May 21, 1935. J. B. KIRBY 2,001,965

LAUNDRY MACHINE

Filed Sept. 8, 1930

Fig. 1

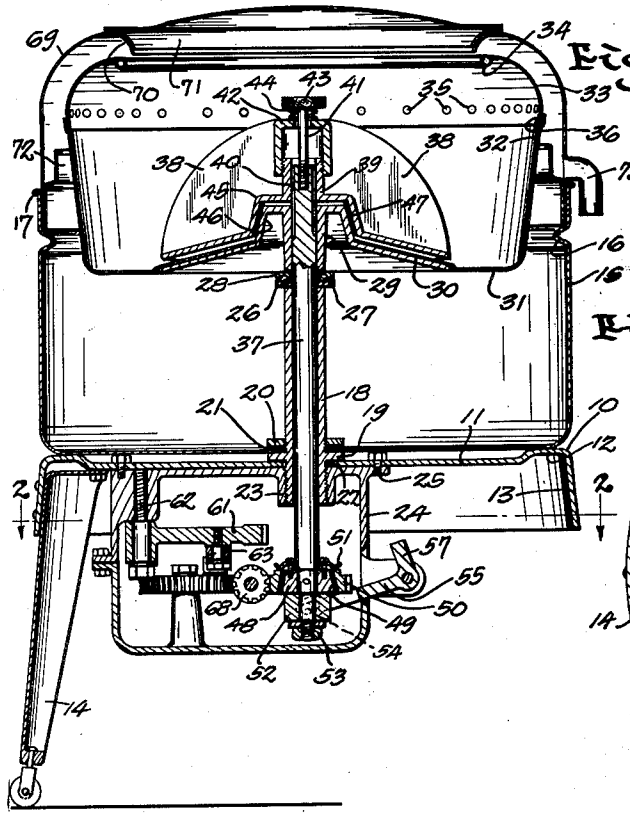


Fig. 4

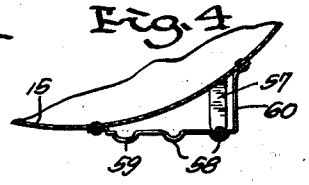


Fig. 2

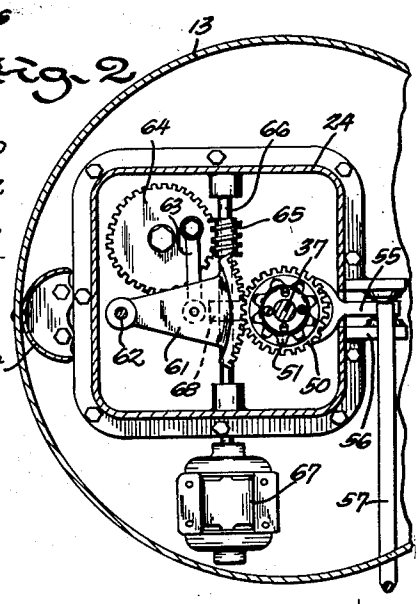


Fig. 3

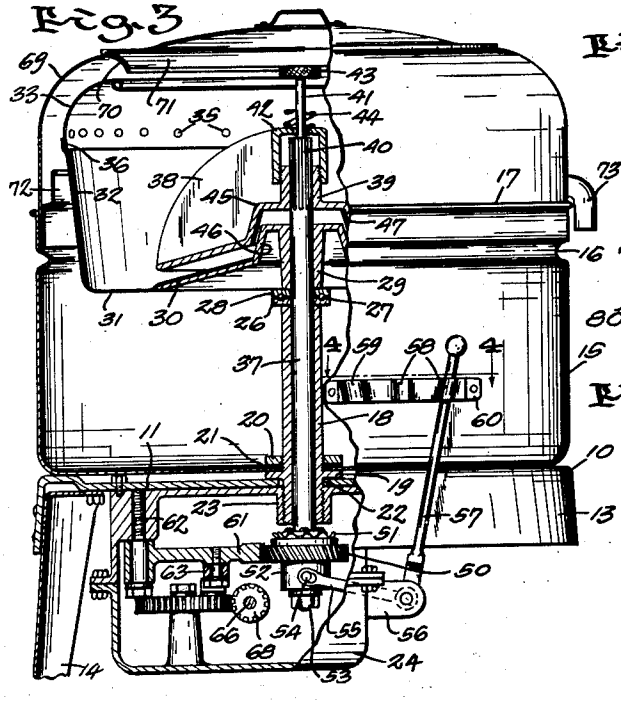


Fig. 5

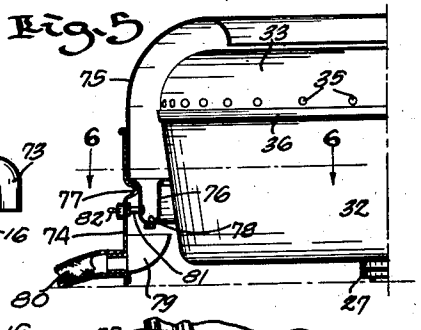
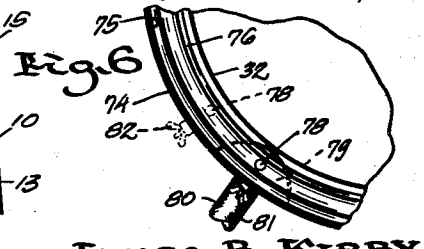


Fig. 6



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2,001,965

LAUNDRY MACHINE

James B. Kirby, West Richfield, Ohio, assignor, by mesne assignments, to The Apex Electrical Manufacturing Company, Cleveland, Ohio, a corporation of Ohio, as trustee

Application September 8, 1930, Serial No. 480,424

20 Claims. (Cl. 68—15)

This invention relates to washing machines and has especial reference to that type of machine, used for domestic washing, wherein the washing liquid is extracted from the articles after washing by rapid rotation of the same tub or container in which the washing is effected.

The objects of the invention are the provision of a new, improved, and simplified mechanism for producing the washing and drying operations; the provision of new and improved mechanism of this type wherein an agitator or washing member is arranged within the tub or container in which the articles are washed and moves relatively to the tub or container to effect the washing operation, together with means for driving the tub or container through connection with the washing member when the drying operation is to be effected; the provision of mechanism of this character in which a shiftable shaft is adapted for connection to driving mechanism for imparting motion to said shaft, and wherein lowering of the shaft effects connection of the tub or container therewith and raising of the shaft effects disconnection, together with a friction clutch for effecting such connection, coupled with means for more tightly engaging the clutch at the start of its driving connection whenever necessary; the provision of a new and improved means for storing the washing liquid during the extracting operation providing a partial enclosing casing for the washing and drying devices, together with a detachable hood or shield substantially completing said enclosure, and adapted to catch any liquid thrown from the washing tub or container; the provision of a detachable trough member for collecting liquid thrown onto the shield, and returning such liquid to the storage casing, or discharging the same entirely from the machine; while further objects and advantages of the invention will become apparent as the description proceeds.

