Dec. 5, 1961 J. W. FROST 3,011,627

WASTE DISPOSER

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FIG 1

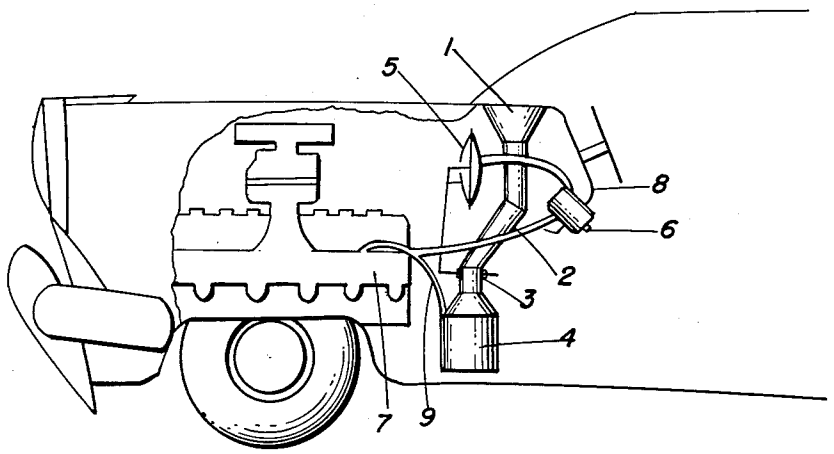
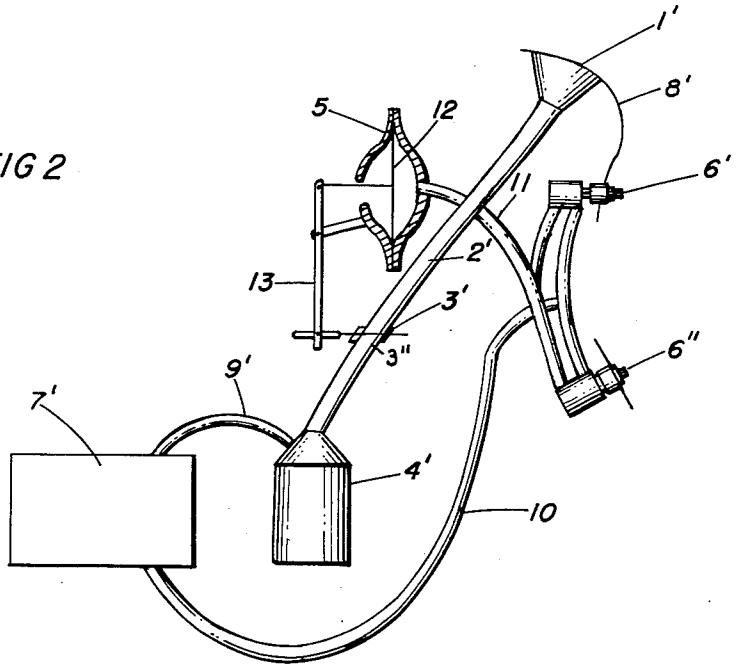


