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Boers

(10) **Patent No.: US 6,290,110 B1**
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(54) **FLUID SEAL FOR A POUR SPOUT OF A PAINT CONTAINER LID MEMBER**

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(73) Assignee: **X-Pert Paint Mixing Systems, Inc.**, Roseville, MN (US)

(*) Notice: This patent issued on a continued prosecution application filed under 37 CFR 1.53(d), and is subject to the twenty year patent term provisions of 35 U.S.C. 154(a)(2).

Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/416,871**

(22) Filed: **Oct. 13, 1999**

(51) **Int. Cl.**[7] **B65B 1/30**
(52) **U.S. Cl.** **222/559**; 222/166; 222/472
(58) **Field of Search** 222/144, 153.01, 222/153.03, 164, 166, 470–474, 559, 562, 563, 570, 571

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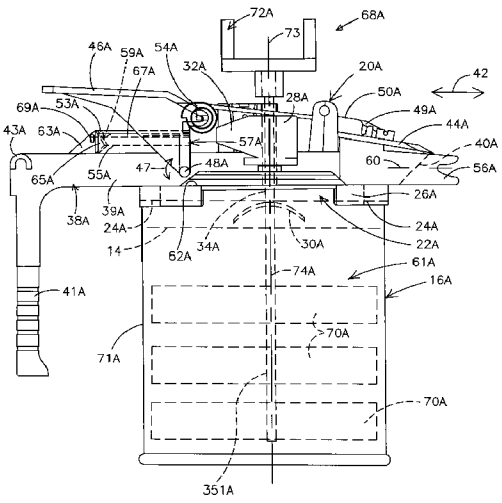
(57) **ABSTRACT**

Disclosed is a lid member for an original container of a liquid paint component. The lid member is usable with a system for dispensing the paint component from its original container into a paint receptacle according to a paint formula to form a liquid paint mixture. The lid member includes a base portion that is adapted to releasably engage an open top of the paint component container. The base portion has a pour spout through which the paint component can be dispensed, and a movable cover element. The cover element is movable between a closed state, wherein the cover element covers the pour spout, and an opened state, wherein the pour spout is uncovered and the paint component can be dispensed from its original container and into the paint receptacle. A resilient seal mechanism is positioned between the pour spout and the movable cover element. The resilient seal mechanism prevents leakage of the paint component, upon tilting of the original container, out of the pour spout past the cover element in the closed state of the cover element.

13 Claims, 16 Drawing Sheets



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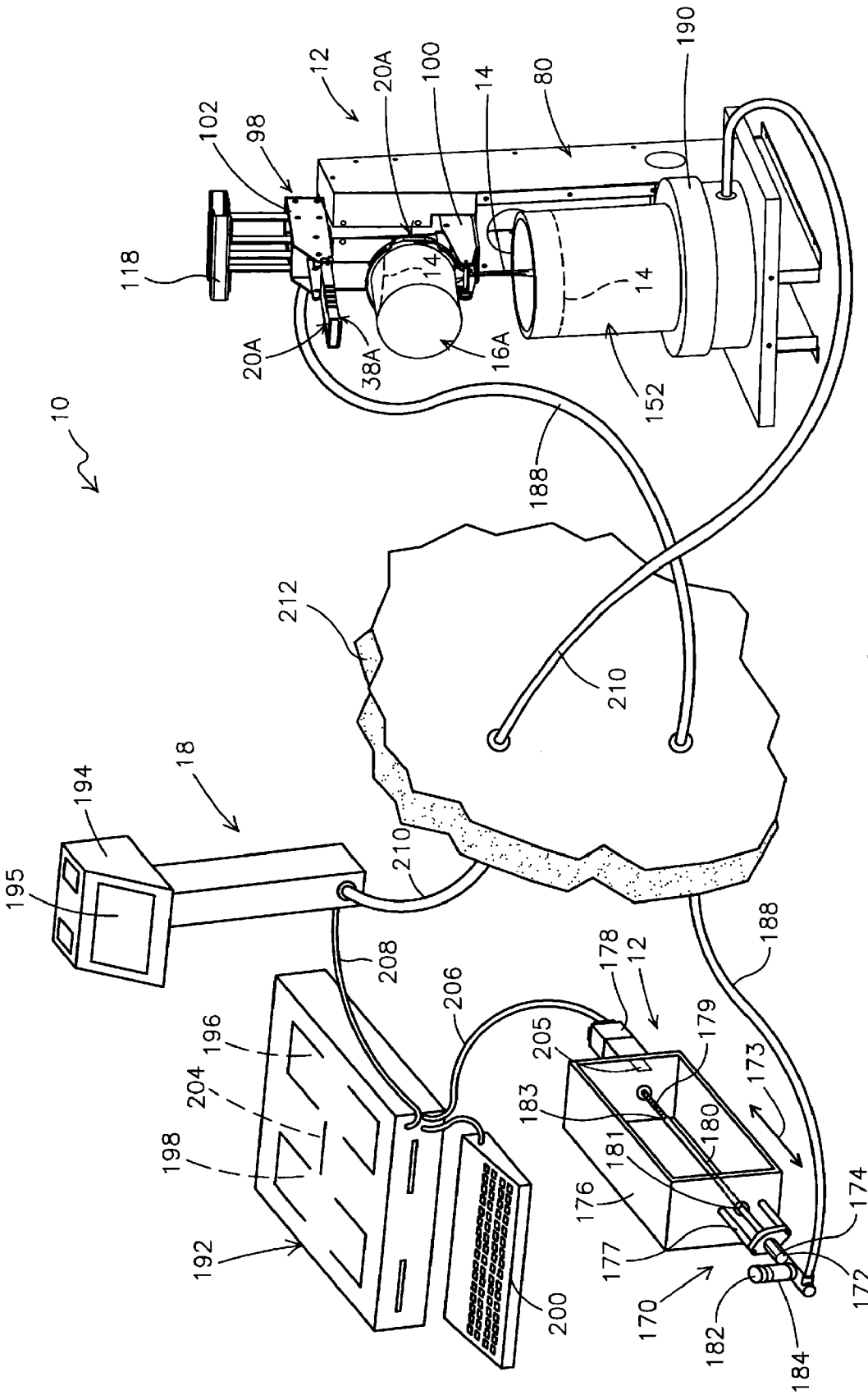
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Fig. 1