In the drawing accompanying and forming a part of this application I have shown certain physical structures in which my inventive ideas may be embodied, although it will be understood that the drawing is intended to be merely illustrative of the general principles of my invention and not to be exhaustive of the designs and constructions whereby those principles can be applied.

Figure 1 is a vertical sectional view through the center of the washing machine, showing the driving mechanism connected to rotate the tub or container. Figure 2 is a fragmentary horizontal sectional view corresponding to the line 2—2 of Figure 1. Figure 3 is a view similar to Figure 1 showing the driving mechanism in position to drive the agitator relatively to the tub or container. Figure 4 is a fragmentary horizontal sectional view corresponding to the line 4—4 of Figure 3. Figure 5 is a fragmentary vertical sectional view of a slightly different embodiment of the invention and Figure 6 is a fragmentary horizontal sectional view corresponding to the line 6—6 of Figure 5.

As shown in Figures 1 to 4 of the drawing, 10 indicates a supporting frame having web 11 and a marginal upstanding rib 12, and a skirt 13 to which suitable legs 14 are secured. Resting upon the marginal rib 12 is a tank or casing 15, preferably made up of vitreous enamelled steel, having adjacent its upper edge an offset or corrugation providing an annular shoulder 16, while the upper edge of the tank or casing 15 is provided with a rolled bead 17, and the casing 15 is provided with a suitable outlet, not shown. The tank or casing 15 is held in operative position by means of a sleeve 18 centrally disposed with respect thereto, having an annular flange 19 upon which the outer surface of the bottom of the tank 15 bears, and being threaded for the reception of a nut 20 bearing upon the upper surface of the bottom wall of the tank 15, a washer 21 being interposed between the nut 20 and the bottom of the tank to render the connection liquid tight. The lower end of the sleeve 18 below the flange 19, extends through an opening 22 in the web 11 of the frame and is threaded into a boss 23 forming part of a housing 24, housing the driving mechanism hereinafter referred to, said housing being detachably secured as a unit to the web 11 of the supporting frame by screw bolts 25.

