Jan. 2, 1945. J. G. HOFF 2,366,529

FILLING DEVICE

Filed April 23, 1942 4 Sheets-Sheet 1

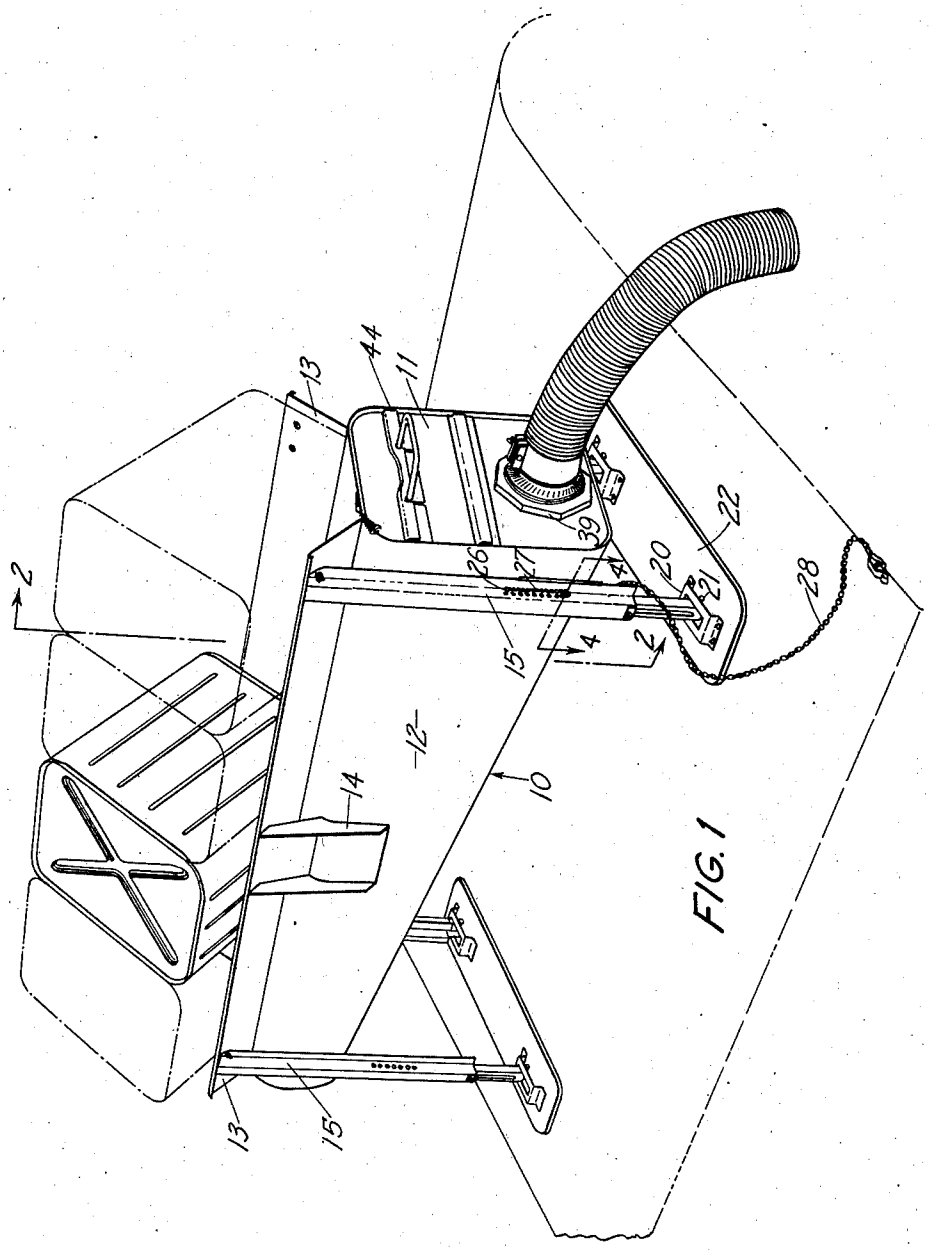

FIG. 1

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FILLING DEVICE

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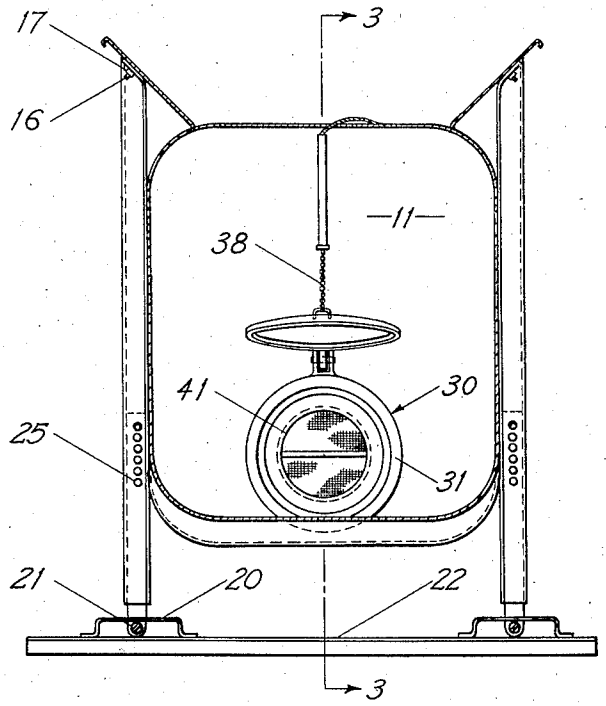