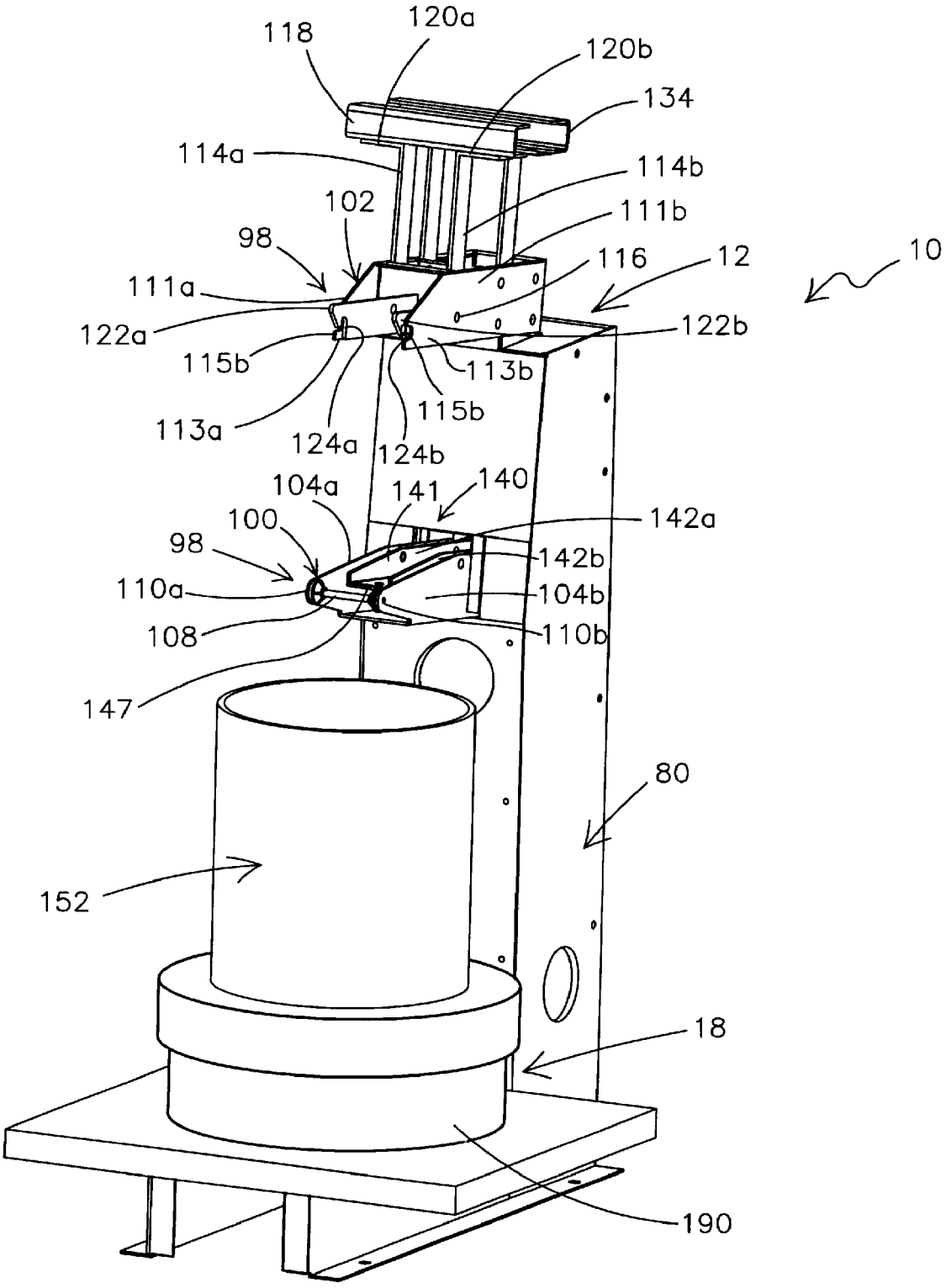
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Fig. 2

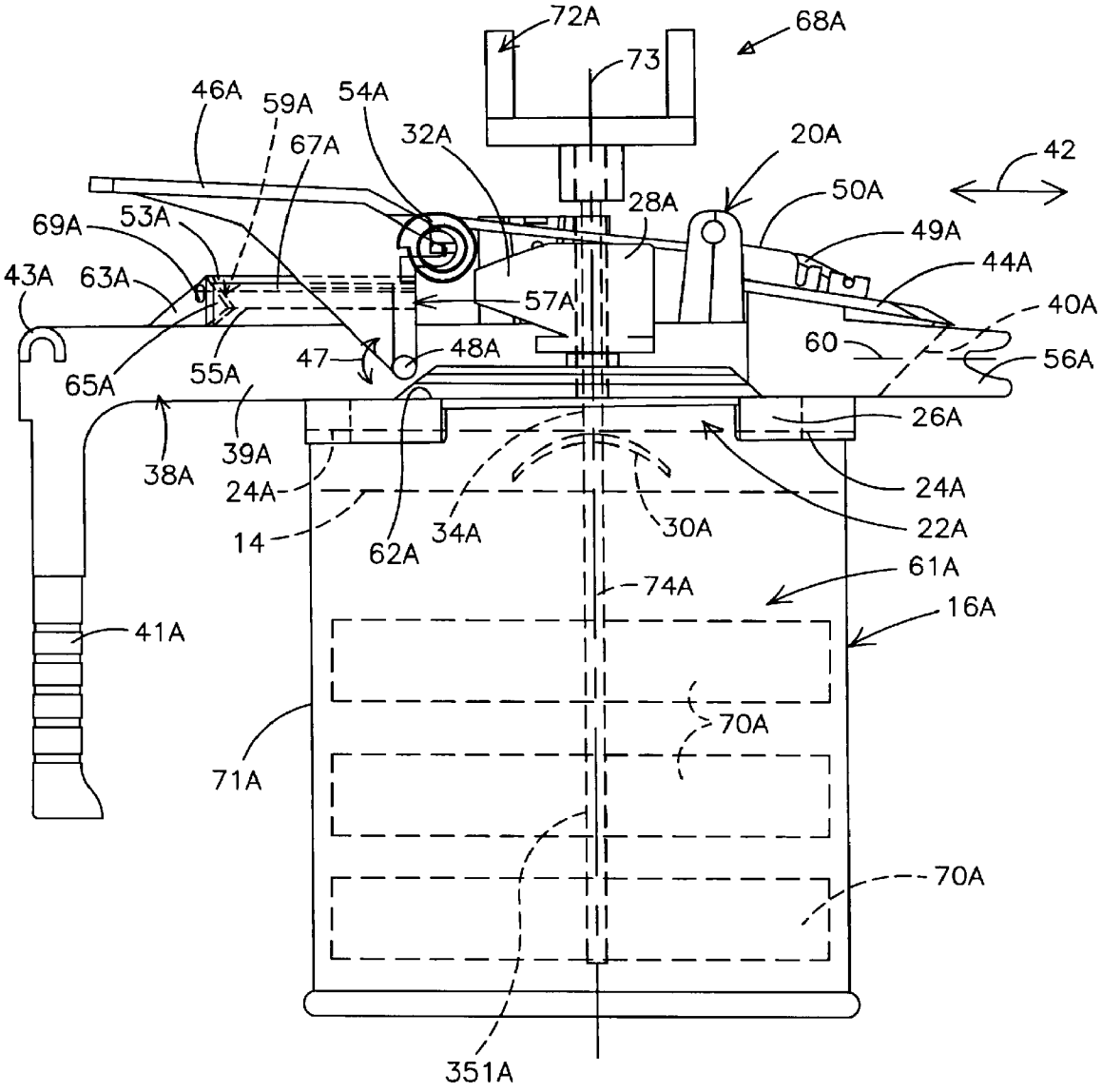
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Fig. 3A