The sleeve 18 extends centrally upward within the tank 15, and at its upper end is provided with a bearing member 26 having an annular groove for the accommodation of ball bearings 27, and resting upon the ball bearings 27 is a bearing member 28 forming part of a hub 29 secured at 30 to the bottom wall of the casing or container 31. The casing 31 has an imperforate upwardly tapered annular portion 32, and a ring-like member 33 having a curved wall terminating in an upper rolled edge 34, and the body portion of the ring provided with perforations 35, the ring 33 and imperforate portion 32 being secured together by a joint 36. The container 31 is thus mounted for rotation, and supported for rotation by the sleeve 18.

Extending through the sleeve 18 is a driving member 37, said member being rotatable within said sleeve, and shiftable longitudinally with respect to said sleeve. Attached to the upper end of the driving member 37 is an agitator having blades 38 and a hub 39 splined upon the spline portion 40 of the driving member 37, said agitator 38 being shiftable longitudinally with reference to the end of the driving member 37 but non-rotatable with respect thereto. The agitator 38 is secured to the driving member 37 by means of a pin 41 threaded into the upper end

thereof, extending through a cap 42 threadedly connected to the hub 39 of the agitator 38, the pin 41 having a head 43, adapted to bear upon a spring 44 interposed between the head 43 of the pin and the top wall of the cap 42.

The hub 39 of the agitator is provided with a conical clutch member 45 adapted to cooperate with a conical clutch member 46 carried by the hub 29 secured to the container 31, the clutch surfaces being lined with any suitable material, preferably brake lining as indicated at 47.

At its lower end, and within the housing 24, the driving member 37 has pinned thereto a tapered driving element 48 having an exterior friction lining 49, carrying thereon a helical gear 50, the latter being frictionally driven by the member 48, and an adjustable member is provided having spring fingers 51 bearing upon the gear 50 to urge the same into engagement with the friction lining of the driving element 48, at the same time providing for relative movement upon overload. Beneath the driving element 48 on the driving member 37 is placed a collar 52, held in position by a washer and nut indicated at 53. The collar 52 is provided with laterally extending pins 54 engaged by slotted furcations 55 forming part of the bell crank arm 56, adapted to be shifted by the lever 57, the latter being held in any one of three positions 58 and 59 of a bracket 60 carried by the side-wall of the casing 15, the position 59 being defined by a groove permitting some movement of the lever 57, for a purpose hereinafter referred to.

The gear 50 is adapted to be engaged with different types of driving mechanism, depending upon its relative position. In its uppermost position the gear 50 is engaged with an oscillating rack 61 pivotally mounted as at 62, connected by a link 63 with a worm gear 64 constantly driven by a worm 65 carried by the shaft 66 and driven by the motor 67. Thus oscillating motion is imparted to the driving member 37, this motion being transmitted through the spline connection with the agitator 38, the container 31 remaining in stationary condition or substantially so. When the shaft 37 is shifted downwardly by movement of the lever 57 to the stop 59 of the bracket 60, the gear 50 comes into engagement with a constantly driven worm gear 68 fixed upon the shaft 66. When the driving member 37 is shifted into this position, as shown in Figure 1, the spring 44 is compressed and the agitator 38 pressed downwardly to bring about clutching engagement between the clutch member 45 of the agitator and the clutch member 46 of the container 31, thereby bringing about rotation of the container 31 and rotation of the agitator 38 in unison therewith. Due to the weight of the container 31 and its contents it may be desirable upon starting to press the lever 57 in a direction to further lower the driving member 37 and more firmly press the clutch members 45 and 46 into engagement, this being permitted through providing room for movement of the lever 57 with respect to the position 59 of the bracket 60. When the lever 57 is engaged with the central position on the bracket 60, the gear 50 is placed in neutral position between the rack 61 and the gear 68 as will be understood.

