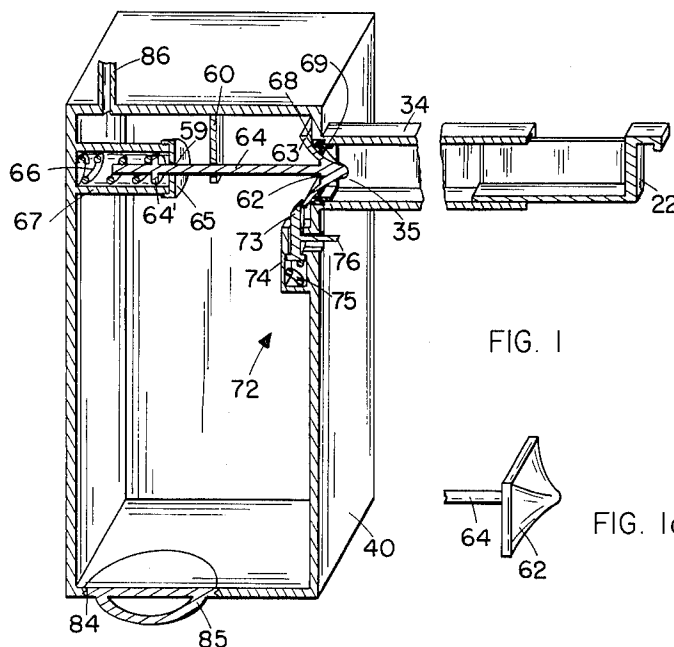
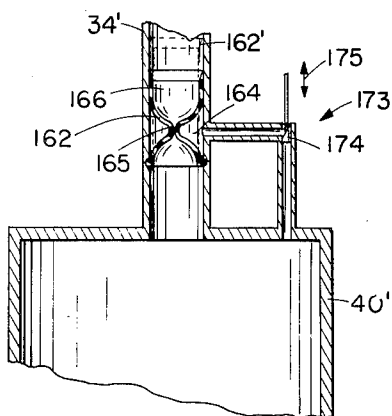
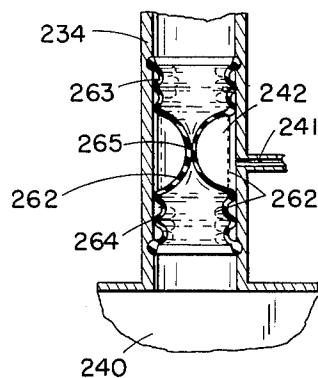