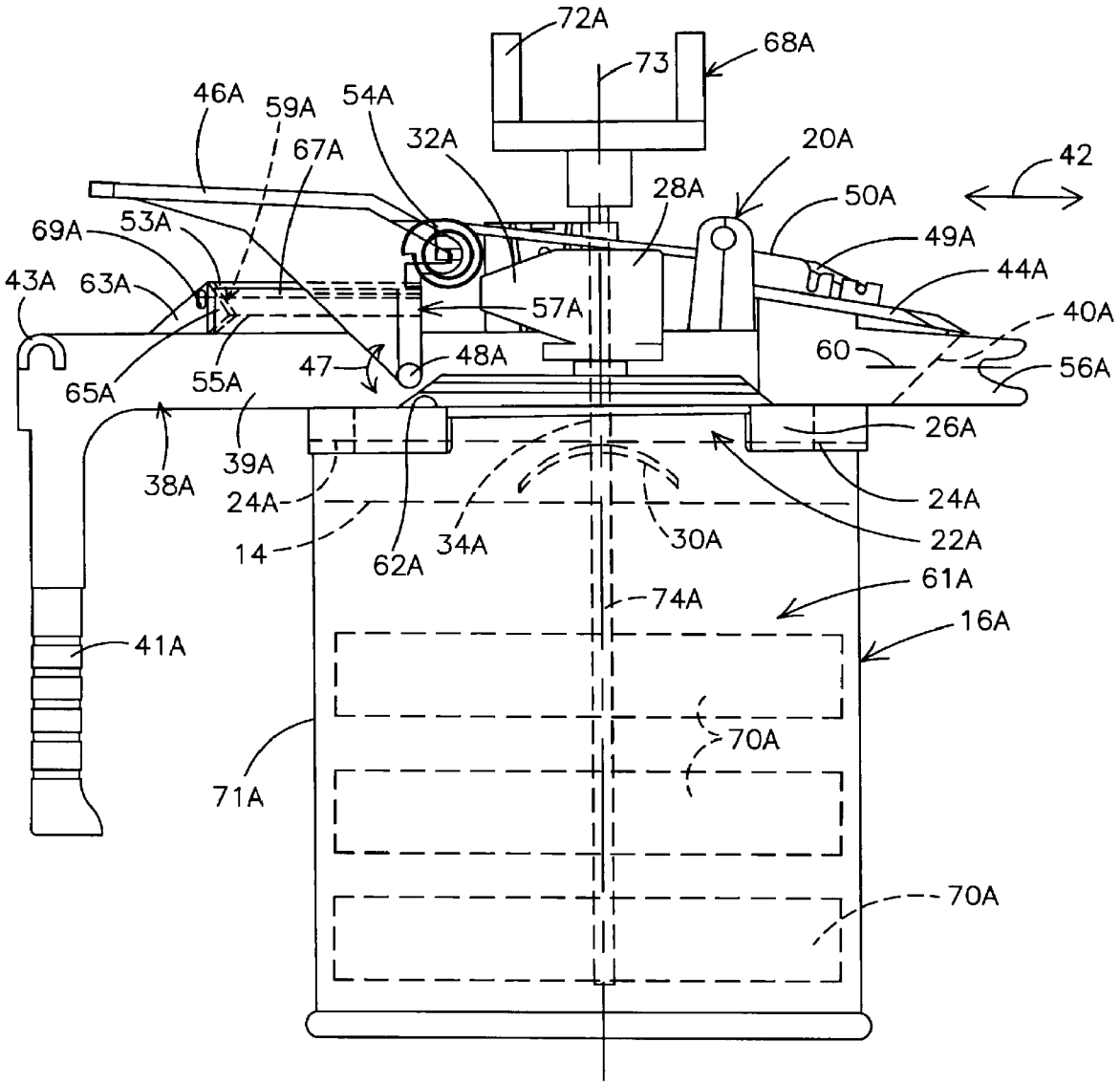
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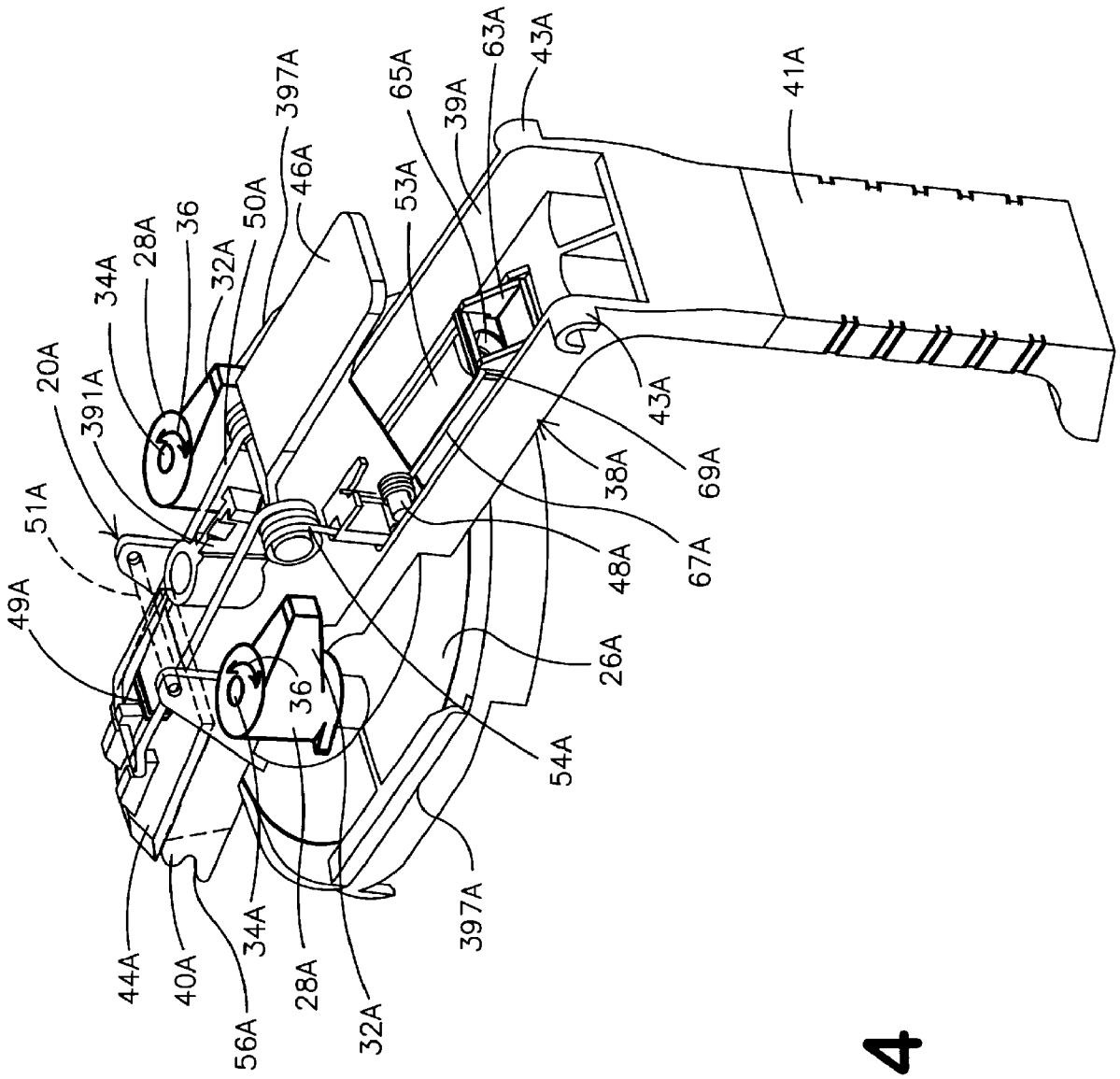
Fig. 