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2,714,848

BLAST GATE AND SYSTEM

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The present invention relates generally to the dry cleaning art and is more particularly concerned with novel apparatus for use with dry cleaning machines to simplify and improve the economy of their maintenance and repair and also assure the desired control over loading and unloading operations and over the flow of solvent vapors from the washing chambers of dry cleaning machines.

In the operation of a conventional dry cleaning machine having a shell defining a washing chamber, an opening for venting solvent vapors from the chamber, and an opening providing access to the washing cylinder in said chamber for loading and unloading operations, the sequence of operations involving the opening and closing of the vent and loading doors is important from the standpoint of the health and safety of the operators. If the loading door is open while the vent door is closed and the solvent is of the usual chlorinated type such as perchlorethylene and trichlorethylene and the solvent is maintained at about its boiling point temperature during the drying operation in accordance with the usual practice, a substantial volume of solvent gas pours from the shell through the loading opening, contaminating the atmosphere in the room and gassing the operator. If, on the other hand, the vent door is first opened and is maintained open until the loading door is closed, the amount of gas escaping through the loading door into the room is negligible, particularly if the machine is equipped as usual with a blower to evacuate solvent vapors from the washing chamber through the vent. Consequently, proper operation of the machine and prevention of poisoning is a matter of training of the operators and reliance upon the operators to follow instructions in using the machine. In some instances, it amounts to more than a matter of overcoming deficiencies in operator education or memory to assure the proper operation because these chlorinated solvents do not have a particularly objectionable odor and operators are inclined to discount warnings and disregard the safety devices of the machine in order to save themselves extra effort and time.

The present invention, to the best of my knowledge, provides for the first time an apparatus whereby proper manipulation of the vent and access doors of a dry cleaning machine will always be assured regardless of inexperience, forgetfulness or laziness on the part of the operator. In other words, by virtue of the invention, the human factor can be entirely removed from the matter of the control over the flow of the dangerous solvent vapors generated in the machine during conventional dry cleaning operations. The present apparatus has the still further advantage of reducing the number of operations and the effort and time required of the operator in converting the machine in accordance with safety practice from loading to unloading condition and vice-versa.

Another serious shortcoming of the prior art dry cleaning machines, which is overcome for the first time to my knowledge by virtue of this invention, concerns the matters of manufacture, assembly, installation, maintenance

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and repair of the blast gate assembly of such machines. Heretofore, these blast gates have been so constructed as to make disassembly for inspection or repair purposes, for instance, a major operation involving considerable time and expense. The closure element or door of such an assembly is in the ordinary prior machine virtually inaccessible and yet this door may require frequent attention, as also may the operating mechanism for the door which is housed within the stack of the assembly and therefore is also relatively inaccessible.

In accordance with this invention, the blast gate assembly is unitary and accordingly can be removed readily and as a body from the dry cleaning machine and entirely replaced or disassembled in part and replaced in its original location. It will be appreciated that with the assembly being thus readily removable from the machine, the door is as accessible as any part and the time and expense involved in making adjustments and replacements in the assembly will be reduced to a small fraction of that previously necessary.

As a further important advantage, this invention uniquely assures that the blast gate will be tightly closed when desired by virtue of sealing pressure being distributed uniformly around the engaging periphery of the door element.

As a still further advantage of this invention, the blast gate of this assembly is positively locked in closed position at all times that this is desired.

This apparatus of my invention has the further advantage of being easily and inexpensively manufactured and installed either in new or old machines.

A further appreciation of the objects and advantages of this invention and a further understanding of the novel structure of apparatus of said invention will be gained by those skilled in the art upon consideration of the following detailed description, reference being had to the drawings accompanying and forming a part of this specification, in which:

Fig. 1 is a fragmentary, perspective view of a dry cleaning machine equipped with apparatus embodied in a preferred form of this invention;

Fig. 2 is a fragmentary, side elevational view of the device of Fig. 1 with parts broken away for clarity; and,

Fig. 3 is a fragmentary, end elevational view of the Fig. 1 device with portions of the blast gate valve body and machine broken away.

