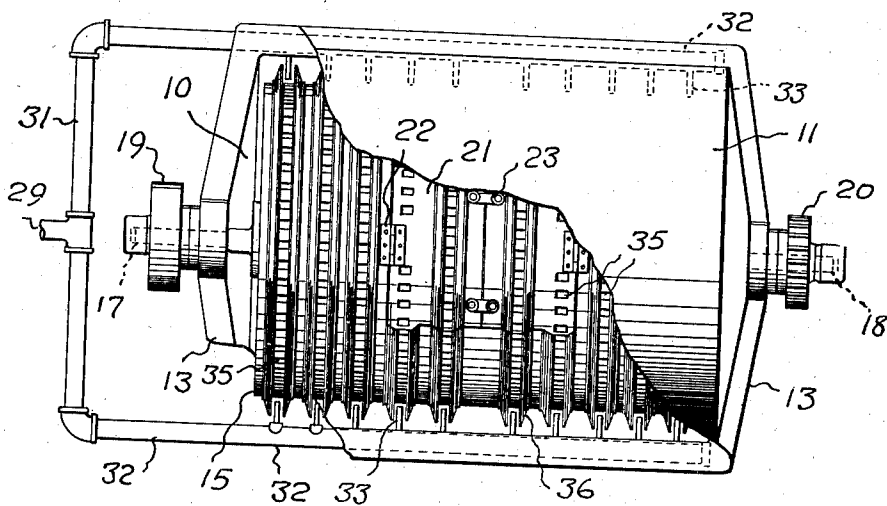


FIG. 1.

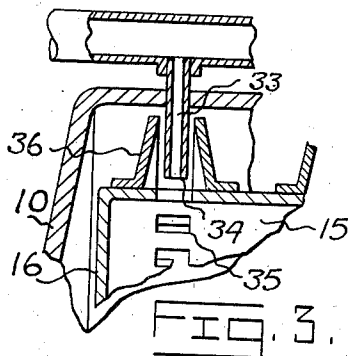


FIG. 3.

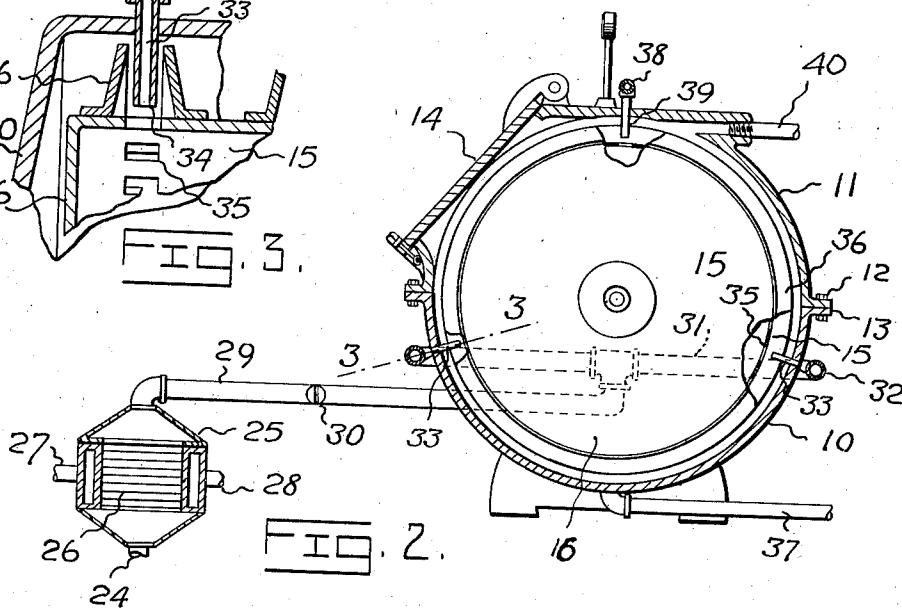


FIG. 2.