3B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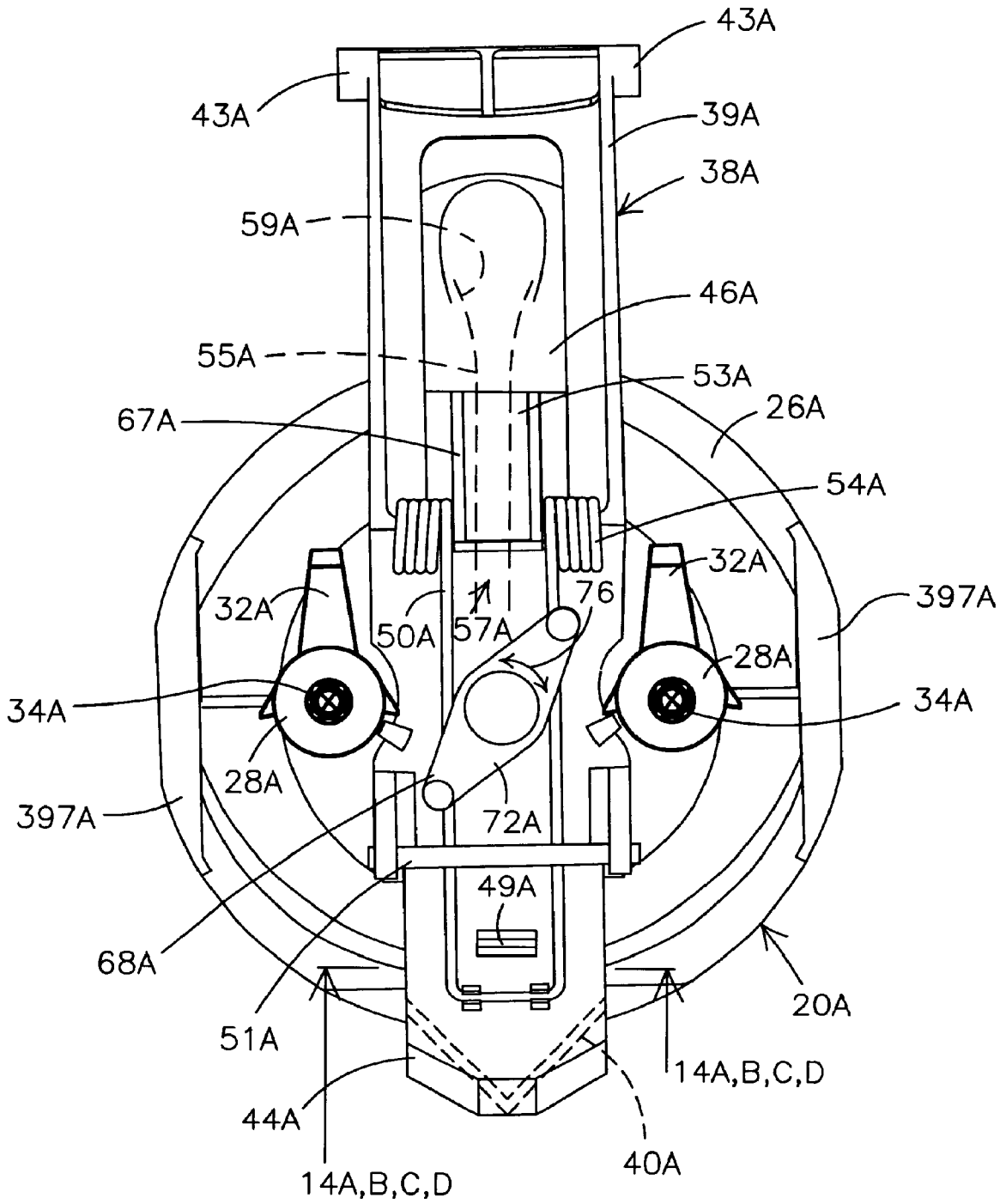
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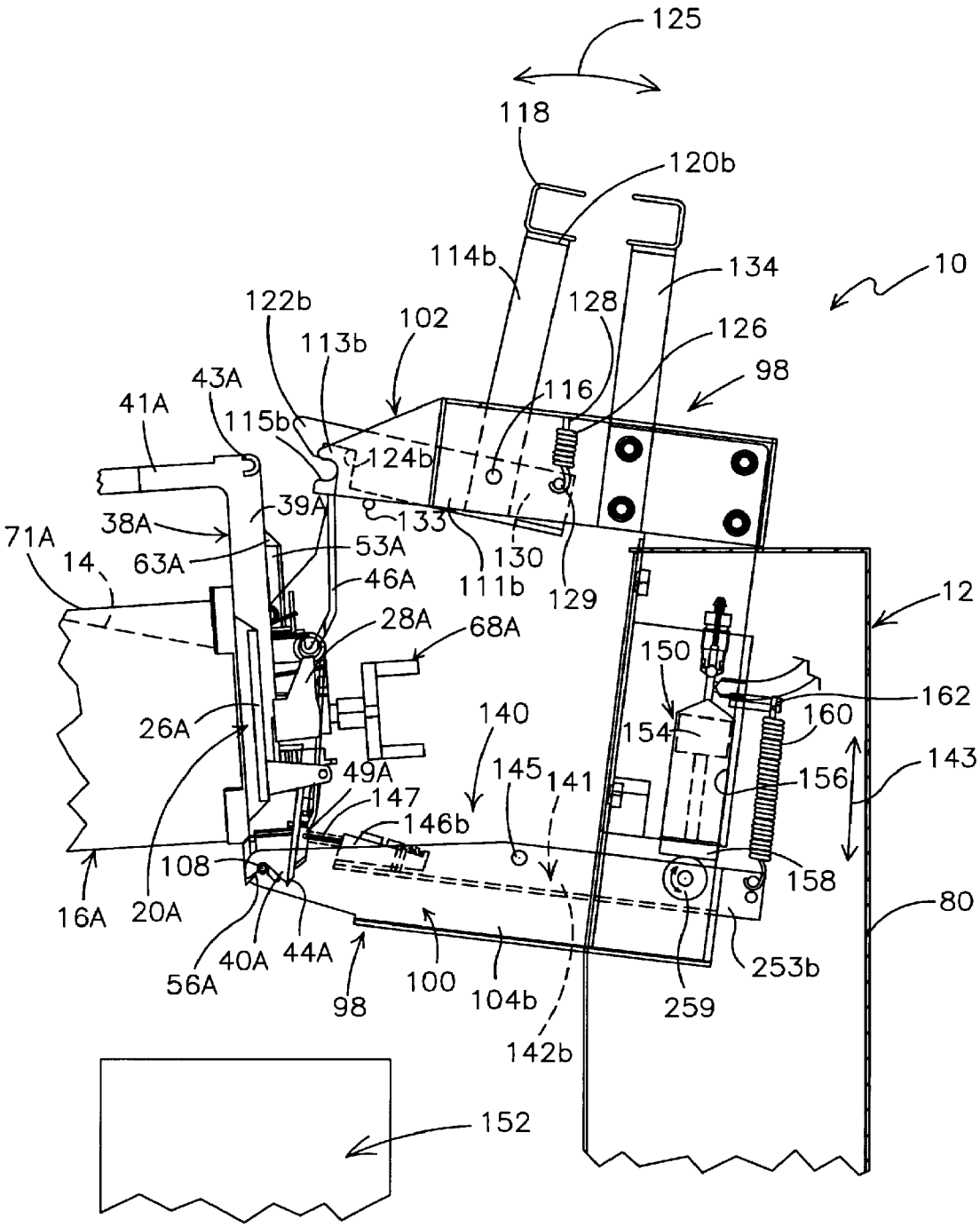