Filed Dec. 9, 1963

DISPOSER FOR TRASH

2 Sheets-Sheet 1



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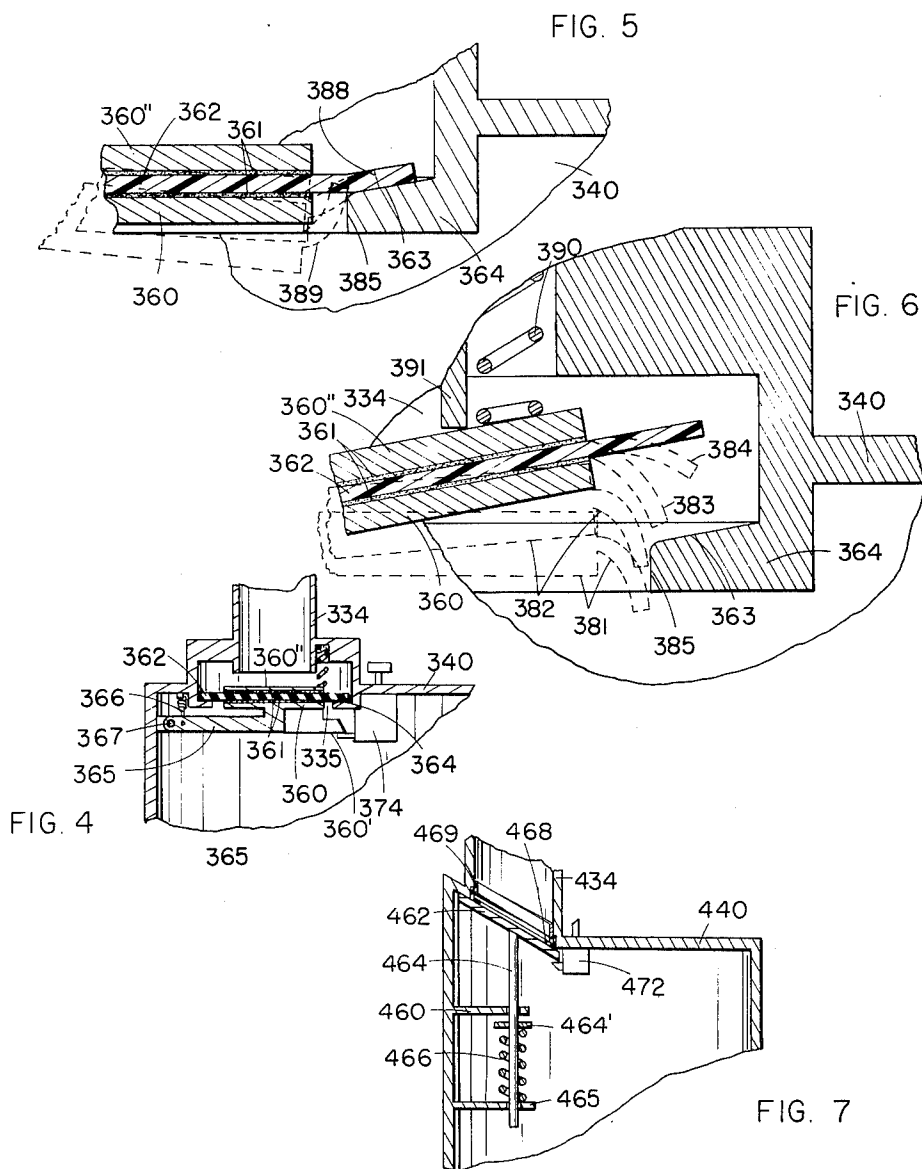
Feb. 15, 1966

J. W. FROST
DISPOSER FOR TRASH

3,235,064

Filed Dec. 9, 1963

2 Sheets-Sheet 2



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3,235,064

DISPOSER FOR TRASH

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Filed Dec. 9, 1963, Ser. No. 329,108
1 Claim. (Cl. 206—19.5)

This application is a continuation-in-part of application Serial No. 157,329, filed December 4, 1961, now U.S. Patent No. 3,113,665, having the same title.

This invention relates to ash and waste receivers and more particularly to vacuum operated self disposing waste receivers for automotive vehicles and other vehicles.

An object is to provide new species of the genus described in the parent application Serial No. 157,329.

Another object of this invention is to provide a manually controlled vacuum operated waste disposal system of simple construction which may be conveniently installed and easily operated with great effectiveness, which is especially adapted for use in vehicles such as automobiles.

Another object of this invention is to provide a disposal system which will functionally dispose of bulky and variegated objects such as paper napkins and discarded food as well as liquids and particles (such as tobacco ash) and cigarette and cigar stubs.

A further object of this invention is to provide a receptacle that is easily installable in a vehicle and that is readily accessible for emptying and servicing and for reinstallation for further use.

Further objects will become apparent from the drawings and from the following description wherein the applicability of the invention is illustrated without intention to thereby limit its scope to less than all of those equivalents which will be apparent to one skilled in the art.

In the drawings like reference numerals refer to like parts.

FIGURE 1 is a partially cross-sectional perspective view of one embodiment of the invention;

FIGURE 1a is a perspective view of a portion of the embodiment of FIGURE 1;

FIGURE 2 is a cross-sectional fragmentary view of another embodiment;

FIGURE 3 is a cross-sectional fragmentary view of a portion of another embodiment;

FIGURE 4 is a fragmentary cross-sectional schematic view of another embodiment;

FIGURE 5 is a fragmentary cross-sectional view of a portion of the embodiment of FIGURE 4;

FIGURE 6 is a fragmentary cross-sectional view of a portion of the embodiment of FIGURE 4;

FIGURE 7 is a fragmentary cross-sectional schematic view of another embodiment.