As before stated it is desirable to use a casing 15 of vitreous enamelled material, and because of manufacturing difficulties these casings or tanks must necessarily be comparatively shallow; in order to substantially entirely enclose the container 31, and to prevent liquid escaping from the machine, I provide a hood or shield 69 in the form of an annular ring-like member having a curved wall defining an opening 70 adapted to be closed by cover 71. The lower end of the hood or shield 69 is telescopically engaged with the upper edges of the casing 15 and rests upon the annular shoulder 16 of said casing, but is readily detachable when desired. The hood or shield 69 as thus provided catches any liquid escaping from the container 31 and such liquid, running down the inner wall of the hood or shield 69 is collected in an annular trough 72 which may be secured to the lower edges of the hood or shield 69, and the hood or shield provided with a drainage spout 73 for carrying away the collected liquid. Thus the hood or shield 69, and the trough 72 take care of the escaping liquid, and if desired may be readily detached as a unit from the machine.

In use, soapy water and clothing are introduced into the container 31, and the lever 57 is then placed in position to engage the gear 50 with the rack 61, bringing about oscillation of the driving member 37, and of the agitator 38. When the fabrics have been washed the lever 57 is placed into position 59, bringing about engagement of the gear 50 with the gear 68, and also shifting the driving member 37 so as to bring the clutch parts 45 and 46 into driving engagement, resulting in rotation of the driving member 37, the agitator 38, and the container 31, all in unison. During the rapid rotation of the container 31 liquid escaping therefrom will impinge against the inner wall of the hood 69, run down this wall and be collected in the trough 72, being then carried away through the spout 73 to which a hose may be connected, or if desired a valve employed, these expedients not being shown, but being well understood by those familiar with such machines. If at the beginning of the engagement between the clutch members 45 and 46, they do not grip with sufficient force to clutch the parts properly together, the lever 57 may be manipulated to lower the driving member 37 still more to effect a tighter engagement between the clutch members 45 and 46. By reason of the provision of the helical driving gears 50, the tendency of the drive upon overload is to force the driving member 37 upwardly and thereby disengage the friction clutch as provided by the clutch parts 45 and 46. The driving mechanism may be readily placed in neutral position by shifting the lever 57 to its position 58 with respect to the bracket 60, thus disposing the gear 50 midway between the rack 61 and the gear 68, as will be understood.

During the drying operation practically all of the fluid in the container 31 is thrown off against the shield 69, fills the trough 72, and the spout 73 being stopped off by lifting the hose connected thereto, the trough overflows and the fluid enters the storage tank 15. Rinsing water is then introduced into the container 31 and the operation repeated, the rinse water entering the trough 72, and the spout 73 being then unobstructed through dropping the hose connected therewith, the rinse water is carried from the trough exteriorly of the casing 15. Upon a subsequent washing operation the soapy water is withdrawn from the storage tank 15 and reintroduced into the container 31.

Referring to Figures 5 and 6 a somewhat different embodiment of the trough means for carrying away escaping liquid is provided. As shown the casing 74 and hood or shield 75,

correspond generally to the casing 15 and hood or shield 69 respectively. The trough member 76 however is not attached to the shield member 75, but rests upon the shoulder 77 of the casing 74, being revolvably supported upon said shoulder and provided with a drainage opening 78 adapted to discharge any liquid collected within the trough member 76. Due to the mobility of the trough 76, the drainage opening 78 may be disposed in line with a cup 79 carried by the casing 74 and opening into a pipe 80 which will carry away the drainage liquid. However if it is desired to return the drainage liquid to the casing 74, the trough member 76 is revolved sufficiently to move the drainage opening 78 out of line with the cup 79, and thus return the drainage liquid to the interior of the casing 74. The trough member 76 may be actuated through manipulation of a pin 81 extending through a suitable slot in the casing 74, and held in position by a wing nut 82 threaded upon the pin.

It will be understood that various changes and modifications may be made without departing from the spirit of said invention and it will further be understood that the embodiments herein described are illustrative only and in the invention not limited thereto.

What I claim is:

1. A washing and drying machine comprising: a rotatable container and an agitator therein, means operable at different times to rotate and oscillate said agitator, said means operating through the bottom of said container, the top of said container being open and free from obstructions, and means for driving said container through connection with said agitator when the latter is rotated.

