

Sept. 2, 1941.

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2,254,276

MOTHPROOF WARDROBE

Filed May 26, 1938

2 Sheets-Sheet 1

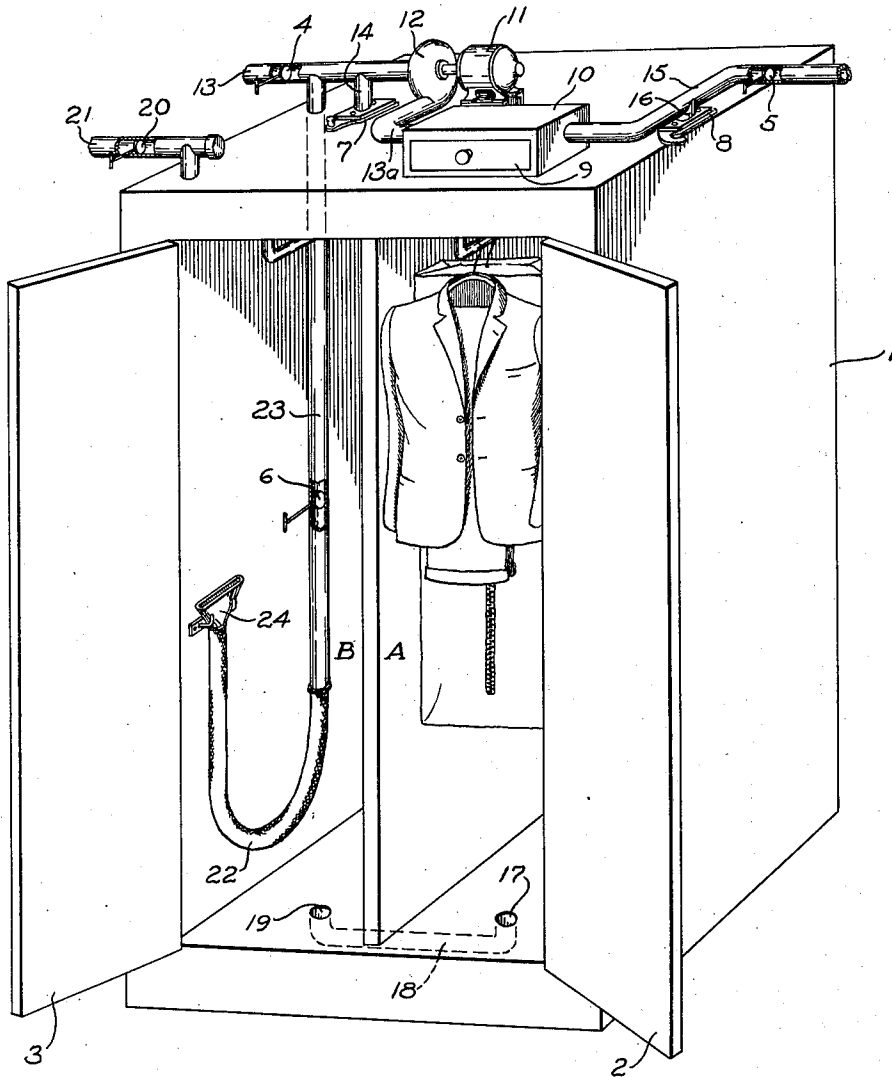


Fig. 1

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2 Sheets-Sheet 2

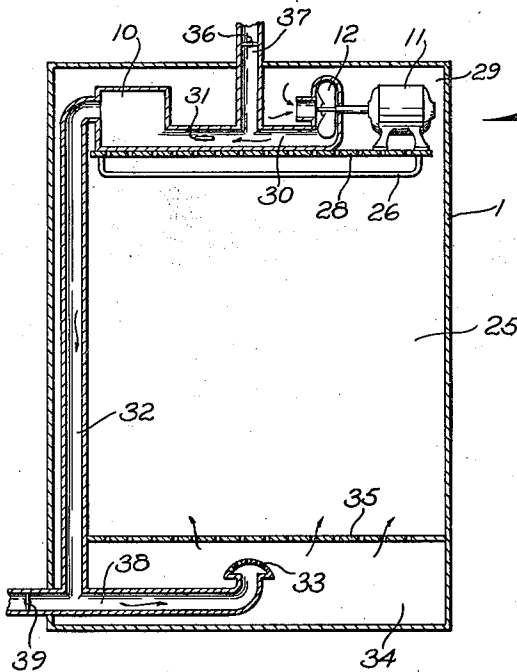


Fig. 2

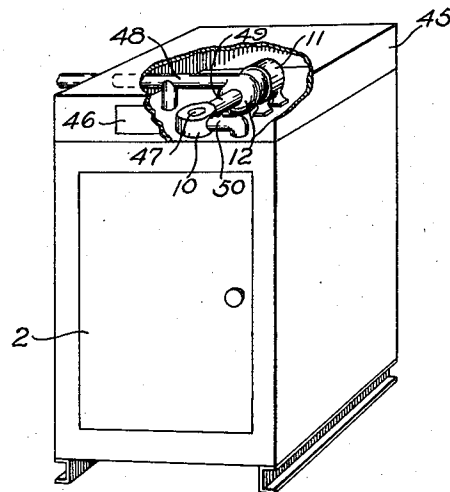


Fig. 3

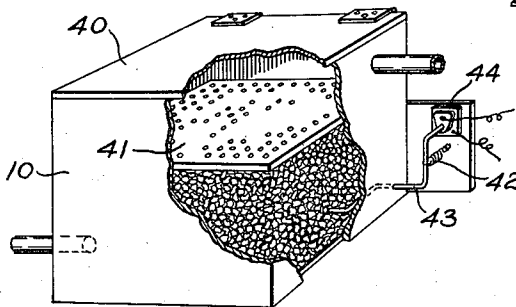


Fig. 4

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MOTHPROOF WARDROBE

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1 Claim. (Cl. 21—109)

This invention relates to a process for the protection of fibrous materials and more particularly woven fabric, clothes and the like from attack and infestation by moths, vermin and other destructive lepidopterous insects or their larvae, together with a wardrobe adapted for carrying out the process.

An object of the present invention is to provide an improved process for the protection of clothes from insect infestation. Another object is to provide a process wherein clothes, woolen blankets, furs and the like may be subjected to the action of insect-proofing agents and maintained in an atmosphere of said agent whereby damage resulting from the insect or its larvae is completely eliminated. Yet another object is to provide a process of thoroughly, completely and positively permeating fabrics with insect-proofing agents during their storage and prior to reuse of such materials, completely removing all traces of the agent used. A further object of the invention is to provide a wardrobe wherein materials above designated may be treated for complete penetration by insect-proofing agents, wherein they may be stored and subsequently all traces of the insect-proofing agent removed prior to their reuse. Other objects and advantages of the invention will hereinafter appear.