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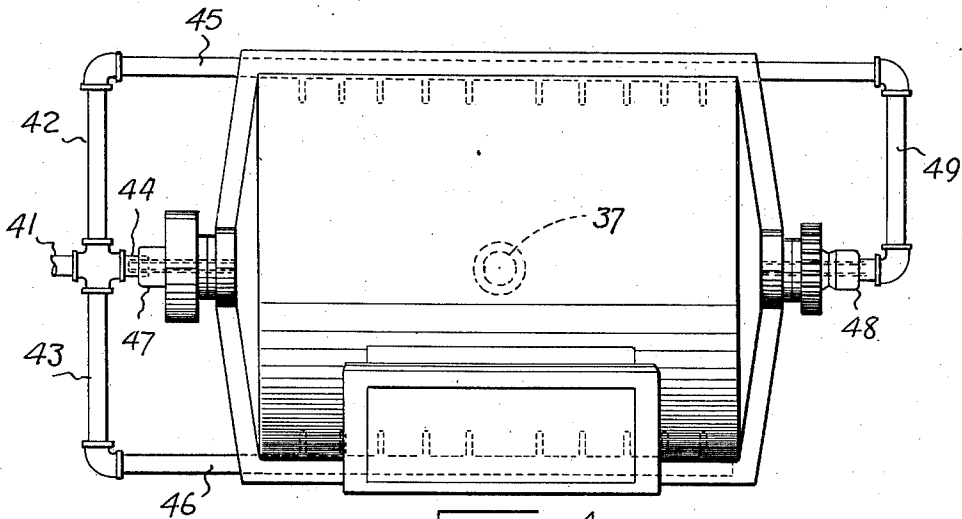


FIG. 4

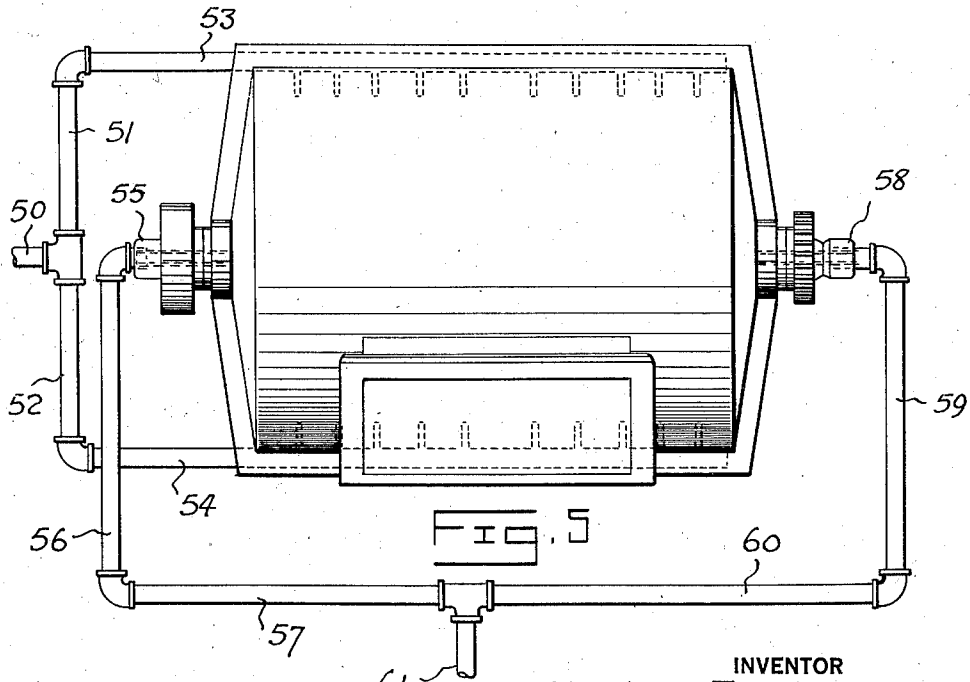


FIG. 5

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DRYING APPARATUS

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4 Claims. (Cl. 34-5)

This invention relates to a drying apparatus for use particularly in a "dry-cleaning" system in which articles of clothing are washed and rinsed in an inflammable solvent or fluid and are dried or partially dried before removal from the machine.

The invention relates more particularly to dry-cleaning apparatus of the type described in my prior Patent No. 1,740,716 dated December 24, 1929, in which the system operates under a vacuum in order to avoid the danger of fire and explosion.

The objects of my present invention are to provide an improved apparatus whereby heated air or gas may be fed into a vacuum chamber containing the articles being cleaned, and whereby the air or gas is drawn from the said chamber after passing in direct contact with the said articles and without destroying the vacuum in the system.

A further object of this invention is to provide an improved apparatus having a perforated rotor containing the articles to be cleaned and means for directing drying air or gas through the perforations in the rotor and into direct contact with the said articles. A still further object of the invention is to provide a rotor having annular circumferential series of perforations, nozzles aligned with said perforations for directing drying air into the rotor, and annular circumferential flanges on the rotor for insuring admission of the drying air into the interior thereof. A still further object is to provide the said rotor also with one or more axial openings for the admission or for the withdrawal of the drying air.