Referring now to FIGURES 1 and 1a, receptacle drawer 22 is slidably received in receptacle duct 34 which may have any desired cross-sectional shape, and thus may be round in cross-section but is preferably rectangular in cross-section as shown. Receptacle duct 34 extends from one wall of receiver container 40. Opening 35 is closed by poppet valve member 62 as shown in detail in FIGURE 1a. Member 62 is attached to shaft 64 which is slidably received in hole 59 in cover member 65 for tube 67 which extends from an inner wall of receiver 40. Provided within tube 67 is spring 66 which acts on extending portion 64' which extends from shaft 64. Poppet valve member 62 may be held in a closed position by latch 72 which may comprise latch portion 73 slidably received in housing 74 biasedly maintained in latched position as shown by compression spring 75 acting thereon. Handle member 76 may be provided extending through a slot in the wall of receiver 40. By fingertip actuation or by remote actuation through a "Bowden" wire, a solenoid or other suitable means, latch member 73 may be caused

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to slide in housing 74 against the action of spring 75, to assume an unlatched position and release poppet valve 62.

Air is removed from container 40 by a source of vacuum, such as an internal combustion engine or a vacuum pump, through a tube which may be attached to outlet 86. Closure 85 may be provided in one wall of container 40, threadedly engaged as shown at 84, to permit removal of the contents of container 40 when the device is not in operation.

Poppet valve member 62 is of relatively rigid material. Extending inwardly from the interior peripheral edge of opening 35 there is provided seal member 68 which may be made of any one of various materials which possess elastomeric properties such as rubber or plastic or it may be made of other flexible material such as metal. It is held in place by any suitable means such as retainer ring 69.

As the pressure in container 40 is reduced by operation of the vacuum source, the portion of seal member 68 which is adjacent the angular upward extending peripheral portion 63 of valve member 62 is drawn tightly against portion 63 due to the increase in pressure differential, if a portion of member 68 contacts portion 63 continuously around the periphery of opening 35, as shown in FIGURE 1, prior to the beginning of the increase in differential. Thus the effectiveness of the seal is increased in proportion to the pressure differential which is created by evacuation of receiver 40.

By suitable operation of latch member 73, member 62 is released and is driven into the interior of container 40 by the greater air pressure in receptacle tube 34 than in container 40. As member 62 is thus driven inward, seal member 68 which is preferably both flexible and resilient assumes a relaxed shape (not shown in FIGURE 1) the inward motion of member 62 may be stopped by the striking of shaft 64 against the inner wall of receiver 40 at the bottom of tube 67. Spring 66 then causes member 62 to return to the closed position shown in FIGURE 1. It is essential in most cases that the valve member such as member 62 contact the seal member such as 68 only relatively very lightly when it initially closes and is then latched closed, in order that the spring force which causes the valve member to close and latch against the action of the seal member need not be excessive. The sealing force and sealing area between the sealing member and the valve member are increased in proportion to the increase of pressure differential across the valve member. Thus, the sealing force becomes great when it is necessary that it be relatively large to prevent leakage resulting from a high pressure differential. Receptacle 40 may have any shape including those described in my Patents 2,801,662 and 3,011,627 and, by suitable modification to provide a duct leading from valve member 62, may be located at any suitable place in the vehicle as described in said patents. Drawer 22 may be omitted.

The source of reduced pressure may be either a portion of an internal combustion engine as hereinbefore described or may be a portion of a gas turbine engine or any mechanism for providing a reduced pressure which preferably may be associated with either of said types of engine.

Various forms of latch such as shown in the parent application Serial No. 157,329 may be used in place of the latch as shown in FIGURE 1.

Seal member 68 may be said to be an annular seal member.