Generally, the apparatus of this invention incorporates in a dry cleaning machine having a shell in which solvent vapors are contained, a vent opening in the shell, and a door to close said vent, the combination of spring hinge means anchored to stationary structure and resiliently urging the door open, and mechanism for closing and locking said door. In a preferred embodiment, the present apparatus comprises a combination of means for opening and closing the vent door of a dry cleaning machine washing chamber including spring hinges resiliently urging the vent door open and mechanism for closing and locking said vent door in closed position against said hinge means, lock means for securing the access door in closed position, and means operatively associated with the vent door and the access-door lock means for actuating the lock means to lock the access door when the vent door is closed and to unlock the access door when the vent door is opened. In a refinement of this preferred form, where the dry cleaning machine with which the present apparatus is used includes a blower to evacuate the solvent vapors from the washing chamber through the vent opening, this apparatus includes in addition, a switch means to control the blower, this switch means being operatively associated with the vent door and lock means so that the switch is actuated and the blower is started when the vent

door is opened and the switch is actuated and the blower turned off when the vent door is closed.

As indicated above, any generally conventional dry cleaning machine, such as that shown in U. S. Patent No. 2,316,669, granted April 13, 1943 to Mario Busi, may be equipped with apparatus of this invention to obtain the foregoing objects and advantages. Such a machine will include the usual conventional parts such as a shell S defining a washing chamber portion 10 and having an access opening in one of its sides, a venting opening 12 in its top communicating with a stack 13, and doors 15 and 16 for closing said access and venting opening, respectively. In addition, the machine will have blower means including a fan 17 to draw solvent vapors from the washing chamber and drive them to the stack through vent 12.

Vent door 16 is disposed within the upper end of shell S adjacent to the lower open end of stack 13 and above washing chamber portion 10 in a passageway wherein blades of fan 17 are disposed, and is resiliently mounted on spring hinge elements 21 in stack 13 and fastened to the lower extremity thereof. Hinges 21 resiliently urge door 16 toward an open position. Door 16 is operated to open and close vent 12 by means of a link 24 extending upwardly from the door into body 13 and constituting, in effect, a valve stem, door 16 being the valve disc and body 13 being the valve body. The ring or seat of this valve comprises the inner peripheral portion of a gasket 25 disposed between body 13 and the top of shell S. Gasket 25, in accordance with this invention, is so dimensioned as to serve the additional purpose of gas-tightly sealing the valve body and shell S together around vent 12, any suitable means such as bolts 22 being used to hold stack 13 in position on shell 10.

Door 16 is operated by means of a rotatable shaft 27 in a bushing 28 (Fig. 3) extending into the valve body substantially horizontally, i. e. at substantially right angles to valve stem 24, and carrying at its end adjacent to the stem cam means 29 to which the upper end of the stem is attached. Thus, rotational motion of shaft 27 is translated into reciprocating motion of the valve stem and door 16 is closed when a handle 30 keyed to the outer end of shaft 27 is turned by the operator. These motions are limited, however, so that the door is positively locked tightly closed, stem 24 engaging an abutment 26 formed in stack 13. This engagement does not occur, though, until the stem has been carried by cam 29 beyond the top dead center position of said cam, thus assuring that the door will not jar open but can be opened only by the application of force to lift the stem back over the cam peak.

The door lock means comprises a lock bar 32 disposed vertically in front of the machine immediately above the upper edge of door 15 and below and to one side of handle 30. The lower end of bar 32 is formed to fit over the upper flanged edge of door 15 to prevent opening of the door when handle 30 is in position shown in the drawings. A housing member 34 is provided to enclose the upper portion of the lock bar and particularly the elbow connection at 35 between the upper end of this bar and an element of the operating means subsequently to be described. Housing 34 may serve the further purpose of supporting the bar 32 against forces applied to the lower end of it tending to open door 15 when the bar is in the locked position. This housing may suitably be bolted to the shell of the machine for ready removal and access to the bar and elements of the operating mechanism in the vicinity thereof.

Fan 17 is electrically operated and is controlled suitably by a conventional three-pole electric switch diagrammatically illustrated at 37 in the drawings. The electrical connections between switch 37, a power source (not shown) and the fan motor may be conventional

and in any event will be understood by those skilled in the art.