The invention and objects thereof will be more fully understood by reference to the attached drawings wherein like parts are similarly numbered throughout. Figures I and III illustrate, by isometrical drawings and by way of examples, two forms of the invention; Figure II illustrates, diagrammatically, a further modification of an embodiment of the invention, while Figure IV illustrates, by way of example, an automatically operated receptacle for my invention.

Figure I is an isometrical drawing of one embodiment of my invention comprising a wardrobe 1 having two compartments, A and B, provided with hangers for storage of clothes or shelves or other suitable storage space for receiving blankets, furs, fabrics and other materials susceptible to damage by moths and other insect pests. After placing the clothes in the wardrobe 1, both doors, 2 and 3, are closed, whereupon chambers A and B are substantially air tight. Valves 4, 5, 6 and 20 are closed and slide valves 7 and 8 opened. The drawer 9 in the receptacle 10 is removed, filled with a suitable insecticide, such as, paradichlorobenzene, and replaced in receptacle 10. The motor 11 is then started, by turning a conveniently placed switch, not shown, which actuates the blower 12, which, in turn,

draws air from compartment B through the pipes 13 and 14 and forces it through pipe 13—A into the receptacle 10 wherein the air is charged with vapors of the insecticide. The air passes from this receptacle through pipes 15 and 16, past valve 8 into chamber A, flows downwardly through said chamber about the materials stored therein and passes from said chamber through the hole 17 in the floor thereof, into the conduit 18 and up through the hole 19 into compartment B. From this compartment it is drawn past valve 7 into pipes 14 and 13 and back into the blower 12. This cycle of operations is continued until the required amount of paradichlorobenzene or other insecticide has been transferred from the chamber 10 to the wardrobe compartments A and B. The motor is then shut off and, if desired, valves 7 and 8 closed, whereupon the contents of the wardrobe will remain for a long period of time, in an atmosphere in which no parasitic growth can take place.