FIG 2



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FIG 3

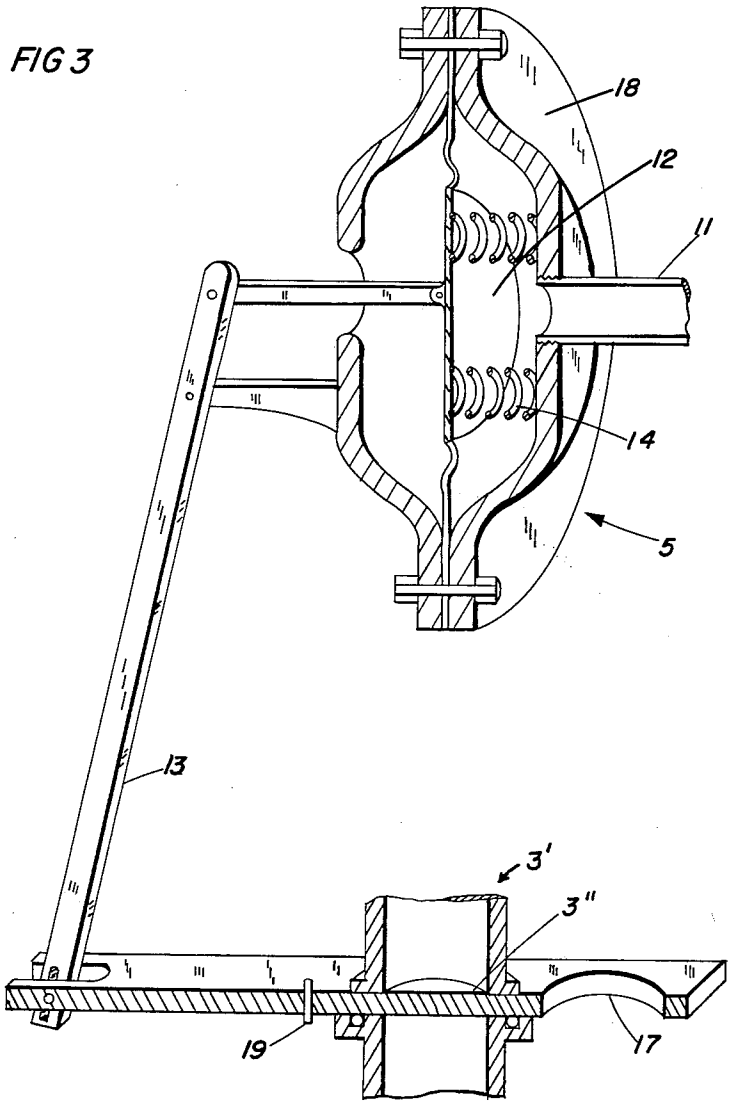
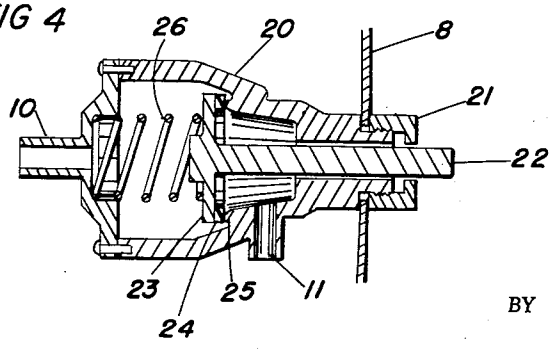


FIG 4



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WASTE DISPOSER

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2 Claims. (Cl. 206—19.5)

This invention relates to disposal apparatus for ashes and other trash, garbage and refuse. More particularly it relates to vacuum actuated apparatus for receiving and depositing within a vehicle such trash and refuse as ashes, cigarette butts, cigar stubs, cleansing tissues, paper napkins, and the like.

This in a continuation-in-part of my co-pending application No. 609,861 filed on September 14, 1956, entitled Vehicle Ash and Waste Receiver, now United States Patent 2,891,662, issued June 23, 1959.

Unlike currently available disposal apparatus, the present invention provides means whereby cigarettes may be deposited in a suitable receptacle in or adjacent to the dash board or instrument panel of an automobile or other passenger carrying vehicle and may then be caused by a simple operation of a push button to be conveyed by means of vacuum to a suitable receptacle apart from the area occupied by passengers.

No means has been heretofore provided which is capable of receiving and disposing of many other sorts of trash, refuse and garbage such as cigar butts, apple cores, peach pits, banana peels, cleansing tissues, paper napkins and the like. The use of paper napkins and cleansing tissues within automobiles has become general, and no means of disposing of such trash or of other trash such as gum and candybar wrappers, cigarette package wrappers, etc. has conventionally been available within the passenger compartments of automobiles or other vehicles. In most cases such trash is thrown from the windows of automobiles. With the steadily increasing concentration of traffic on our highways, roadsides often become littered with trash and refuse. Not only is such littering objectionable and a fire hazard, but in many places it is illegal.

One of the problems in providing a disposal device which utilizes an onrush of air into a previously evacuated chamber is to provide for the rapid, positive, and complete opening and closing of the passageway connecting the trash receptacle with the trash storage container. When the system is to be intermittently operated by humans whose span of attention will be short or nonexistent, the problem is even more acute. A means of providing a valve which functions positively and dependably with slight, variable actuating pressures is much to be desired.

To be practical, a system should be able to dispose of trash in reasonably large sizes, such as apple cores, banana peels, and other bulky items. With these requirements in mind it has been found impractical to have the valve directly controlled by hand, as humans are not consistent enough to open the valve properly every time. If the valve is not opened very swiftly, the onrush of air is reduced in magnitude and bulky trash is likely to become lodged in the passageway.