2. A washing machine comprising: a rotatable container and an agitator therein, means operable at different times to rotate and oscillate said agitator, said means operating through the bottom of said container, the top of said container being open and free from obstructions, and a friction clutch for operatively connecting said agitator and said container whereby said container is operated by said agitator.

3. A washing machine comprising: a rotatable container and an agitator therein, power-driving means including an oscillating element and a rotating element, means for connecting said elements selectively to said agitator in operating relation, said means operating through the bottom of said container, the top of said container being open and free from obstructions, and means for detachably connecting said agitator to said container.

4. A washing machine comprising: a rotatable container and an agitator therein, means operable at different times to rotate and oscillate said agitator, said means operating through the bottom of said container, the top of said container being open and free from obstructions, a friction clutch for driving said container through connection with said agitator, and means for manually applying pressure to said clutch to effect tight initial engagement thereof.

5. A washing machine comprising: a rotatable container and an agitator therein, driving means operable at different times to rotate and oscillate said agitator, and means for rotating said container through connection with said agitator, said driving means comprising intermeshing helical gears, a friction clutch having one element rotatably and axially movable with one of said helical gears, and means yieldingly forcing the elements of said friction clutch together, the direction of slope of the gear teeth being such as to tend to separate said clutch members when overload is encountered.

6. In a washing machine, the combination of a casing, a rotatable container within said casing, an agitator for washing fabrics within said container, a vertically shiftable driving member extending into said container, means operable when said member is in raised position to drive said agitator relatively to said container, means operable when said member is in lowered position to drive said agitator and said container together, means independent of said member for supporting said container means for actuating said driving member, and means for raising and lowering said driving member.

7. In a washing machine, the combination of a casing, a rotatable container within said casing, an agitator for washing fabrics within said container, a vertically shiftable driving shaft extending into said container, means operable when said shaft is in raised position to drive said agitator relatively to said container, means operable when said shaft is in lowered position to drive said container, means independent of said shaft for supporting said container, an oscillating element to which said driving shaft is operatively connected in said first mentioned position, and a rotating element to which said driving shaft is operatively connected when in said second mentioned position.

8. In a washing machine, the combination of a casing, a rotatable container open-topped arranged within said casing, an agitator for washing fabrics within said container, a shiftable driving member extending through the bottom of said container and connected with said agitator, driving means, operable at different times, for rotating and oscillating said driving member, clutch means for driving said container through connection with said agitator when the latter is rotated, and means independent of said driving member for supporting said container during its operative movement.

9. In a laundry machine, the combination of a casing, a rotatable container arranged within said casing, a vertical driving shaft extending into said casing, clutch means operatively connecting said container to said shaft in driving relation when the latter is rotated with said container, driving means for rotating said driving shaft, and means independent of said driving member for supporting said container during its operative movement; said driving means comprising a helical gear carried by said vertical driving shaft and a second helical gear meshing therewith in operating relation, the slant of the gear teeth being such as to shift said vertical driving shaft when overload is encountered and thereby disconnect said clutch means.

10. In a laundry machine, the combination of a casing, a rotatable container and an agitator therein, a driving member extending into said container and operable to drive said container and element, said driving member being vertically shiftable, and means for connecting said container with said driving member when the latter is shifted to a lower position and disconnecting said container with reference to said driving member when the latter is elevated.

11. In a washing machine, the combination of a casing, a rotatable container therein, an agitator inside said container, a driving member extending into said container and operable to drive said agitator, said driving member being vertically

shiftable, and friction-clutch means for connecting said container with said driving member when the latter is shifted downwardly and disconnecting said clutch means with reference to said driving member when the latter is shifted upwardly.

12. A laundry machine comprising, a casing, a vertical shaft supported therein for rotational and axial movement, a container inside said casing coaxial with said shaft and having an apertured side wall, an agitator-blade inside said container, an oscillating element and a rotating element located at different heights along said shaft, the rotating element being located at a lower level than the oscillating element, means for operating said elements, connections from said shaft to said blade and container, and means for raising and lowering said shaft to connect it in driven relation to said oscillating-element and rotating-element selectively whereby said blade is oscillated when said shaft is raised and whereby said container is rotated when said shaft is lowered.

13. In a laundry machine, a casing having a vertical bearing in its bottom, a container in said casing coaxial with said bearing and adapted to hold fabrics to be washed, a blade in said container adapted to produce washing action when oscillated, a rotating-element and an oscillating-element located beneath said casing at different heights, the rotating-element being located at a lower level than the oscillating-element, and means including a rotatable and slidable vertical shaft traversing said bearing for connecting said oscillating element operatively to said vane when said shaft is raised and for connecting said rotating element operatively to said container when said shaft is lowered.