When it is desired to remove the articles from the chamber, valves 4, 8 and 20 are opened and valves 6, 7 and 5 are closed. The blower is then started, the end of pipe 13 being open to the outside air, fresh air is drawn into pipe 13, blower 12, pipe 13—A, chamber 10, now free of insecticide, pipes 15, 16 and valve 8 into the wardrobe chamber A, through pipe 18, into chamber B and through that chamber again to the outer air through pipe 21. This aeration is continued until the stored materials are free from all insecticide or odor thereof. Doors 2 and 3 may then be opened and materials removed. If desired a connection directly from pipe 13—A to chamber A can be provided, thus bypassing the receptacle 10 during this operation.

If desired the clothes may be vacuum cleaned prior to use or prior to storage by means of flexible rubber attachment 22, illustrated inside, but may, if desired, be outside the wardrobe, which is connected to the blower through pipes 23 and 13. At the end of the attachment 22 is provided a cleaning nozzle 24 adapted to efficiently remove dirt from fabrics and the like. When operating this cleaning attachment, valves 6 and 5 are opened and valves 4, 7 and 8 closed. The air and dirt from the cleaned materials is drawn through the nozzle 24, through pipes 22, 23 and 13, the blower 12, tube 13—A, chamber 10, tube 15, past valve 5 into the open-air or, if desired, into a cloth bag or other type filter for collecting the dirt removed from the fabric being cleaned.

Figure II illustrates, diagrammatically, a section of a wardrobe 1 provided with a storage

space 25 for the storage of clothes, furs, woolen blankets and like materials.

The materials to be treated are charged into the enclosed space 25 and subsequently all egress and ingress of air excluded therefrom by a suitable closing means not shown in this figure. The blower 12 is started and air is drawn from the space 29, into the blower 12, through pipe 30, past valve 31, into the receptacle 10, wherein the air is charged with the insect-proofing agent. It is then forced through pipe 32, nozzle 33, and through the gas-permeable partition 35 into the enclosed chamber 25. The air from this chamber is sucked into the blower 12 and the cycle continuously repeated until the required amount of insect-proofing agent has been charged into the wardrobe.

The advantages derived from this process are many. For example, the air is withdrawn at a substantially uniform rate and in substantially the same amounts from all parts of the wardrobe. The entering air, charged with the insect-proofing agent, does so in such a manner that the concentration throughout chamber 25 is uniformly and progressively increased during the treatment until the desired atmosphere is attained. Due to the circulation afforded, there is no uncharged air left in the chamber, and it follows that, when the desired amount of insect-proofing agent has been transferred from receptacle 10 to the chamber 25 the materials therein are uniformly permeated with the insect-proofing agent.

No opening or closing of doors is required, the protecting atmosphere remains undisturbed, and it remains so over a long period of time. Furthermore, there is substantially no loss of insect-proofing agent, the agent being held entirely in the chamber throughout the operation and since the complete wardrobe is substantially hermetically sealed and, at atmospheric pressure, there is little tendency to leak.

Subsequent to the storage which may, for example, be over the summer months for winter furs and the like, it is, of course, necessary to remove from the materials the insect-proofing agent prior to their return to use. My process is particularly well adapted for effecting this result without any injury or annoyance attending the removal of materials from the wardrobe containing high concentrations of an insect-proofing agent.