FIG. 2

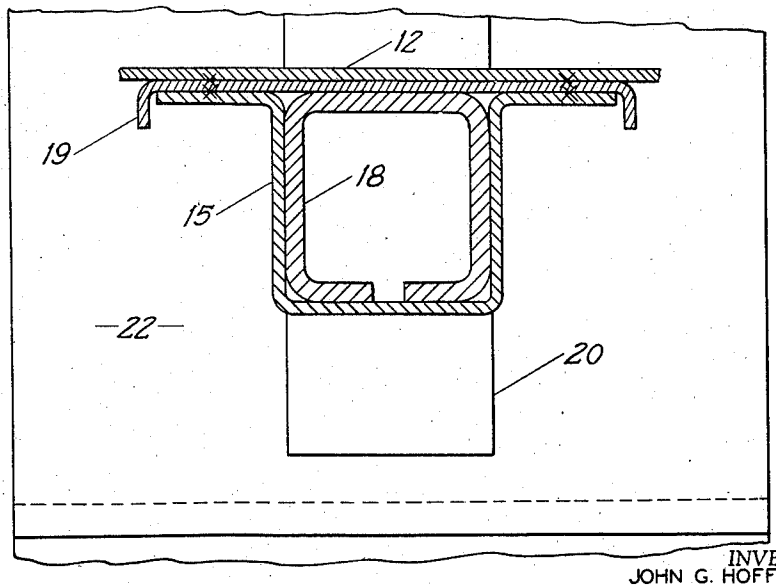

FIG. 4

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FILLING DEVICE

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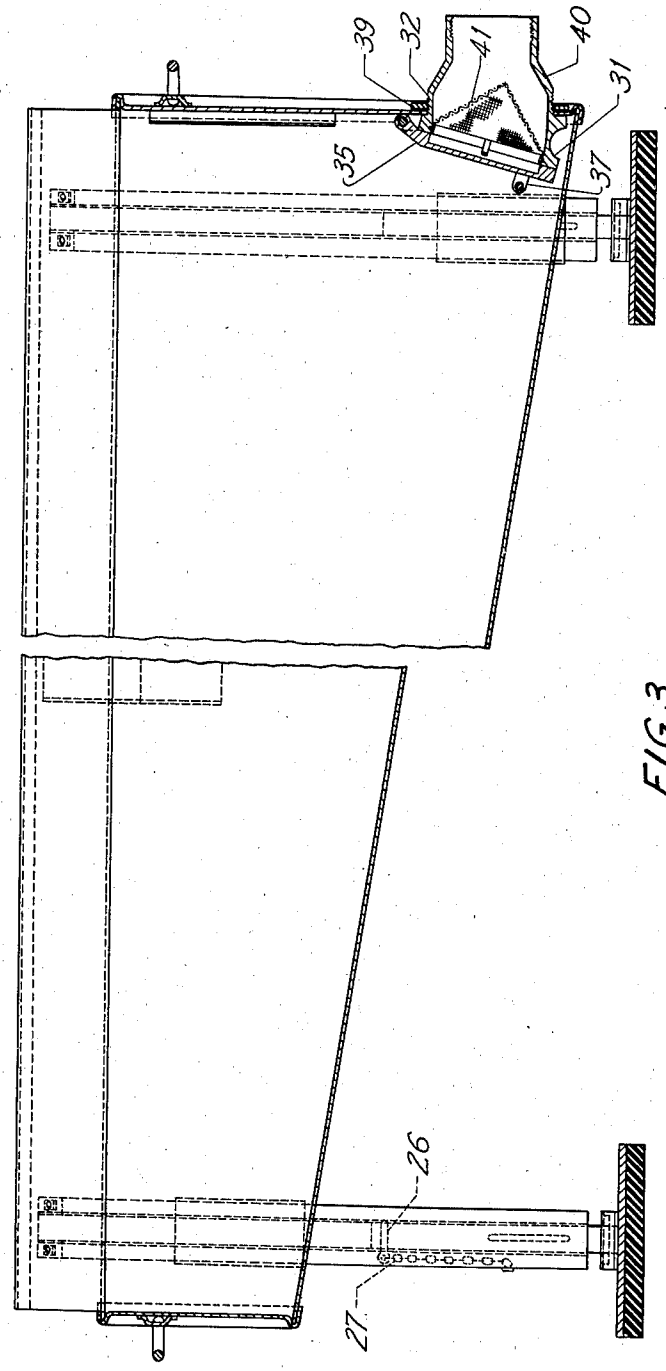

FIG. 3

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FILLING DEVICE

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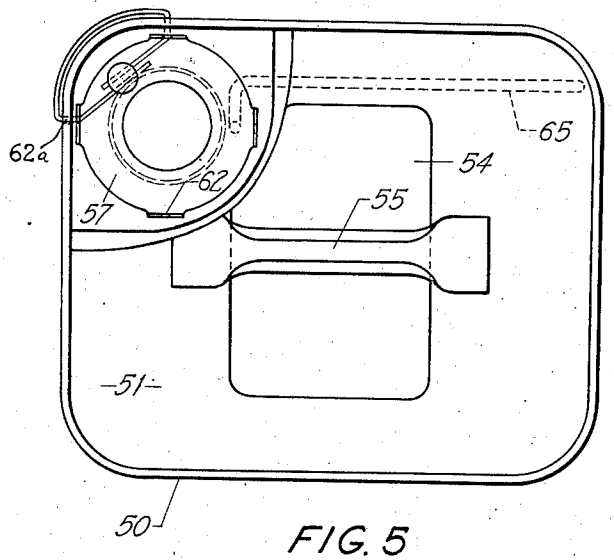