With these and other objects in view, the invention consists in the novel construction and arrangement of parts hereinafter described, illustrated in the accompanying drawings and particularly pointed out in the appended claims, it being understood that various changes in the form and construction and in minor details may be made without departing from the spirit of the invention or sacrificing any of the advantages thereof.

In the drawings,—

Fig. 1 is a plan view, partly broken away showing part of the apparatus;

Fig. 2 is a vertical cross-section of the apparatus;

Fig. 3 is an enlarged detail sectional view taken on the line 3-3 of Fig. 2;

Fig. 4 is a plan view corresponding to Fig. 1

and showing a modified form of the apparatus; and

Fig. 5 is a similar view showing another modification.

Referring to Figs. 1, 2, and 3 of the drawings, the apparatus is of the type shown in the said prior Patent No. 1,740,716 and comprises an outer shell or casing having a lower part 10 with an upper part 11 secured thereon by means of bolts 12 passed through flanges 13, and the upper part 11 is provided with a hinged door 14 giving convenient access to the interior of the shell or casing.

Mounted on a horizontal axis within the casing 10, 11 is a hollow rotor 15 of cylindrical form 15 with end walls 16 and trunnions or end shafts 17, 18, suitably mounted in bearings in the end walls of the casing, so that the rotor may be driven in the manner clearly described in the said prior patent, a pulley 19 being provided on the trunnion 17 and a gear wheel 20 being provided on the trunnion 18 as in the prior patent. The rotor 15 is provided with a pair of doors 21 hinged at 22 and having fastening means 23, these doors being adapted to swing outwardly when the door 14 is opened, so that the clothing or other articles to be treated may be supplied to or removed from the interior of the rotor.

After the articles in the rotor have been washed and rinsed in the inflammable solvent or fluid supplied to the casing 10, 11, the fluid is drawn off and, while the casing is still maintained under a partial vacuum, the rotor is rotated at a high speed in order to discharge by centrifugal force some of the moisture in the articles being treated. The moisture thus extracted is drained from the casing and in accordance with the present invention heated air or gas is then supplied to the interior of the rotor to dry its contents.

As shown at Fig. 2, atmospheric air is admitted at 24 to a casing 25 containing a nest of tubes 26 through which steam is passed by means of steam pipes 27, 28. The air passing in contact with the external surfaces of the steam tubes 26 is heated and passes from the casing 25, through a pipe 29 with a control valve 30, and is led into branch pipes 31 leading into two longitudinal pipes 32 each of which is provided with a series of nozzles 33 that pass through airtight joints in the cylindrical wall of the lower part 10 of the casing, and the open ends 34 (Fig. 3) of the nozzles 33 are in close proximity to the external surface of the rotor 15 which latter is formed with annular circumferential series of

openings or perforations 35 in alignment with the nozzles 33 and through which the heated air passes to the interior of the rotor. Each circumferential series of openings 35 is provided with a pair of annular deflecting plates or flanges 36 between which the nozzles 33 project for the purpose of insuring passage of the heated air to the interior of the rotor. The flanges 36 are preferably formed to converge towards each other at their outer peripheral extremities, as shown clearly at Fig. 3.

As the said control valve 30 is opened to admit drying air to the system, the vacuum within the casing 10, 11 is maintained by means of a vacuum pump connected with the lower part of the casing by means of a pipe 37, Fig. 2, in such manner that the heated air is admitted to the casing through the two parallel series of nozzles 33 whereby the heating medium is directed inwardly toward the axis of the rotor and passes inwardly through the perforations 35 to impinge upon the articles contained in the rotor as the latter is slowly rotated first in one direction and then in the other, and at the same time the partial vacuum in the casing and rotor is maintained by the operation of the vacuum pump.

In the operation of this system the cleaning solvent or fluid may be supplied to the casing through an overhead spray pipe 38 having branch pipes 39 for the admission of the fluid as in the said prior patent. In accordance with the present invention the branch pipes 39 are each arranged in alignment with a circumferential series of openings 35 and the branch pipes preferably extend—as shown at Fig. 2—between the flanges 36.