To assist in providing lateral motion of rod 64 in both directions such that valve member 62 is properly aligned with opening 35, bracket member 60 may be provided extending from an interior wall of receiver 40; bracket 60 may be provided with an aperture in which shaft 64

may be slidably received. Bracket 60 may be omitted if the sliding fit between extending portion 64' and the interior of tube 67 and also the sliding fit between aperture 59 and shaft 64 are such as to maintain the desired alignment.

Referring now to FIGURE 2 there is shown another embodiment in which refuse is introduced through tube 34' into receiver 40'. The passage within tube 34' is closed by flexible or resilient valve member 162 which preferably is made of an elastomeric rubber or plastic. When in the closed position as shown in full lines, member 162 is maintained in the closed position, as shown, by the pressure differential which may be provided between atmospheric pressure in the upper portion of 34' and the reduced pressure which may be provided in receiver 40', so long as pilot valve 173 is closed. When pilot valve 173 is opened (opening may be accomplished by moving valve operating member 174 upward as indicated by the upwardly pointing portion of arrow 175) reduced pressure is introduced into space 164 around the periphery of sealing valve member 162, and it is caused to be drawn against the interior walls of tube 34' and assume the position shown by dashed lines 162', whereupon refuse may be caused to pass through tube 34' and through the interior of member 162, into receiver 40' by the sudden and voluminous flow of air which rushes therethrough to fill receiver 40'. As soon as the flow of air under atmospheric pressure through tube 34' into receiver 40' causes the pressure in receiver 40' to reach atmospheric pressure, the vacuum provided in space 164 around member 162 no longer exists; member 162 thereupon reassumes the shape shown in full lines; pilot valve 173 may be of a type that automatically thereupon closes. Valve 173 may be a pilot valve of a type which automatically closes, for example, as shown in my Patent 2,801,662.

As air is withdrawn from receiver 40', the pressure differential created across member 162 causes its upper portion 166 to slide downward somewhat along the interior walls of member 34' to cause the sealing action at 165 to be increased in proportion to the increase in pressure differential.

Referring now to FIGURE 3, a modification of the embodiment of FIGURE 2 is shown, wherein refuse may be introduced into receptacle tube 234 and may subsequently be conveyed into receiver 240 and pilot tube 241 may be connected to the interior of container 240 through a pilot valve (not shown for simplicity) similar or identical to valve 172. Sealing and valve member 262 may correspond to member 162 and may be made of like material. When member 262 is in a closed and sealed position as shown in full lines the increase of pressure differential between the upper portion of tube 234 in the interior of container 240 causes bellows portions 263 and 264 to extend and the sealing area at 265 to be increased. When, by operation of the pilot valve which for simplicity is not shown, the interior of tube 241 is connected to the interior of container 240. Air is withdrawn from space 242 surrounding the central portion of valve member 262 and it is caused to assume the position shown in dashed lines at 262' and thence through the interior of valve member 262 and into the interior of receiver 240. As soon as pressure within the interior of container tube 240 and space 242 is approximately equal to the pressure exterior to tube 234, the force which causes member 262 to assume the position shown in dashed lines 262' ceases or nearly ceases and 262 snaps back into position shown in full lines, by reason of the action of bellows portions 263 and 264 which act as compression springs, whereupon the seal is established at 265 and by evacuation of 240 a pressure differential is caused to exist and then to be increased in magnitude which causes the sealing action of 265 to increase in effectiveness as above described.