FIG. 5

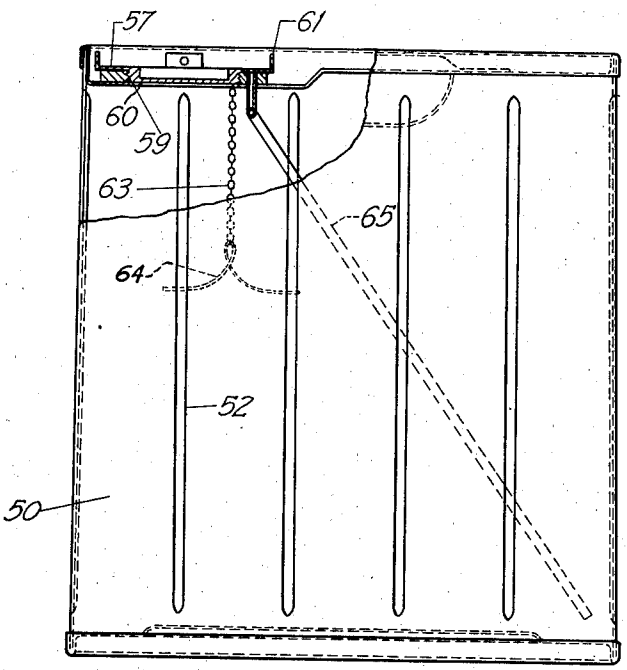

FIG. 6

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UNITED STATES PATENT OFFICE

2,366,529

FILLING DEVICE

John G. Hoff, Mansfield, Ohio, assignor to The Tappan Stove Company, Mansfield, Ohio, a corporation of Ohio

Application April 23, 1942, Serial No. 440,149

5 Claims. (Cl. 226—31)

The present invention relates to a filling device designed primarily for use in fueling airplanes. As generally known, the gasoline tanks in airplanes are located within the wings and the filling opening for each tank is usually located in an inaccessible position which makes the use of a funnel difficult. Another defect of the filling equipment hitherto in use is its slow operation. This drawback may become very serious when planes with empty tanks are exposed to enemy action on the ground where utmost speed in refueling may prove to be a vital question for the survival of the plane and the crew.

One of the objects of the present invention is to provide a combined filling trough and can which will enable the refueling of an airplane tank in the shortest time possible. My filling device preferably comprises a trough shaped receiver having adjustable legs, which make it possible to place the trough horizontally on a sloping airplane wing. The top of the trough is so shaped that it will accommodate a certain number of specially designed cans in a position ready for draining their contents. The removal of empty cans at one end of the trough and simultaneous substitution of full cans at the other end make the filling operation continuous and as speedy as possible.

Other novel features of my combined filling trough and can will become apparent from the annexed drawings and the detailed description of the same.

Fig. 1 is a perspective view of the trough with cans in filling position;

Fig. 2 is a vertical section along line 2—2 of Fig. 1 with cans removed, showing one of the end walls of the trough with the valve leading to the connecting hose;

Fig. 3 is a section along line 3—3 of Fig. 2 with cans removed;

Fig. 4 is an enlarged section on lines 4—4 of Fig. 1;

Fig. 5 is a top plan view of the can according to the invention; and

Fig. 6 is a side elevation thereof.

Referring more particularly to Fig. 1, 10 designates an elongated trough shaped member enclosed by longitudinal side walls 12 and two end walls, one of which, 11, is seen in this figure. The upper edge of the side walls 12 is provided with flared flanges 13, reinforced by ribs 14 and uprights 15. The uprights 15, four in number, form at the same time the legs of the trough and are made adjustable as more fully described below.

As illustrated in Fig. 4, the uprights 15 are made of hollow members shaped as a U with extended flanges which slidingly receive slotted bars 18, being about half the lengths of the uprights 15. The extended flanges of uprights 15 lie adjacent and are spot welded to a reinforcing plate 19 which is in turn spot welded to wall 12 of the trough.

The bottom ends of bars 18 are semicircular in cross section (see Fig. 2) and adjustably mounted by means of pins 21 in slotted squares 20 that are rigidly secured to foot members or base plates 22. The uprights 15 are fastened on top to flanges 13 by bolts 16 and nuts 17.