In operation, the articles of clothing or other articles or materials to be dry-cleaned, are fed into the rotor 15 while the doors 14 and 21 are opened and when the rotor has thus been loaded, the doors 21 are closed and secured and the door 14 is then closed and sealed. The cycle of operations then commences with the exhaustion of air from the casing by means of a suction pump connected with the pipe 40 leading into the upper part of the casing. When the desired degree of vacuum is obtained in the casing, benzene or other like cleaning fluid is supplied to the pipe 38 and branch pipes 39 and the rotor is rotated in the manner desired in the cleaning of the particular goods under treatment. After the contents of the rotor have been cleaned and rinsed, the cleaning fluid is drained off by gravity through a suitable outlet as described and shown in the said prior patent, without disturbing the vacuum condition within the casing, and after the rotor has been operated to discharge moisture by centrifugal force, the drying operation is performed in the manner above described, so that a partial vacuum is maintained in the system from the time that the articles are introduced until the washing, rinsing and drying has been completed at the end of the cycle of operation, and it is only when the doors 14 and 21 are to be opened that the vacuum within the system is destroyed.

In the modification shown at Fig. 4, a hot-air pipe 41 leads from a steam-heating unit and communicates with three branch pipes two of which, 42 and 43, lead to parallel longitudinal pipes 45, 46 respectively supplying the air nozzle as in the form above described; while the third branch pipe 44 leads to a hollow trunnion 47 communicating with the interior of the rotor. The trunnion 48 at the opposite end of the rotor is also hollow, and is supplied with heated air by means of a pipe 49 connected to the end of the

longitudinal pipe 45. In this manner, heated air is supplied to rows of nozzles and through circumferential series of perforations to the interior of the rotor, and is at the same time admitted to the rotor in an axial direction through both ends thereof. Heating air is exhausted from the lower part of the casing through a pipe 37 as in the form shown at Fig. 2.

In the modification illustrated at Fig. 5, heated air is supplied through a pipe 50 and through branch pipes 51, 52 to longitudinal pipes 53, 54, leading to a series of nozzles as above described, so that the supply of heated air to the system is similar to that described in connection with Figs. 1 and 2. In the form shown at Fig. 5, however, the drying air is withdrawn in an axial direction from the rotor, a hollow trunnion 55 communicating with branch pipes 56, 57, and a hollow trunnion 58 communicating with branch pipes 59, 60. The drying air is exhausted from the rotor and the vacuum condition is maintained in the system by means of the suction pump which is connected by means of a pipe 61 to the said branch pipes 57, 60.

Although the drawings and the above specification disclose the best modes in which I have contemplated embodying my invention, I desire to be in no way limited to the details of such disclosure, for in the further practical application of my invention many changes in the form and construction of the apparatus may be made as circumstances require or experience suggests without departing from the spirit of the invention within the scope of the appended claims.

What I claim is:

1. In a dry-cleaning apparatus, a sealed casing, a cylindrical rotor mounted within the casing, means for maintaining a partial vacuum in the casing and rotor, annular series of perforations in the walls of the rotor, stationary air nozzles in proximity to the perforations, means for supplying hot air to said nozzles, and annular means on the rotor for guiding the hot air through the said perforations.

2. In a dry-cleaning apparatus operating under vacuum, a fixed casing having a sealing door therein, a cylindrical rotor mounted on a horizontal axis within the casing and having a door to be opened when in alignment with the door in the casing, means for rotating the rotor within the casing, annular circumferential series of perforations in the rotor and in its door, fixed rows of air nozzles in close proximity to the said perforations, annular flanges on the rotor and on its door for directing heating air from the nozzles through the perforations to directly contact the contents of the rotor, means for supplying heated air to the nozzles and means for withdrawing the heated air from the casing and for maintaining the vacuum in the casing.

3. In a dry-cleaning apparatus, a fixed casing, a cylindrical rotor mounted on a horizontal axis within the casing, an annular series of perforations extending around the rotor, annular ribs arranged in pairs and extending around the rotor in close proximity to the perforations, a fixed nozzle extending between the annular ribs of each pair to direct drying air through said perforations, and means for supplying heated air to the nozzles and for exhausting the drying air from the casing, and for maintaining a vacuum within the casing.

4. In a dry-cleaning apparatus, a closed casing, a cylindrical rotor, hollow trunnions supporting the rotor in the casing, annular series of perfora-

tions in the cylindrical wall of the rotor, annular flanges on the rotor between each series of perforations and the series adjacent thereto, nozzles extending between said flanges for directing drying air through said perforations, means for withdrawing the drying air from the rotor through

said trunnions, and for maintaining a partial vacuum in the casing and rotor, and means for rotating the rotor while the drying air is passing therethrough.

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