The present invention provides suitable and efficient means for disposing of bulky trash and smaller refuse quickly, easily, and dependably.

It is therefore an object of this invention to provide a device for receiving cigarette ashes and cigarette butts and other waste and garbage and conveying such materials to a receptacle upon the operation of a push button.

Another object is the provision of a means of disposing of ignited and ignitable materials without the latter becoming ignited by the former.

Another object is a vacuum operable means for conveying bulky trash, garbage, and waste paper from the

interior of the passenger compartment of a vehicle to a receptacle upon the operation of a push button.

A further object of this invention is to provide a disposal system which will use the erratic actuating motions of a human being to produce smooth, swift, positive and dependable operation of the means whereby trash and refuse is conveyed from the initial receptacle to the storage container.

Still further objects will become apparent from the drawings and the following detailed description in which it is my intention to illustrate the applicability of the invention without thereby limiting its scope to less than that of all equivalents which will be apparent to one skilled in the art.

In the drawings like reference numerals refer to like parts and:

FIGURE 1 is a partially cutaway elevation of a portion of an automotive vehicle provided with the device of the invention;

FIGURE 2 is a schematic view of the components making up the invention;

FIGURE 3 is a cross-sectional perspective view of the actuating servo-mechanism and the valve which opens and closes the passageway between the receptacle and storage container;

FIGURE 4 is a cross-sectional view of an embodiment of a push-button which serves to actuate the servo-mechanism shown in FIGURE 3.

Referring now to FIGURE 1 there is shown a portion of an automobile having a dashboard **8** and an intake manifold **7**. Trash-receiving receptacle **1** may be mounted on dashboard **8** so that it opens into the passenger compartment or may be located at any other suitable place within a compartment adapted to contain humans. Receptacle **1** is connected by a large smooth tube **2** to storage container **4**, which is connected by a smaller tube **9** to a source of vacuum such as intake manifold **7**. In smooth tube **2** connecting receiving receptacle **1** and storage container **4** is a knife valve **3**, which is actuated by servo-mechanism **5**. Servo-mechanism **5** which comprises a vacuum operated diaphragm, is actuated in turn by push-button valve **6** which may be also mounted on dashboard **8**.

A schematic diagram of the same essential elements (FIGURE 2) and an enlarged view of the servo-mechanism (FIGURE 3) illustrate the operation of the device. Trash may be placed in the dashboard receptacle **1'** located at dashboard **8'**. The push-button of valve **6'** may then be pushed by an operator by hand or the push-button of push-button valve **6''** may be pushed by the foot of a human operator. The operation of push-button valve **6'** connects servo-mechanism **5** with source of vacuum **7'** through tubes **10** and **11**. The vacuum causes diaphragm **12** of servo-mechanism **5** to move to the right, thus moving knife **3''** of valve **3'** to the left by means of lever **13** and opening the tube **2'** between receiving receptacle **1'** and storage container **4'**. The ensuing onrush of air carries the trash from receptacle **1'** through the tube **2'** and deposits it within the storage container **4'**. When the push-button of valve **6'** is released, diaphragm **12** in servo-mechanism **5** returns to its original position, closing knife-valve **3'**. The device is then ready for another operation.

A more detailed description of the operation of servo-mechanism **5** may be had by referring to FIGURE 3. When the housing **18** is connected to a vacum through tube **11**, air pressure forces diaphragm **12** to move instantly toward the right, compressing springs **14** and causing lever **13** to move the knife **3''** of knife-valve **3'** to the left. This brings the opening **17** in the knife **3''** into at least partial registry with the tube, and causes air to rush down the tube and into the storage container,

bringing the deposited trash and refuse with it. When the vacuum is disconnected from tube **11** (by releasing the push-button of **6'**) the springs **14** cause diaphragm **12** to return to its normal position (determined by pin **19** contacting tube **2**), closing the knife-valve **3'**.

Experiments have shown that a force of 18 pounds is required to open knife-valve **3'** positively and quickly if tube **2** has a diameter of about 1½ inches and both the knife and seat are suitably smooth and lubricated. A mechanical advantage of 1 to 8 on the lever **13** and a diaphragm **12** of 5 inch diameter are sufficient to produce the needed force when the device is installed in a modern automobile.