This feature of the invention is accomplished in the wardrobe of Figure II by opening valve 35, provided in pipe 37. This pipe is attached to pipe 30, the open end of pipe 37 leading into the atmosphere at any convenient point. Attached to pipe 32 is another pipe 38, likewise leading to the air outside of the wardrobe 1 and operated by valve 39. Prior to removing the materials from the wardrobe, valve 31 is closed and valves 36 and 39 opened. The blower is then started and the air drawn from chamber 25 is discharged to the atmosphere through blower 12 and pipes 30 and 37, respectively. As the pressure in chamber 25 drops below atmospheric, air is drawn through pipe 38 and nozzle 33 into chamber 25. This fresh air is drawn into the apparatus until all traces of the insect-proofing agent has been removed. The aeration of the material can be further improved, if desired, by the employment of a material which rapidly counteracts the odors of the insect-proofing agent, this material being inserted in the stream of fresh air entering pipe 38. The clothes now being free of insect-proofing agent

and as fresh as garments hung in the open air, may now be removed and used.

Figure III is an isometrical drawing of a preferred embodiment of my invention showing a wardrobe 1 with a substantially hermetically sealed door 2 with an upper compartment 45. A simply constructed apparatus is shown in the cutaway portion of compartment 45 which can be reached through door 46. It constitutes a blower 12 with motor 11, attached receptacle 10, with pipes for passing the air through the receptacle into the chamber. It is operated by opening the door 46, removing the chamber 10, which may be of glass, removably fixed to the receptacle holder 47, this receptacle is filled with a suitable insecticide, replaced in the holder, the motor started and the air drawn from the wardrobe through pipe 50, the chamber 10, pipe 49, blower 12 and pipe 48 back into the wardrobe. This operation is continued in a manner similar to the operations described above in Figures I and II. An extension of pipe 48 is likewise provided, the end of which is capped during the above operations and uncapped to aerate the material stored therein prior to reuse. The air may be exhausted from the wardrobe 1 by an air outlet suitably placed.

Any suitable insect-proofing agent may be employed in my process and apparatus such, for example, as paradichlorobenzene, naphthalene flakes, or, if desired, liquids such, for example, as carbon disulfide, formalin, ethylene dichloride, and carbon tetrachloride, may be employed in lieu of the solid insect-proofing agents. Gases may likewise be employed, if desired, which may be introduced as such directly into the air to be charged. Gases such as hydrocyanic acid, chloropierin mixtures of carbon dioxide with ethylene oxide, methyl bromide or methyl formate may be used. The gaseous materials may, if desired, be formed by chemical action within the receptacle by well known means.

I prefer to use, however, the solid agents such, for example, as paradichlorobenzene and naphthalene. When using such materials adequate protection is afforded if, for every 1000 cu. ft. of wardrobe space there is evaporated therein about 8 oz. of paradichlorobenzene or about 0.65 oz. of naphthalene flakes. No insect pests can live when concentrations are maintained at substantially these values.

A preferred embodiment of my invention involves conducting the operation of my apparatus in a substantially continuous manner. This means is illustrated by the isometrical drawing, Figure IV, wherein receptacle 10 is provided with a hinged top 40 and a second loosely fitted top 41. Prior to introducing the solid parasite-proofing agent into the receptacle, the loosely fitting top 41 is lifted. This allows the spring 42 to actuate the lever 43 which closes contacts 44, controlling the operation of the motor 11 and blower 12. Inasmuch as solid parasite exterminating agents volatilize without passing through the liquid phase, the passage of air through receptacle 10 gradually evaporates them and they shrink; the loose fitting top 41, at the same time, gradually settles to the bottom of the receptacle 10. Just prior to reaching the bottom, top 41 contacts the lever arm 45 and when the top 41 reaches the bottom the lever arm opens the contact 44, thus shutting off the blower 12; the measured amount of agent having at this time been transferred to the wardrobe.

From a consideration of the above specifica-

tion, it will be appreciated that many changes may be made therein without departing from the invention or sacrificing any of the advantages which may be derived therefrom.

I claim:

In a wardrobe the combination comprising a closed chamber, a closed circuit within the wardrobe through which air can be removed from and returned to the closed chamber, a receptacle in said closed circuit for holding a solid parasite-exterminating agent having an appreciable vapor pressure at room temperatures, air circulating

means disposed above said closed chamber for circulating air through the closed circuit and in direct contact with the agent, an open circuit, including the aforesaid circulating means, provided with a fresh air intake disposed in the bottom and an exhaust air exit disposed in the top of the wardrobe, valves disposed in the closed and open circuits to direct the flow of air in contact with the agent when the closed circuit is operating and out of contact with the agent when the open circuit is operating.

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