14. A laundry machine comprising: an upright casing circular in horizontal section and having an internal annular shoulder spaced below its upper margin, a centrifugal container for fabrics mounted upon a vertical axis inside said casing and projecting above the upper margin thereof, said container having liquid-discharge apertures in its side wall, and an annular shield fitting inside said casing and with its bottom edge resting on said shoulder, the upper part of said shield being inclined inwardly and downwardly and overlying and surrounding the upper part of said container in shielding relation, said shield having the double function of a safety guard for said container and a deflector for the liquid discharged therefrom and said internal annular shoulder having the triple function of a support for said shield, a stiffening and reinforcing member for said casing and a splash ring for the liquid contents of said casing.

15. A laundry machine comprising: an upright casing, a rotatable container supported inside said casing upon a vertical shaft and having liquid-discharge apertures in its side wall, said container being spaced sufficiently above the bottom of the casing to accommodate therebeneath the entire liquid contents of said container, and said container projecting sufficiently above the side walls of said casing to expose said apertures, an annular trough surrounding said container and removably supported by said casing, said trough being located below said apertures, and an annular safety shield surrounding the projecting portion of said container in a position to catch the liquid discharged from said container and deflect it into said trough, said shield being separate both from said trough and from said casing and having its upper part inclined inwardly and downwardly to overlie and surround the upper part of said container.

16. A machine comprising: an upright casing having an annular internal reinforcing shoulder integrally formed in the casing side wall below its upper margin, an annular trough fitting into the top of said casing with its bottom edge movably resting on said shoulder, a container for fabrics rotatably mounted on a vertical axis inside said container and having side walls projecting above the margin of said casing-wall, said container being formed with liquid-discharge apertures above the top of said trough, and a safety shield fitting inside said casing and embracing said container and having its upper margin tapered inwardly to overlie the top of said container in protecting and liquid-deflecting relation.

17. In a washing machine, the combination of a casing, a container in said casing having an agitating element therein, a vertical driving member extending through the bottom of said casing, two trains of gearing beneath said casing and adapted to impart to said driving member oscillating and rotating motion selectively, manually operable means for shifting said driving member vertically, and means for connecting said driving member to said container when said member occupies its lower position and disconnecting it from said container when it occupies its elevated position.

18. In a washing machine, the combination of a casing, a container in said casing having an agitating element therein, a vertical driving member extending through the bottom of said casing, two trains of gearing beneath said casing, one adapted to produce oscillating motion and the other to produce rotating motion, manually operable means for shifting said driving member vertically, means operative when said member occupies its elevated position for disconnecting it from said container and for connecting it to that train of gearing which produces oscillating motion, and means operative when said member occupies its depressed position for connecting it to said container and also to that train of gearing which produces rotating motion.

19. In a laundry machine in combination, a casing, an extractor-container journaled in said casing upon a vertical axis, said container having upwardly-flaring walls terminating in an inwardly-turned top part with perforations at the point of greatest diameter located above the level of the top of the casing-wall, and a removable top member for said casing having a part adapted to fit inside the casing-wall and a part adapted to fit on the casing-wall, and an inwardly and downwardly projecting part defining an aperture registering with the opening defined by the margin of the top part of said extractor-container and arranged to surround the top part of said extractor-container and prevent access to the exterior of the latter during its rotation.

20. In a washing machine, a rotary clothes basket, an agitator centered therein, a vertical driven shaft with which the agitator has relatively slidable driving engagement, means to exert a downward pressure on the agitator, and cooperating and constantly contacting friction surfaces on the agitator and basket arranged, when such pressure on the agitator is exerted, to cause the basket to be clamped to the agitator to rotate therewith.

JAMES B. KIRBY.

CERTIFICATE OF CORRECTION.

Patent No. 2,001,965. May 21, 1935.

JAMES B. KIRBY.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, second column, line 15, claim 6, after "container"insert a comma; page 4, second column, line 3, claim 15, after the syllable "tainer" and before the period insert the words in shielding relation; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 16th day of July, A. D. 1935.

Leslie Frazer

(Seal) Acting Commissioner of Patents.