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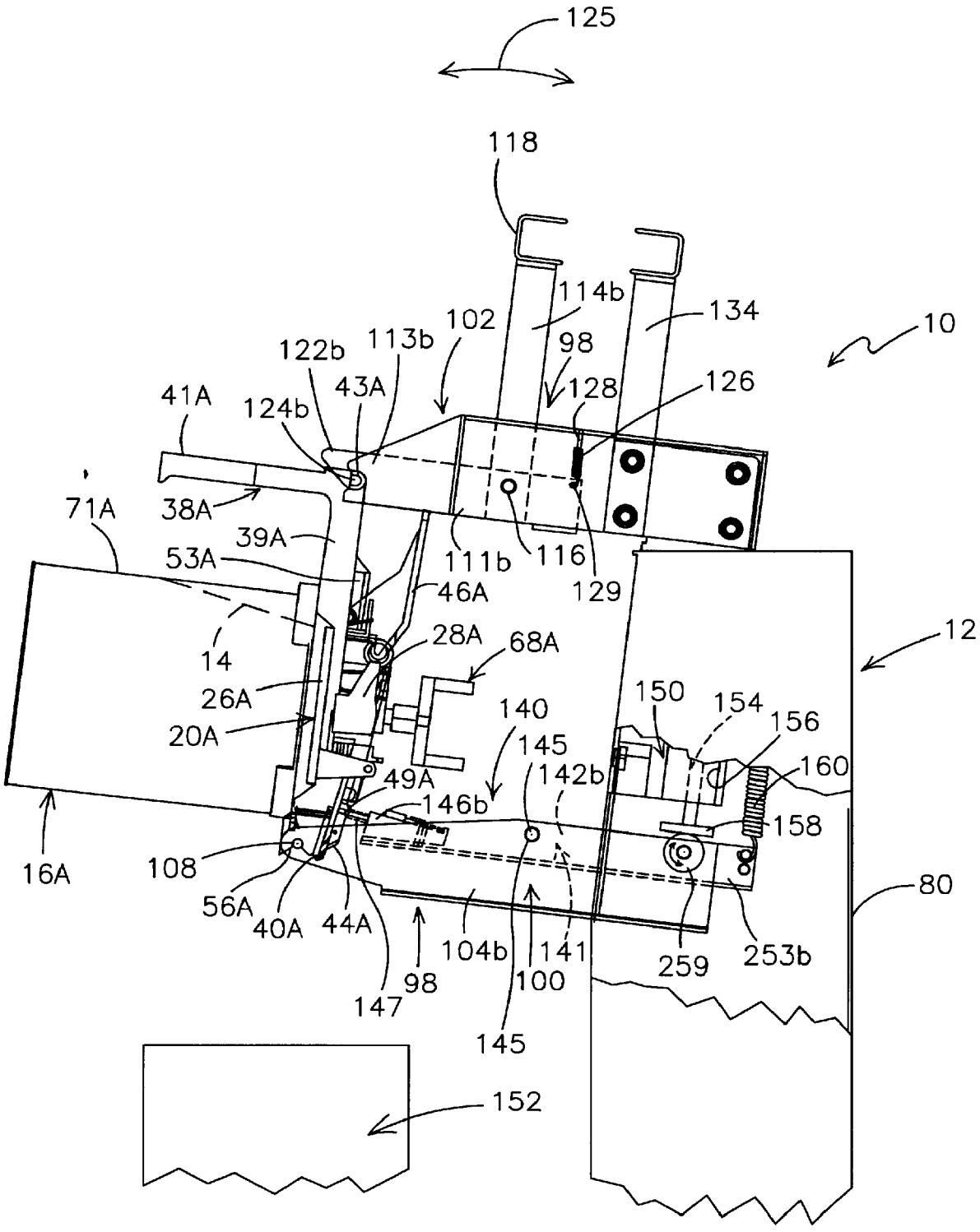
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Fig. 7

