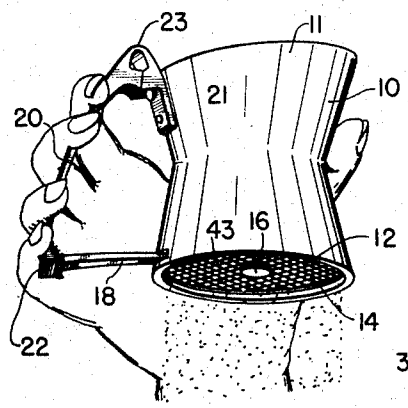
Dec. 10, 1968 M. J. SMITH ETAL 3,415,376

FLOUR SIFTER

Filed Jan. 20, 1967

FIG. 1



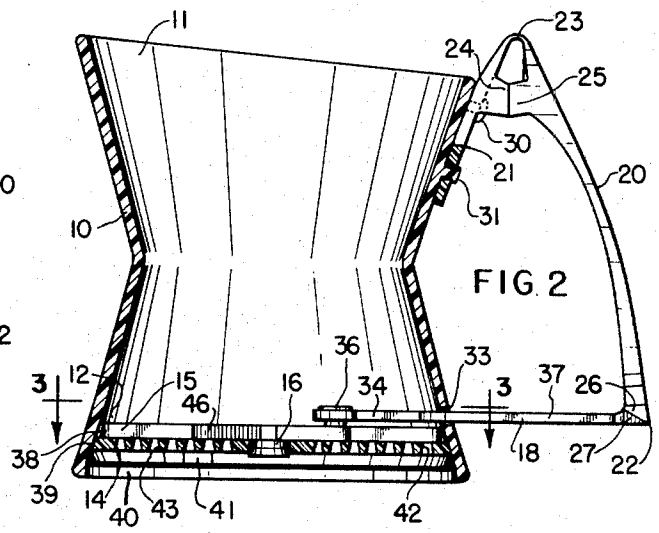


FIG. 2

FIG. 3

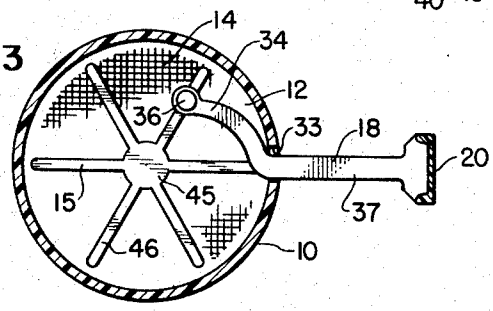


FIG. 4

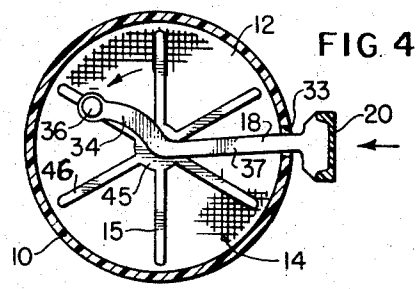


FIG. 5

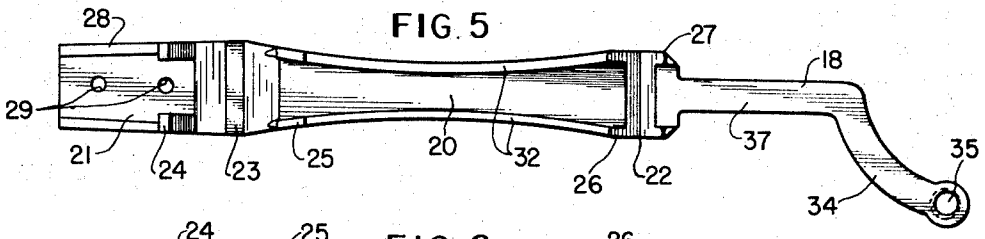


FIG. 6

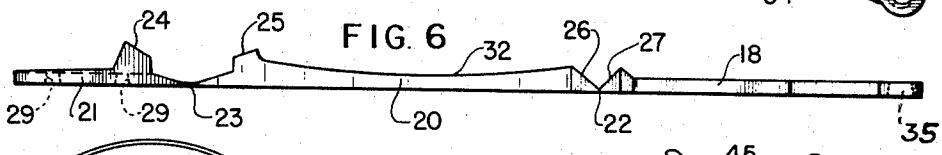
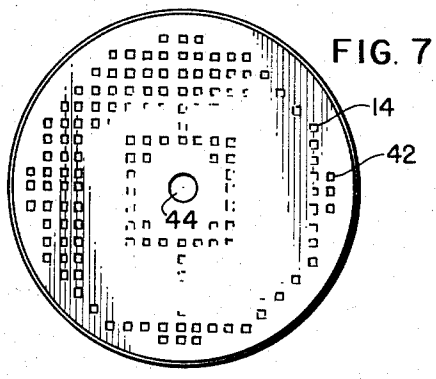