Servo-mechanism **5** possesses the advantages of having very few moving parts, of being relatively easy to manufacture and install and of producing the dependable and positive motion which is necessary.

A possible embodiment of a push-button valve **6** or **6'** is shown in FIGURE 4. Housing **20** may be attached to a dashboard **8'** by a threaded nut **21**. Operation of push-button **22** causes valve **23** to be forced away from seat **25**, compressing spring **26** and causing tube **10** to communicate with tube **11**. When push-button **22** is released, spring **26** forces valve **23** back against seat **25**, sealing tube **10** from tube **11**. Gasket material **24** may be provided to make the seal more effective.

The drawings merely indicate one possible embodiment of the invention. Others will be apparent to the skilled reader.

Prior to my inventions it has not been possible to remove trash and refuse from the passenger compartment of an automobile by operation of a push-button or like device having a limited or restricted range of movement. Also, as mentioned and more fully described heretofore, it is necessary that the sliding knife-valve be opened with great rapidity in order to provide a sharp surge of air to suitably convey trash through the tube, and that the valve subsequently be closed with great rapidity in order to permit the apparatus to become ready for subsequent operation as soon thereafter as possible. These conditions are met in my invention by providing an actuating servo-mechanism such as the diaphragm herein described which causes the slidingly sealed knife-valve to operate satisfactorily and relatively independently of the originating force applied to the push-button.

A satisfactory device of this type must be able to function satisfactorily during repeated operations with relatively short periods required for the vacuum to become re-established in the container. With the system described herein operating in conjunction with a 90 horsepower V-8 automobile engine, 11 seconds were required after closing the knife-valve **3** for the vacuum to reach 10 inches of mercury and 19 seconds were required for the vacuum to reach 15 inches of mercury when using a container of about 1 gallon capacity. The engine developed 16 inches of mercury when the apparatus was detached or not operated for 1 or 2 minutes.

It should also be mentioned that the apparatus of my invention may be used in theatres, taverns, hotels, and the like and may be used in various types of vehicles other than automobiles, for example, boats, passenger liners, aircraft, and the like.

It may thus be seen that the invention is broad in scope and is not to be limited except by the claims.

Having thus disclosed my invention I claim:

1. In a device of the type described the combination of a compartment adapted to contain humans; a substantially enclosed space inadapted to contain humans spaced apart from said compartment; a source of reduced air pressure disposed in said space; a closed container communicating with said source; a trash-receiving receptacle disposed within said compartment; a tubular conveying member providing a communicating passage between said trash-receiving receptacle and said closed container; a valve having a slidingly closing member disposed in said conveying member to close said passage by sliding sealing action against a substantially stationary member; said sliding member biased toward closed position; an air-tight housing having at least one side defined by a diaphragm; said diaphragm free to move in response to changes in pressure within said housing; said diaphragm connected to said sliding member so that the motion of said diaphragm moves said sliding member to open said passage; a manually moveable valve operating member disposed within said compartment; tubular means connecting said source of reduced air pressure and said rigid air-tight housing; a valve in said tubular means operated by said manually moveable member when said manually moveable member is subjected to a minimum pre-determined manual pressure.

2. In a device of the type described the combination of a compartment adapted to contain humans; a substantially enclosed space inadapted to contain humans spaced apart from said compartment; a source of reduced air pressure disposed in said space; a closed container communicating with said source; a trash-receiving receptacle disposed within said compartment; a tubular conveying member of substantially circular cross-section providing a communicating passage between said trash-receiving receptacle and said closed container; a valve having a slidingly closing member disposed in said conveying member to close said passage by sliding sealing action against a substantially stationary member said sliding member biased toward closed position an air-tight housing having at least a portion thereof formed of a flexible diaphragm; said flexible diaphragm free to move in response to a reduced pressure within said air-tight housing; said diaphragm attached to said sliding closing member so that said motion of said diaphragm causes said sliding member to open said passage; a manually moveable valve operating member disposed within said compartment; tubular means connecting said housing with said source of reduced pressure; a valve in said tubular means to thereby provide a closed communicating passageway between one side of said valve and said air-tight housing and a closed communicating passageway between the other side of said valve and said reduced pressure source; said manually moveable member disposed to open said valve when subjected to a minimum predetermined manual pressure, and to provide no additional response to greater manual pressure and to length of time and distance over which said manual pressure is applied.

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