Each of the uprights 15 and the bars 18 is provided with a set of holes which are of equal size capable to register and of which the holes 25 of the uprights 15 only appear in the drawings; these holes are adapted to receive a pin or bolt 26, which after being passed through two registering holes is adapted to hold the uprights and bars together in any desired position. Pins 26 are fastened by means of chains 27 to their respective uprights so that they will not become lost or misplaced when temporarily removed from the holes.

The trough is provided with the usual safety ground chain 28 having one end electrically connected to the trough, and the opposite end provided with a connecting clip to guard against static. As shown in Fig. 1, the connecting clip is electrically connected to a metal part of the plane so that the trough is thereby grounded to prevent sparking due to static charges.

As shown in Figs. 2 and 3 the end wall 11 has fitted thereto the valve 30 for connection with the tank in the airplane. Valve 30 comprises an annular seat 31 having a threaded portion 32 which engages with a thread in a nut 39. The valve is provided with a cover 35 tightly fitting to the seat 31. The cover carries a lug 37 to which a chain or cable 38 is attached that serves for pulling up and fastening the cover in the open position.

Into the cone shaped part 40 of the valve a funnel shaped sieve 41 is inserted which serves to filter the gasoline.

The trough is preferably made of zinc coated steel of light weight which makes it easy to be moved about according to requirement. For this purpose it is, moreover, provided with folding handles 44 attached to each of the end walls. As a protective means against marring the surface of the airplane wings the legs have felt or rubber pads secured to their bottoms, which also pre-

vent sliding of the device on the sloping surface.

As another means to speed the flow of gasoline from the trough into the tank of the plane, I preferably make the bottom of the trough inclined toward the end wall carrying valve 30 to insure constant maximum pressure against this outlet.

While it will be understood that the trough according to the invention will be very useful for filling airplane tanks using some of the known types of fuel containers, for obtaining best results it is necessary to use the trough in combination with a set of cans particularly designed for that purpose. Such a can has a substantially square-shaped body one side wall 50 of which is seen in Fig. 6, while Fig. 5 shows the top 51. The edges of the can body are rounded as are also the corners of the top 51. All parts are die formed with ribs 52 evenly distributed around the circumference to provide maximum strength. The bottom, not shown in the drawings, is likewise embossed with stiffening ribs.

The top 51 has a depression 54 which is spanned by a flat handle 55 flush with the can top. The depression makes it possible to grip the handle without making it project over the edge of the can. Owing to this arrangement a number of cans may be vertically stacked upon each other. This is facilitated by making the can tops slightly smaller than the bottoms.

The cap 57, which for that same reason is counter-sunk, engages threadingly as at 59 with an opening 60. The cap is provided with two or more gripping members on tabs 61 which are pierced at 62 and the can is provided with holes 62^a, registering with the holes 62. After the cap has been screwed in, wire may be threaded through the holes 62^a on the can and 62 on the cap and sealed in the usual manner. To guard the cap against misplacement when unscrewed, I provide a chain 63 and anchor 64, the prongs of which are pressed together for insertion into the can. It is very convenient to tuck the cap under the handle 55 during the filling operation.

A vent tube 65 is provided in the can body, which extends from the top near the opening for the cap diagonally along the adjacent side wall to about one inch from the bottom of the can. By providing this tube I assure a regular flow during the filling operation owing to admission of air. The dimensioning of the cans as a unit is in definite relationship to the available space in the trough so that the openings of the vent tubes will be closed by the rising level of liquid in the trough at a time, when continuation of flow would cause flooding of the trough.

As already mentioned the can is very strong owing to the reinforcing ribs embossed on the side walls and the bottom. In order to make the exposed parts of the can still more resistant the top and the bottom are wrapped over the sides of the body making the total thickness of the wall at these points three times the metal thickness. The flange extending over the can body on top of the can is comparatively deep and forms an ideal pouring lip in case a single can is used and the liquid poured out over the corner.

For operating the filling device according to my invention the funnel is placed on the plane wing and adjusted so that it will be substantially horizontal; the outlet hose being at the same time connected to the tank opening.