FIG. 7



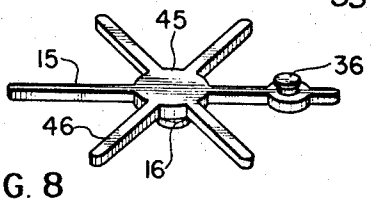


FIG. 8

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United States Patent Office 3,415,376
Patented Dec. 10, 1968

3,415,376

FLOUR SIFTER

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Filed Jan. 20, 1967, Ser. No. 610,689
9 Claims. (Cl. 209—236)

ABSTRACT OF THE DISCLOSURE

This flour sifter is of a small size designed to fit in one's hand and be operated by opening and closing the hand. It is of plastic construction throughout, making it possible to wash it thoroughly at intervals without danger of any part thereof rusting. There is no separate spring, spring action being obtained by flexing a resilient lever fixed on one side of the sifter at one end and pivotally connected at the other end to an agitator operating link. The lever and link, also the lever attaching part, are all molded in one piece of polypropylene or the like with an integral web hinge connection between the lever and driver link for the one pivot, and a similar integral thin web hinge connection between the other end of the lever and the part attached to the sifter body.

This invention relates to a sifter for flour or like materials and, more particularly, to a small sifter of approximately single cup or cup and one-half capacity, better suited for a large variety of cookie and pastry baking operations than the conventional larger capacity sifters.

A general object of the invention is to provide a sifter of the foregoing kind which, as contrasted with prior art sifters, as, for example, Dennis Patent 2,695,708, is constructed at lower cost with fewer and simpler parts, and adapted to give better and smoother performance and have greater durability.

A more specific object of the invention is to simplify the construction of a sifter by providing a unique design including a flexible lever which is arranged to be flexed in the operation of the sifter and eliminates the need for a separate spring required in prior art sifters to return the agitator after each forward movement.

Another object of the invention is to simplify the construction and assembly of a sifter by the formation in one piece of a combined spring action lever and agitator operating link, there being integral flexible hinges provided at opposite ends of said lever, one for connecting the upper end of the lever to an upper attaching member fastened rigidly to the sifter body, while the other serves to connect the lower end of the lever to the outer end of the link.

Other objects and advantages of the invention will be apparent from the following description taken in connection with the accompanying drawing, in which:

FIG. 1 is a perspective view of a sifter made in accordance with the invention and illustrating how the same is adapted to be grasped and operated between the thumb and two or more fingers of one hand;

FIG. 2 is an enlarged central vertical section through the sifter of FIG. 1;

FIG. 3 is a horizontal section taken along the line 3—3 of FIG. 2, showing the parts on a smaller scale;

FIG. 4 is a section similar to FIG. 3 and on the same scale showing the agitator rotated to the other extreme position from that of FIG. 3;

FIG. 5 is a plan view substantially full-size of a one-piece molded plastic element adapted to form an operating spring lever and driver link for the sifter of FIG. 1;

FIG. 6 is a side elevation of the one-piece molded plastic assembly of FIG. 5;

FIG. 7 is a plan view substantially full size of a screen for the sifter, and

FIG. 8 is a perspective view of a spider agitator shown substantially full size.

The same reference numerals are applied to corresponding parts throughout these views.

As shown in the drawing, for purposes of illustration, the invention is embodied in a sifter having an elongated sifter body **10** of hourglass cup shape partly to facilitate holding the same in one hand and also for the sake of good appearance, the same having a longitudinally extending bore of circular cross section extending from an open upper end **11** at the top of the body to a lower open end **12** at the bottom of the body. The material to be sifted, which is usually flour, is scooped into the body through the top opening and comes to rest on a screen **14** in the lower end portion of the body. The flour is agitated relative to the screen to gravitate and sift through the openings therein upon oscillatory movement of an agitator **15**. Herein, the agitator is a rotatable spider lying on the screen and mounted for oscillation about an axis through a pivot pin **16** (FIG. 2) rotatable in the center of the screen. An elongated flexible resilient lever **20** is attached in a novel manner at its upper end on the outer side of the body **10** and, at its lower end, is drivingly connected in a novel manner to the spider **15** through a driver link **18** to oscillate the spider as the lower end of the lever in the flexing thereof swings toward and away from the body **10**.