The operation mechanism for opening and closing switch 37 and for locking and unlocking door 15 comprises a cam disc 40 keyed eccentrically to shaft 27 adjacent to handle 30 and outside the valve body. A generally vertically disposed connecting rod 41 extends from cam 40 downwardly toward the loading door of the machine and terminates adjacent to one end of a link 42 pivoted at its midsection for vertical rocking motion. Rod 41 and link 42 are pivotally connected together at their adjacent ends and at its other end link 42 is fastened to lock bar 34 at joint 35. Thus, rotational motion of shaft 27 is translated by means of rod 41 and link 42 into vertical reciprocating motion of the lock bar as door 15 is locked and unlocked, door 16 is closed and opened.

Between its ends the connecting rod carries a bracket 43 which is mechanically associated with switch 37 so that as the handle 30 is rotated and the foregoing results respecting the vent and access door are obtained the switch is simultaneously turned on or off.

From the foregoing description, the operation of the apparatus of this invention may be apparent to those skilled in the art. For example, when it is desired to open the loading door to put garments into the machine or to take them out at the beginning or end of the cleaning cycle, the operator turns handle 30 to the position indicated in outline in Fig. 2, thereby opening vent door 16, unlocking access door 15 by withdrawing upwardly lock bar 32 and substantially simultaneously starting fan 17 by closing switch 37. Door 15 is then opened and instead of solvent vapors pouring through the loading opening, air from the room is drawn therethrough into the washing chamber because of the draft created in the stack by the blower. When the washing operation is to be resumed, door 15 is closed and handle 30 is returned to its original position so that door 15 is locked closed, fan 17 stopped and vent door 16 is closed, all substantially simultaneously.

It will likewise be clear that when it is desired to inspect or repair door 16, or replace gasket 25, or do anything else to the blast gate assembly, it is only necessary to detach stack 13 from body 10 and disengage shaft 27 and cam 28 and lift said assembly from the shell. This will also enable the operator to reach easily the interior of shell 10 in the vicinity of fan 17 and thus may enable the manufacturer to dispense with one or more shell access doors usually provided in the upper portion of the shell.

Having thus described the present invention so that those skilled in the art will be able to gain a better understanding and practice the same, I state that what I desire to secure by Letters Patent is defined in what is claimed.

What is claimed is:

1. A blast gate assembly for use on a dry cleaning machine to regulate venting of solvent vapors from the washing chamber of the machine comprising a hollow body open at each end, a flange extending around one end of the body having an outer portion adapted to rest on a supporting structure and having an inner peripheral portion, a gasket along the outer side of the inner peripheral portion of the body, a door hinged to said body and disposed outside the flanged end thereof, and mechanism for rotating the said door on its hinges to open and close the door against said inner peripheral portion of the flange comprising a shaft extending through the body into the interior thereof, cam means on the shaft adapted to hold the door locked against the gasket when in an over-center position, and link means connecting the cam means and the door.

2. A blast gate assembly for use on a dry cleaning machine to regulate venting of solvent vapors from the washing chamber of the machine comprising a hollow

body open at each end, a flange extending around one end of the body having an outer portion to rest on a supporting structure and having an inner peripheral portion, a door disposed outside the flanged end of said body, spring hinge means anchored within the body and secured to and resiliently opposing motion of the door to close the body, mechanism operatively associated with said door to open and close the door against said inner peripheral portion of the flange and to lock the door in closed position comprising a shaft, cam means on the shaft and a link extending between the cam means and the door, and abutment means carried by said body to engage said cam mechanism and limit motion thereof to a predetermined range.

3. In a dry cleaning machine having a washing chamber in which solvent vapors are contained and a loading door for the chamber, means associated with the machine for exhausting said vapors from the chamber including the combination of a shell having a vent opening and a blast gate assembly for regulating flow of solvent vapors through the vent opening, said assembly comprising a body open at its ends and constituting a stack for the machine, a flange extending around the lower open end of the body to rest on the shell and surround said vent opening, and a door hinged to said body and disposed outside the lower flanged end thereof, a normally closed lock for the loading door, and mechanism for simultaneously operating the lock to permit opening of the loading door and for operating the stack door to open the stack and permit vapors to escape.