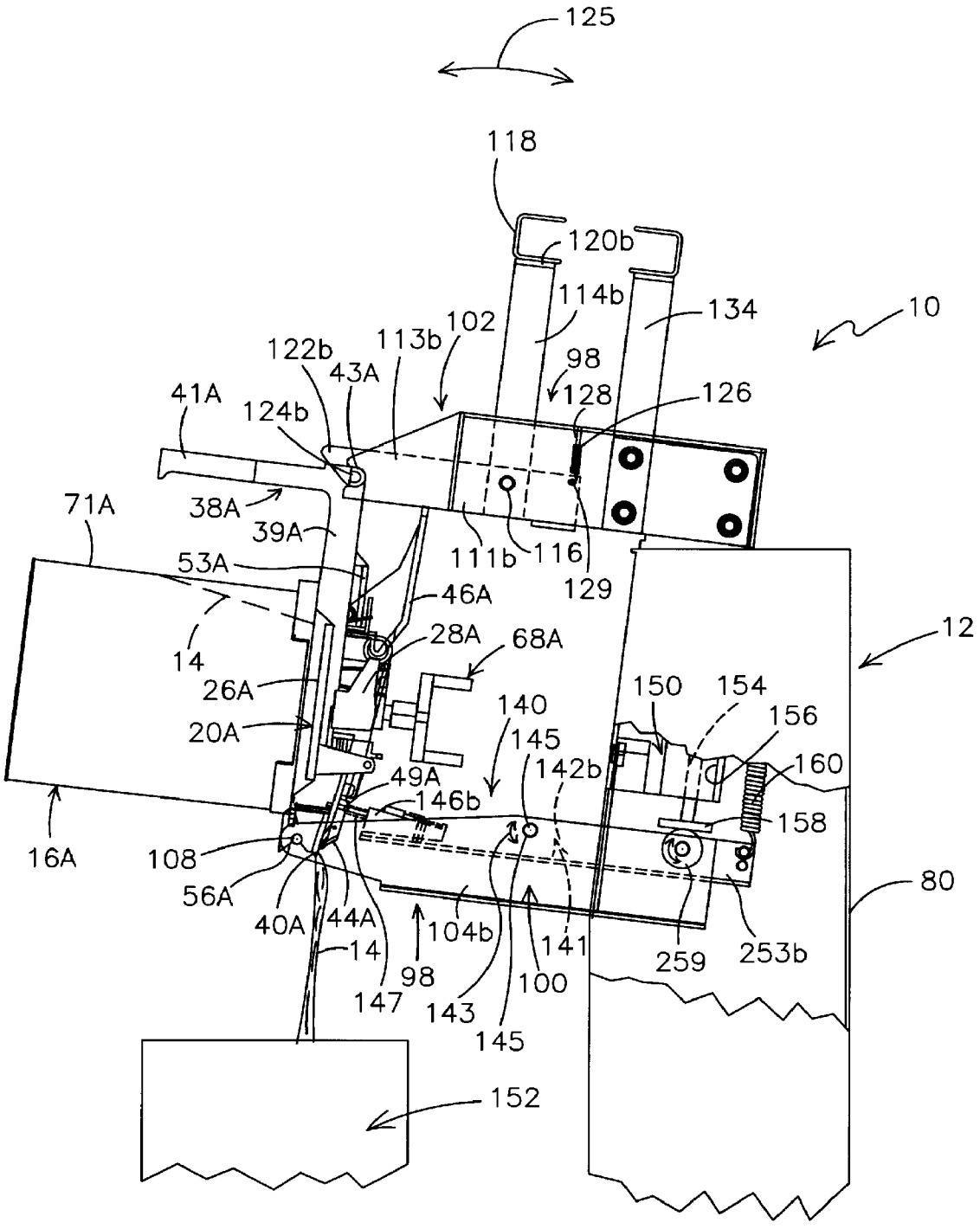
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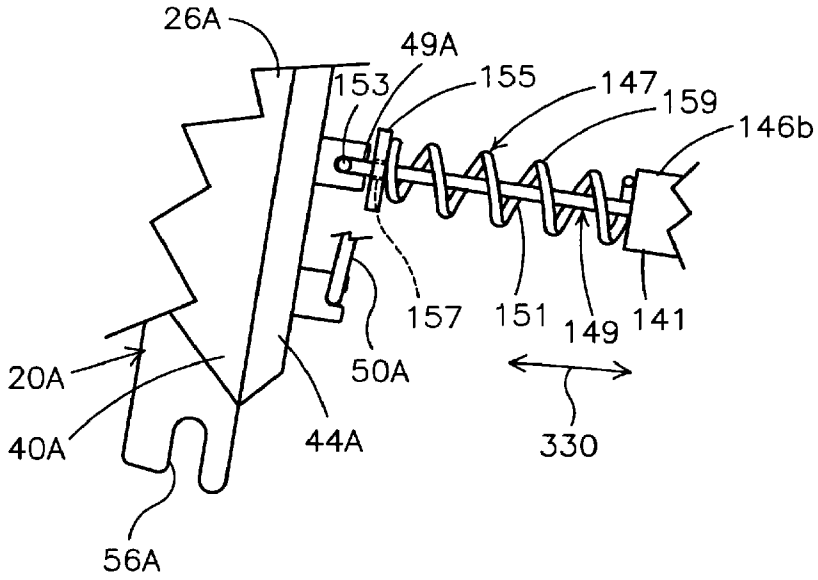
Fig. 8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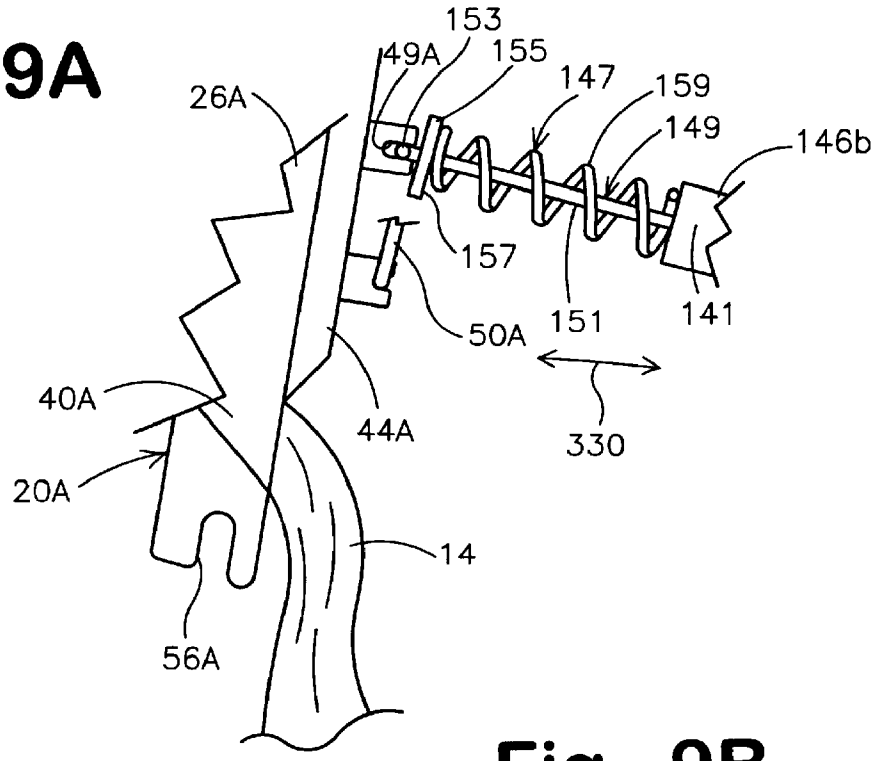
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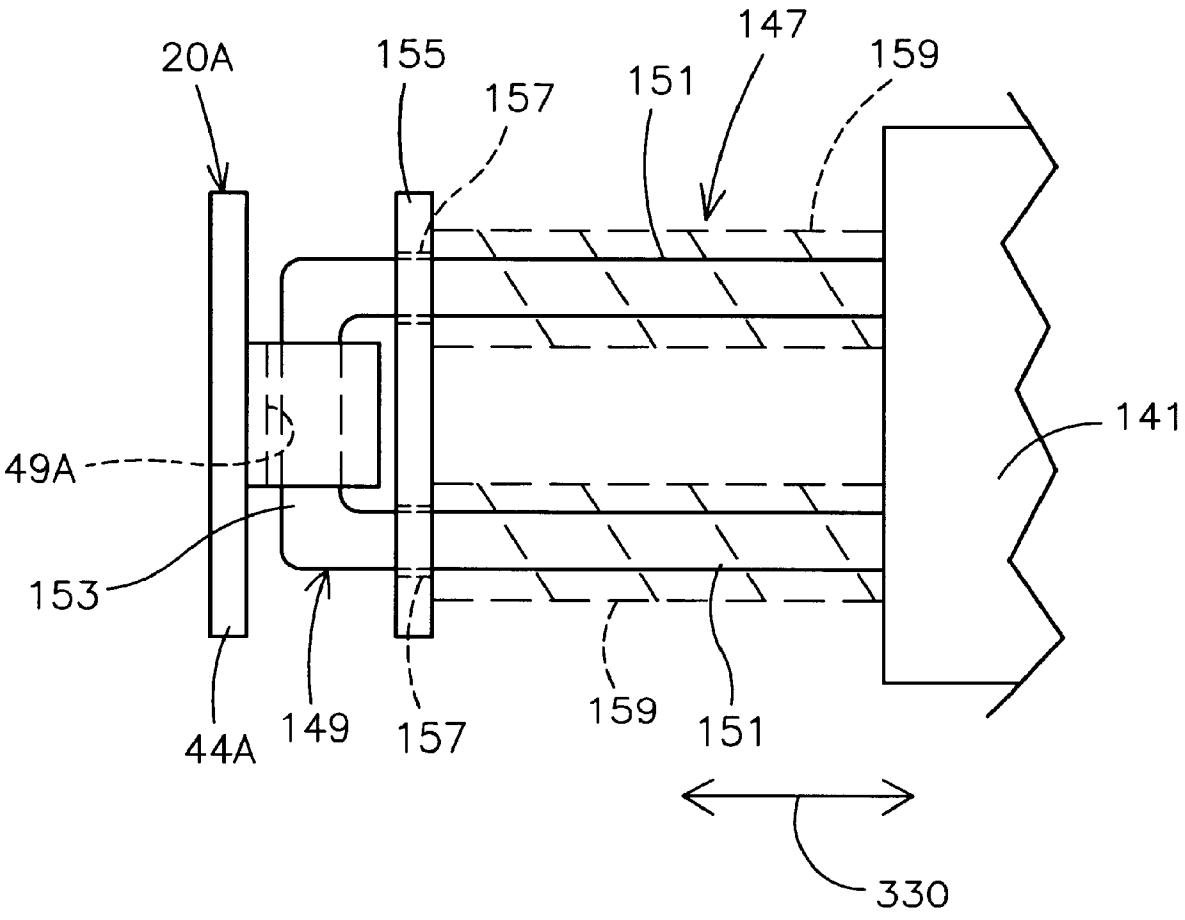
Fig. 9B