In accordance with the present invention, the lever **20**, its attaching member **21** on one end of said lever, and the driver link **18** on the other end are molded in one piece of polypropylene or the like with an integral thin web hinge connection **22** between the lever and driver link so that the lever is flexible laterally to provide the necessary pivotal or hinge action for oscillation of the lower end of the lever relative to the driver link as well as the spring action in the flexing of the lever relative to its similar but longer and thicker integral web hinge connection **23** with the attaching member **21** for returning the driver link to a normal outermost position of rest shown in FIG. 2. The elongated attaching and supporting member **21** extends downwardly along and is secured to the outside of the sifter body adjacent its top rim. To permit that member **21** as well as the driver link **18** to be molded as one flat piece, which is bent later into its final configuration, the additional hinge connection of web form seen at **23** joins the upper end of the lever **20** to the upper end of the attaching member **21**. Opposed flat abutments **24** and **25** extend substantially radially relative to the hinge axis defined at **23** and are formed on adjacent facing sides of the attaching member **21** and

upper end portion of the lever **20**, respectively, to engage each other and form a rigid support for the upper end of the lever when the lever is flexed in the operation of the sifter. Similar opposed flat abutments **26** and **27** are formed on adjacent faces of the lower end of the lever **20** and the adjacent end of the link **18**, respectively, to limit return movement of the link under spring action of the lever.

The member **21** is of shallow channel form providing outwardly projecting strengthening ribs **28** extending along the longitudinal edges of the member **21** to the abutments **24**, which extend farther outwardly from the plane of the member adjacent the hinge connection **23** with the lever **20**. A pair of circular openings **29** in the member **21** are spaced longitudinally of its center line to receive studs or pins **30** and **31** molded integral with sifter body **10** for securing the member **21** to the side wall of the sifter body **10**. The upper pin **30** is longer than the lower pin **31** and after entry in the hole **29** has its protruding end swedged over under heat and pressure to provide a reliable permanent connection of an economical type. The lower pin has a smaller head preformed on its outer end and this pin has a snap-fit in its hole **29** to complete that fastening.

When the blank for the lever and link assembly of FIGS. 5 and 6 is removed from a molding die and is still hot, the member **21** is moved bodily relative to the lever **20** several times between its flat position of alinement with the lever and another position in which the abutments **24** and **25** contact one another. This results in flexing of a narrow section of the upper hinge **23**, and the molecules of the polypropylene therein are rearranged so that that section may be flexed innumerable times as a hinge without breaking, in spite of the thinness of the section. Also, while the blank is still hot, the other and thinner web at the lower hinge **22** is flexed and bent to rearrange the molecules of this section in a similar manner for the same purpose.

The lever **20** is of channel form with strengthening ribs **32** formed integral with its longitudinal edges. At one end, the ribs **32** terminate in the abutments **25**, and at the other end they terminate in the abutments **26**. The arched thicker web **23** permits disposition of the lever **20** at a small angle relative to member **21**, as seen in FIG. 2, while the thinner web **22** permits disposition of lever **20** at right angles to link **28** and to pivot relative thereto to a greater angle as required in the operation of the sifter, without any danger of fatigue and finally breakage.

The driver link **18** includes a straight portion **37** extending from the lower hinge **22** and through a slot **33** provided in the lower wall of the sifter body **10**. On the free end of the driver link **18** is an arcuate crank **34** for connection with the agitator **15**, a circular upwardly tapered aperture **35** being formed in the extremity of the crank to receive with a snap-in fit a headed pin **36** integral with one spoke **46** of the spider **15** near its outer end, this snap connection being similar to that of pin **31** in the tapered hole in attaching member **21**. The straight portion **37** of the driver link is disposed on a radial line toward the longitudinal axis of the agitator **15** while the pin **36** and crank end are spaced radially outward of this axis. The crank and pin convert the reciprocation of the driver link **18** into the oscillatory movement of the spider **15**.