4. In a dry cleaning machine having a washing chamber in which solvent vapors are contained and a loading door for the chamber, means associated with the machine for exhausting said vapors from the chamber including the combination of a shell having a vent opening and a blast gate assembly for regulating flow of solvent vapors through the vent opening, said assembly comprising a body open at its ends and constituting a stack for the machine, a flange extending around the lower open end of the body to rest on the shell and surround said vent opening, a door hinged to said body and disposed outside the lower flanged end thereof, and a gasket disposed between the said body flange and the shell to seal the body and shell together around said vent opening and having an inner peripheral portion extending into said vent opening, a normally closed lock for the loading door, and mechanism for simultaneously operating the lock to permit opening of the loading door and the stack door to divert vapors into the stack comprising a shaft carrying a handle, a first cam means and a second cam means, a link extending between the said first cam means and the stack door, and a link extending between the second cam means and the lock.

5. In a dry cleaning machine having a washing chamber and a loading door therefor, vapor protection apparatus comprising the combination of a stack, a stack door positioned at the lower extremity of the stack and adapted to be rotated downwardly so as to open the stack and divert vapors into the stack, operating means for the said stack door comprising a rotary shaft and a crank at one end, a link extending between the said crank and the said stack door, a cam mounted on the shaft, lock means for the loading door of the machine comprising a sliding bar and a pivoted lever supporting the bar, and a link extending between the said lever and the said cam whereby rotation of the said shaft to open the stack unlocks the loading door.

6. In a dry cleaning machine having a loading door, vapor protection apparatus for preventing escape of noxious vapors from the door comprising the combination of a stack, a stack door positioned at the lower extremity of the stack and adapted to be rotated downwardly so as to open the stack and divert vapors into the stack, operating means for the said stack door comprising a

rotary shaft and a crank at one end and a link extending between the said crank and the said stack door, a blower for withdrawing vapors from the washing compartment of the machine, and an electric motor for the said blower, lock means for the loading door comprising a sliding bar and a pivoted lever supporting the bar, a cam mounted on the shaft and a link extending between the said pivoted lever and the said cam, and a switch operatively connected to the said link whereby rotation of the said shaft to open the gate unlocks the door and closes the switch to start the motor.

7. In a dry cleaning machine having a washing chamber and a loading door for the chamber, vapor protection apparatus for preventing escape of noxious vapors from the door comprising the combination of a vapor removal shell communicating with the chamber, a stack, a stack door positioned at the lower extremity of the stack and adapted to be rotated downwardly so as to open the stack and divert vapors from the shell into the stack, operating means for the said stack door comprising a rotary shaft and a crank at one end and a link extending between the said crank and the said stack door, a blower for withdrawing vapors from the washing compartment of the machine and directing them into the shell, and an electric motor for the said blower, lock means for the loading door comprising a sliding bar and a pivoted lever supporting the bar, a cam mounted on the shaft and a link extending between the said pivoted lever and the said cam, and a switch operatively connected to the said link whereby rotation of the said shaft to open the gate unlocks the door and closes the switch to start the motor.

8. In a dry cleaning machine having a washing chamber, a shell through which vapors may be circulated from the washing chamber, a loading door for the washing chamber and means for opening the loading door, the combination of a lock for holding the loading door secure against opening, means for exhausting vapors from the washing chamber including a stack mounted on the shell and a door in the shell for closing the stack at the lower end thereof, a blower mounted in the shell to draw vapors from the washing chamber into the shell, a motor for operating the blower, switch means for starting and stopping the blower motor, means for opening the stack door to exhaust vapors from the washing chamber and shell through the stack, and means for controlling the sequence of machine opening operations so that the loading door cannot be opened until the blower is operating and the stack door is opened including mechanism connected to the stack door and to the switch means to start the blower motor simultaneously with the opening of the stack door, and lever means for releasing the loading door lock as the stack door is opened so that vapors cannot escape through the loading door opening when the loading door is opened.

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