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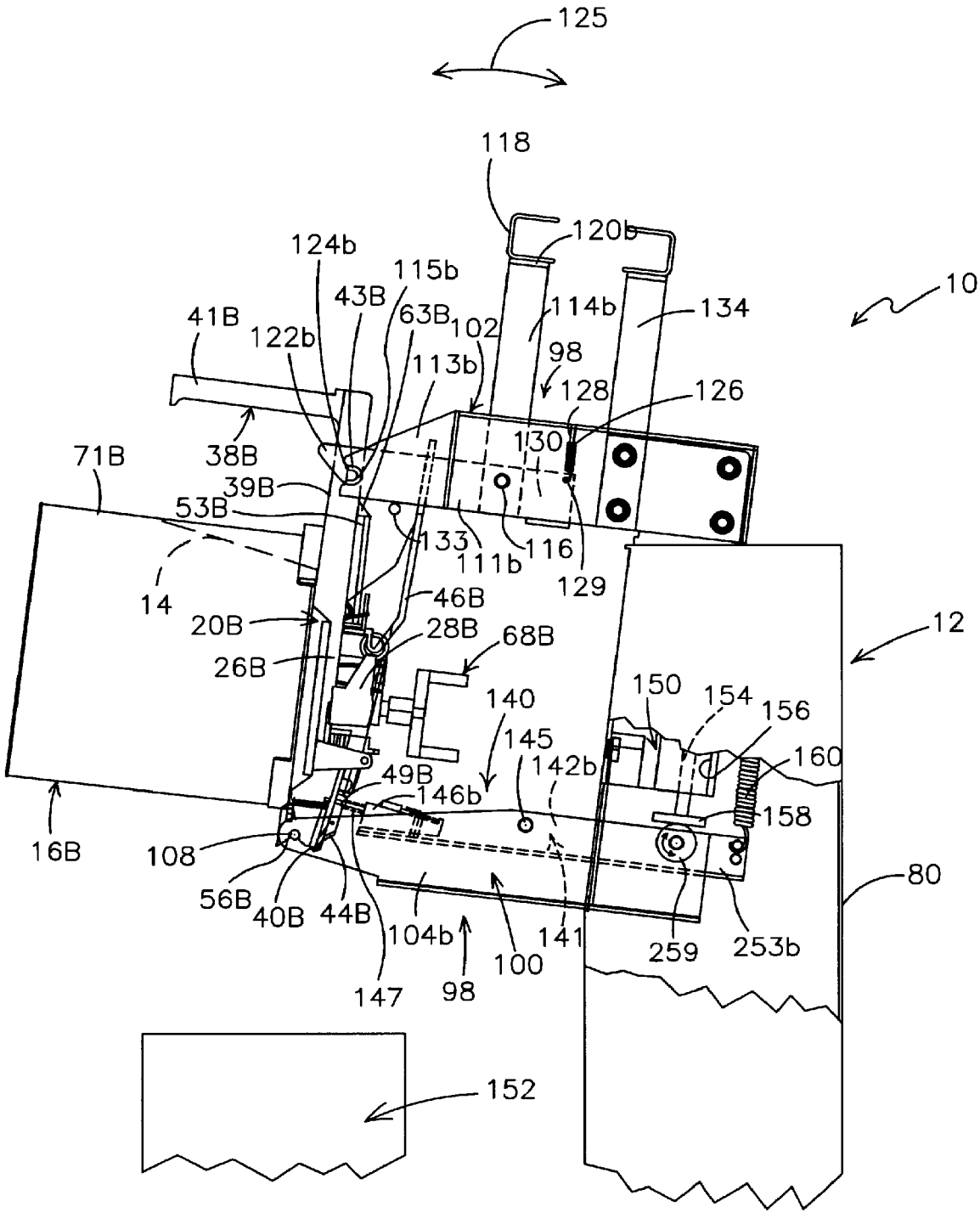
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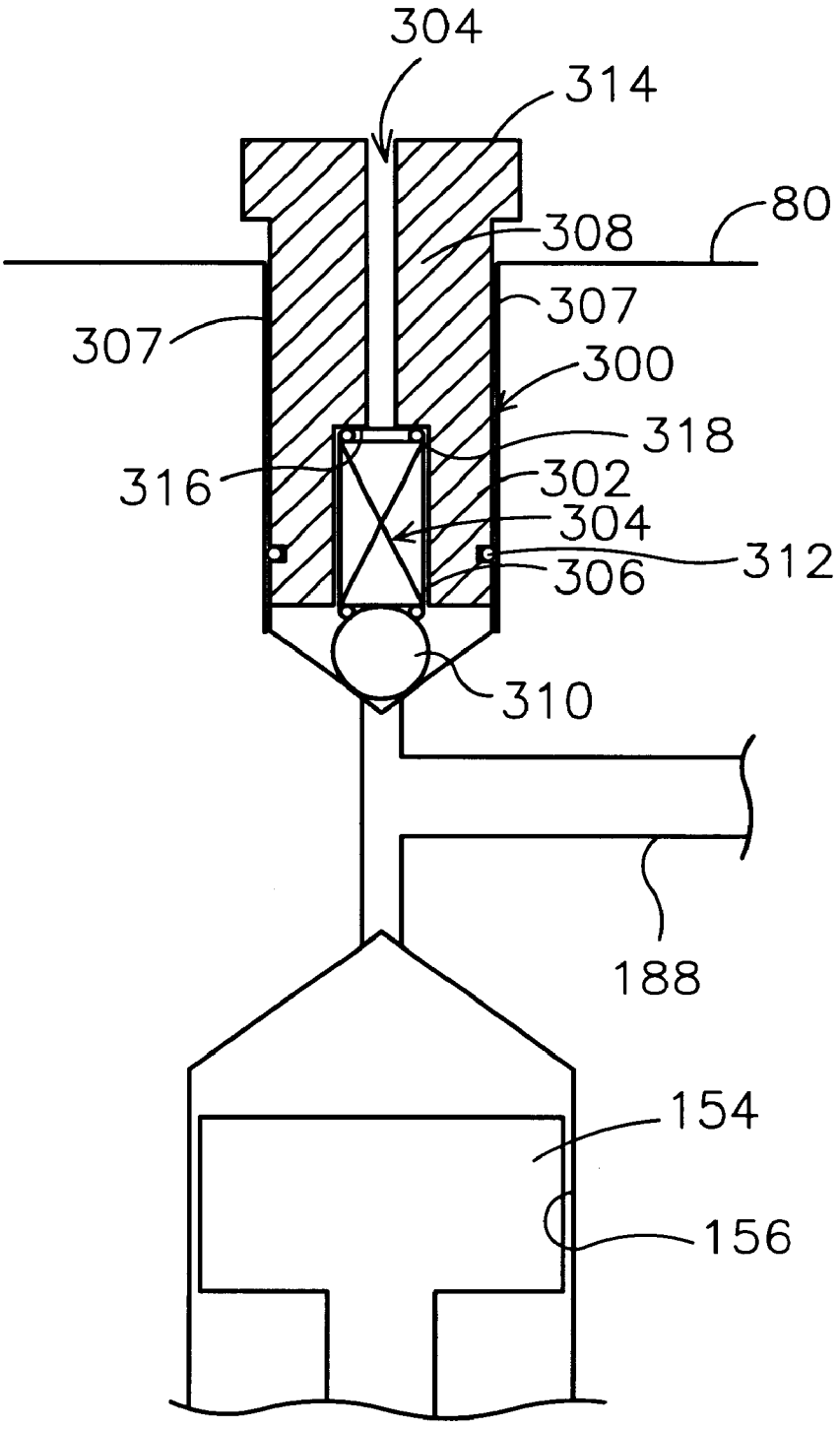