In operation, the slant of the top of the sifter body is of advantage in scooping flour out of a canister or bag, and this is particularly true when it is necessary to scoop the remaining flour out of a corner of a container. To operate the sifter, the lever **20** is grasped by two or more fingers of one hand while the thumb engages the far side of the sifter body **10**, as seen in FIG. 1, or alternatively, the lever **20** is grasped by the thumb with the fingers extended around the sifter body. As the hand is then closed, the lower end of the lever **20** is flexed relative to its upper end at the abutments **24** and **25** adjacent the upper hinge **23**, moving the driver link **18** linearly inwardly in a generally horizontal plane (FIG. 2) to oscillate the agitator **15**, the driver link being guided in this movement by the slot **33**. during this inward movement of the driver link, the slanted surfaces **26** and **27** adjacent the lower hinge **28** separate. Upon opening the hand, the lever **20** straightens and its lower end moves away from the sifter body **10** pulling the driver link **18** outwardly through the slot **33** until the lever **20** returns to its outer limit position determined by abutment of the crank portion **34** with the inner wall of the sifter body adjacent the slot **33**, as shown in FIG. 3. During a sifting operation, the operator performs a series of such closing and opening motions of the hand, causing rapid reciprocations of the driver link and accompanying oscillations of the agitator **15** relative to screen **14**. Grasping and controlling the sifter body **10** using only one hand is facilitated by forming the body with an hourglass shape in which the central diameter is less than the diameters of the upper and lower end portions. This novel shape obviously also improves the general appearance of the sifter.

To provide a low-cost construction and a construction which will not be subject to getting rusty because of frequent washings, it is preferred that the entire sifter assembly, including the screen **14**, usually made of wire screen, be formed of molded plastic material. To retain the sifting screen **14** in place, a downwardly facing ledge **38** is formed around the inner wall of the sifter body adjacent the lower opening **12**. The ledge forms the upper side of an annular groove **39** defined in the interior body wall between the upper shoulder **38** and a lower lip or flange **40**. The latter is of a relatively thin cross-section for flexibility and projects from the wall of the body downwardly and inwardly toward its axis, thus providing a flexible retaining lip for the screen **14** below groove **39**, so that the screen **14** may be shoved upwardly past the lip **40** when the latter is flexed to a larger diameter than the screen **14** to admit the screen. When the periphery of the screen **14** is fitted in the groove **39**, the lip **40** retains the screen. To make this method of assembly feasible we provide a gap **41** at one point in the circumference of the lip **40**, enabling the same to flex outwardly more readily than it would if the lip were continuous. The downward flare of the lower portion **12** of the sifter body **10** combined with the upward taper on the periphery of the screen **14** also makes for easier assembly.

The screen **14** is a molded plastic circular flat disc with a grid of uniformly spaced square openings **42** formed therein in molding the part of plastic material. To assure that the flour moves freely through the openings and does not clog in the latter, the openigns **42** taper upwardly, that is, they are larger at the bottom surface **43** of the screen than at the top surface (see FIG. 2). The taper of the square openings **42** facilitate the release of the plastic screen **14** from its die in the molding operation. The screen **14** is also formed with an upwardly tapered central bearing opening **44** for a downward press fit of the center pin **16** on the agitator, this connection being similar to that at pins **31** and **36**.

The agitator spider **16** is also preferably molded from the same plastic material as the other parts, with a central hub **45** and six radial arms **46** projecting outwardly from the hub at 60° intervals. The pivot pin **16** is integral and coaxial with the hub and extends downwardly therefrom through the central bearing opening **44** in the screen **14**. The agitator **15** rests on the top surface of the screen **14** and slides across the latter during oscillation of the agitator by the driver link **18**.

The sifter illustrated herein is of the small cup or one and a half cup size, either of which sizes is convenient for sifting flour in making cookies, pastries, gravy or the like. This sifter can be readily stored in a canister or bag of flour and its all plastic construction permits the

same to be readily washed without any danger of rusting due to any residual moisture. Moreover, the sifter is of economical construction suitable for mass production.

It is believed the foregoing description conveys a good understanding of the objects and advantages of our invention. The appended claims have been drawn to cover all legitimate modifications and adaptations.

We claim:

1. In a sifter for flour or like materials comprising a sifter body having a top opening into which material to be sifted is supplied, said body having a lower opening covered by a screen which holds said material within the sifter body while permitting some of the material to gravitate and sift through openings in the screen when agitated, and an agitator lying on top of and movable across said screen to agitate said material relative to said openings, the improvement comprising an elongated manually flexible resilient lever which is fixedly mounted at one end on the outside of an upper portion of said body and extends downwardly and is connected at its lower end with means operatively connecting said lever with said agitator, the latter being thereby moved in one direction relative to the screen as said lever is flexed manually toward said sifted body and being moved in the opposite direction under spring action of said lever when the latter moves away from said sifter body as manual flexing pressure thereon is relieved, said lever being of molded plastic material and the fixed mounting for said lever on said sifter body comprising a plastic attaching member integrally hingedly attached by a flexible plastic web to the upper end of said lever and rigidly secured to the sifter body, said attaching member having the upper end of said lever fulcrumed thereon.