The operator then opens the valve and checks the strainer to remove any impurities if necessary. As soon as the funnel is ready the cans will be opened and the caps tucked under the handles. The cans are then placed on the trough one by one with their openings down and averted from the service man. One can after the other is pushed toward the outlet end of the trough until all the cans, four in the embodiment shown in the drawings, are in position. As shown in Fig. 1, the cans have at least one transverse dimension which is greater than the width of the trough so that the cans may be disposed on the flanges 13 with the top edge of the can having the filling and discharge orifices disposed within the trough and below the upper edges thereof. As soon as the first can is empty it will be removed and the three other cans advanced accordingly and a full can placed in the vacant space on the opposite end of the trough. This procedure will be continued until the tank is filled.

Having thus described my invention what I claim is:

1. A filling device for airplane tanks comprising an elongated trough, members on the upper edges of said trough extending outwardly thereof for supporting fuel containers in emptying position, adjustable legs mounted on said trough adapted to hold the same in horizontal position on a sloping airplane wing, one end wall of the trough being provided with a discharge opening and conduit means connected to the discharge opening for connecting the interior of said trough with the filling opening of a tank of said wing, a flap valve pivotally mounted within the trough and arranged to close the discharge opening under the influence of gravity and the static pressure of fuel in the tank, said trough having its bottom inclined toward said end wall in which said valved discharge opening is located whereby maximum pressure of gasoline at this end of the trough is obtained to insure proper seating of the valve.

2. A filling device for airplane tanks comprising an elongated trough, members on the upper edges of said trough extending outwardly thereof for supporting fuel containers in emptying position, adjustable legs mounted on said trough adapted to hold the same in horizontal position on a sloping airplane wing, one end wall of the trough being provided with a discharge opening, conduit means connected to the discharge opening for connecting the interior of said trough with the filling opening of a tank in said wing, a flap valve pivotally mounted within the trough and arranged to close the discharge opening under the influence of gravity and the static pressure of fuel in the trough, said trough having its bottom inclined towards the said end wall in which said valved discharged opening is located whereby the maximum pressure of gasoline at this end of the trough is obtained to insure proper seating of the valve, and means accessible from the exterior of the trough for opening said flap valve.

3. A filling trough for fueling the wing tanks of an airplane comprising an elongated open-topped trough having a bottom wall sloping downwardly from one end of the trough to the other, a pair of upright supporting members secured to the trough at either end thereof and depending below the sloping bottom wall thereof, means for individually adjusting the length of said uprights, a foot member carried jointly by each pair of uprights and means for movably connecting each foot member to its pair of up-

rights whereby to position the trough in a generally horizontal position regardless of the inclination of the wing surface on which it is supported.

4. A filling device for airplane tanks comprising an elongated trough, outwardly flared flanges secured to and extending substantially the full length of the upper edges of said trough for supporting a set of fuel containers in emptying position, adjustable legs mounted on said trough adapted to hold the same in horizontal position on a sloping airplane wing, one of the walls of said trough being provided with a discharge opening, a flap valve mounted in that same wall of said trough for controlling the discharge of fuel from the trough through said opening, and conduit means for connecting the discharge opening of said trough with the filling opening of a tank of said wing.

5. A filling device for airplane tanks comprising an elongated trough, flange members on the upper edges of said trough extending outwardly thereof for supporting a set of fuel containers in emptying position, pairs of uprights mounted on said trough at opposite ends of the trough, adjustable foot members carried jointly by the respective pairs of uprights and positionable to hold the trough in horizontal position on a sloping airplane wing, the upper ends of the uprights being secured to the flanges to reinforce the same, one end wall of the trough being provided with a discharge opening, a flap valve mounted in that same wall of said trough for controlling said discharge opening, and conduit means connecting the discharge opening of said trough with the filling opening of a tank of said wing.

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