Referring now to FIGURE 4, and to the fragmentary views of FIGURES 5 and 6 which show stages in the opening and closing of the valve member of FIGURE 4, there is shown another embodiment wherein sealing and valve closure action is provided by resilient plastic disc 362 which is preferably of a relatively highly flexible self-lubricating and fatigue resisting plastic such as nylon or polychlorotrifluoroethylene or polytetrafluoroethylene. Disc 362 may preferably be from about 3 mils to about 10 mils in thickness. It closes opening 335 at the juncture between receptacle tube 334 and 340 and is sealed by air pressure resulting from the differential in pressure created by partial evacuation of receiver 340 which provides sealing action against surface 363 on shoulder 364 which extends from exterior wall of container 340. Disc 362 is held in a closed position by the action of latch 374 (which may be like any suitable latch described in parent application Serial No. 157,329) against portion 360' which extends from disc supporting member 360. When disc 362 is opened by release of latch 374, it is caused to return to the closed position by action of spring 366 acting on support member 360 which is attached to arm 365 which is pivotally mounted at 367 to a bracket extending an interior wall of receiver 340. Disc 362 may be attached by adhesive 361 to support member 360 which extends from arm 365. The action of spring 366 imparts considerable angular velocity to members 365, 360, and 362 when they move to close opening 335, which causes the outer edges of disc 362 and member 360 to be forced into positions shown by dashed lines at 381, 382, 383 and 384 successively as they pass the outer edge 385 of shoulder 364 and which causes spring 390 to be compressed, disc 362 being stopped in its closing motion by the contact of overlying metal disc 360'' with downwardly extending terminal portion or lip 391 of tube 334. The biasing action of compressed spring 290 then causes member 362 and its supporting parts to move downwardly into sealing engagement with surface 363.

When latch 374 is operated, the pressure of air in tube 334 existing by reason of evacuation of receiver 340 causes member 362 and its supporting parts to move hingedly downward and the outer portion of disc 362 wipes off surface 363 by reason of the continuing pressure which causes the outer portion of 362 to continue to contactingly engage surface 363 and tip 385 of shoulder 364 during the early portion of its opening cycle as shown in dashed lines at 388 and 389, which indicate successive positions in the opening cycle, whereby the under surface of the outer portion of 362 and the surfaces of 363 and 385 are wiped free of tar, cigarette ashes and the like which may have accumulated thereon.

Referring now to the embodiment of FIGURE 7, there is shown a modification of the embodiment of FIGURE 1, in which those parts which are numbered identically to the parts in FIGURE 1, with the exception that a digit 4 precedes the number, have like functions and operate similarly to the corresponding parts of FIGURE 1. It is to be noted in FIGURE 7 that poppet valve member 462 is a flat disc, slopes to one side and is mounted near the side of receiver 440. That is, tube 444 is not central with respect to receiver 440. The sloped attitude of member 462 causes refuse which enters through tube 434 when latch 474 is released and valve member 462 begins to open to be deflected away from the brackets and springs beneath the valve member 262 to prevent fouling of these members.

Combined valve and sealing members 162 (FIGURE 2) and 262 (FIGURE 3) are sphinctral members of resilient flexible material. Sphinctral member 162 is fixed at one end and free to slide within tube 34' at its other end. Sphinctral member 262 is provided with a bellows portion at each end and the outer end of each bellows portion is attached to the interior of tube 234.

It may thus be seen that the invention is broad in

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scope and includes such modifications as will be apparent to those skilled in the art and is to be limited only by the claim.

Having thus described my invention, I claim:

In a device of the type described, the combination of: 5
 a source of reduced air pressure,
 a closed container communicating with said source
 a duct adapted to receive trash and into which trash
 may be introduced, said duct communicating with
 said closed container, 10
 a valve member to close said duct,
 said valve member comprising a resilient flexible seal-
 ing portion having the form of the outer periphery
 of a disc at its outer peripheral edges,
 said valve portion in closed position, sealable to said 15
 walls of said duct by said seal portion,
 said seal resiliently movable to seal between said
 valve member and said walls in response to lower-
 than-atmospheric pressure in said container to pro-
 vide greater pressure in said duct upstream of said 20
 valve than in said container,
 the peripheral edges of said seal portion being flexibly
 deformed by engagement with a portion of said

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wall to allow said seal portion to pass said portion
 of said walls as said valve opens and said peripheral
 edges of said seal portion are flexibly deformed by
 engagement with said portion of said walls to allow
 said seal portion to pass said portion of said walls
 as said valve closes,
 means holding said valve member closed,
 said means operable to release said valve member
 rapidly,
 said valve member mounted to be opened in response
 to release of said means,
 said valve member being driven open by the greater
 pressure in said duct upstream of said valve than
 in said container.

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THERON E. CONDON, *Primary Examiner.*