2. In a sifter for flour or like materials comprising a sifter body having a top opening into which material to be sifted is supplied, said body having a lower opening covered by a screen which holds said material within the sifter body while permitting some of the material to gravitate and sift through openings in the screen when agitated, and an agitator lying on top of and movable across said screen to agitate said material relative to said openings, the improvement comprising an elongated manually flexible resilient lever which is fixedly mounted at one end on the outside of an upper portion of said body and extends downwardly and is connected at its lower end with means operatively connecting said lever with said agitator, the latter being thereby moved in one direction relative to the screen as said lever is flexed manually toward said sifter body and being moved in the opposite direction under spring action of said lever when the latter moves away from said sifter body as manual flexing pressure thereon is relieved, said lever being of molded plastic material and the means operatively connecting the lower end of said lever with said agitator comprising an elongated plastic link one end of which is connected with said agitator, the other end being integrally hingedly attached by a flexible plastic web to the lower end of said lever.

3. In a sifter for flour or like materials comprising a sifter body having a top opening into which material to be sifted is supplied, said body having a lower opening covered by a screen which holds said material within the sifter body while permitting some of the material to gravitate and sift through openings in the screen when agitated, and an agitator lying on top of and movable across said screen to agitate said material relative to said openings, the improvement comprising an elongated manually flexible resilient lever which is fixedly mounted at one end on the outside of an upper portion of said body and extends downwardly and is connected at its lower end with means operatively connecting said lever with said agitator, the latter being thereby moved in one direction relative to the screen as said lever is flexed manually toward said sifter body and being moved in the opposite direction under spring action of said lever when the latter moves away from said sifter body as manual flexing pressure thereon is relieved, said lever being of molded plastic material and a plastic attaching member is integral with the upper end of the lever secured to an outer side wall of the sifter body, the means connecting the lower end of said lever to said agitator comprising a plastic link, and flexible plastic web hinges integrally hingedly connecting the lever and link at one end of the lever and the lever and attaching member at the other end of the lever.

4. In a sifter for flour or like materials, comprising a sifter body having a top opening into which material to be sifted is supplied, said body having a lower opening covered by a screen which holds said material within the sifter body while permitting some of the material to gravitate and sift through openings in the screen when agitated, and an agitator lying on top of and movable across said screen to agitate said material relative to said openings, the improvement comprising providing said sifter body of molded plastic material with an annular internal groove provided in the lower end portion to receive said screen, said groove having an annular inwardly projecting shoulder integral with said body defining the one side thereof and a flexible resilient annular inwardly projecting lip integral with said body defining the other side thereof, said lip being adapted to be spread radially enough to allow passage of the peripheral portion of said screen in entering the screen into said groove, said lip being thereafter adapted to contract to substantially its initial radius to retain said screen in said groove, said sifter body and groove being of downwardly flared form internally to facilitate entry and assembly of said screen in said groove and said screen being of rigid construction and having the periphery thereof tapered to conform to the downward flare of said body and groove to further facilitate assembly.

5. The structure as set forth in claim 4 wherein the lip has at least one break in its circumference to enable easier spreading of the same.

6. In a sifter for flour or like materials comprising an elongated sifter body having a bore extending from an upper open end to a lower open end, a screen secured in said body across the lower open end of the bore, and an agitator oscillatably mounted on the screen and operable on the top surface thereof, the improvement comprising an integral, one-piece molded plastic member providing an elongated flexible resilient operating lever, an attaching member rigidly attached to said sifter body and connected integrally to one end of said lever to support the lever exteriorly of the sifter body, and a driver link connected by an integral hinge to the other end of said lever and extending through a slot provided in said sifter body to the interior thereof where the driver link is connected to the agitator, the first mentioned end portion of the lever flexing relative to said sifter body under manual pressure to provide a spring action for reciprocating the driver link and thereby oscillating the agitator.

7. The structure of claim 6 in which the one-piece molded plastic member is made of molded polypropylene having connecting webs of reduced thickness at the junctures between the lever and the attaching member and the driver link, said webs being flexed while still hot to form flexible hinges.

8. As an article of manufacture, a one-piece elongated molded plastic member providing an elongated flexible resilient lever, a relatively short attaching member connected by an integral flexible plastic hinge to one end of said lever, and a link connected by an integral flexible plastic hinge to the other end of said lever, whereby the three-part assembly is in one piece and is adapted to be handled as such.

9. An article of manufacture as set forth in claim 8 in which the one-piece molded plastic member is made of material having substantially the properties of polypropylene, whereby when the integral hinge portions are flexed

while the molded material is still hot, said hinges remain flexible thereafter and are durable.

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