Fig. 11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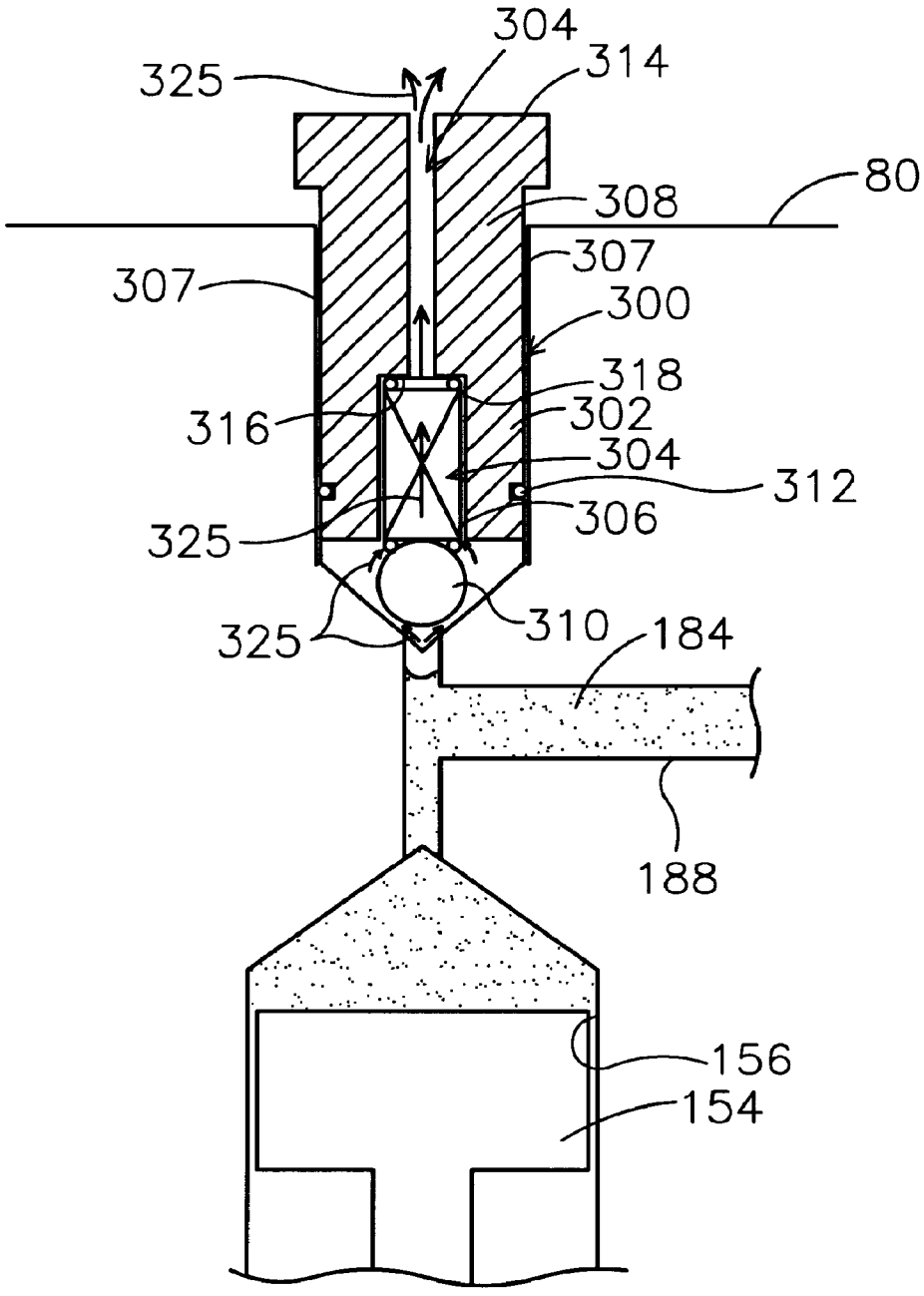
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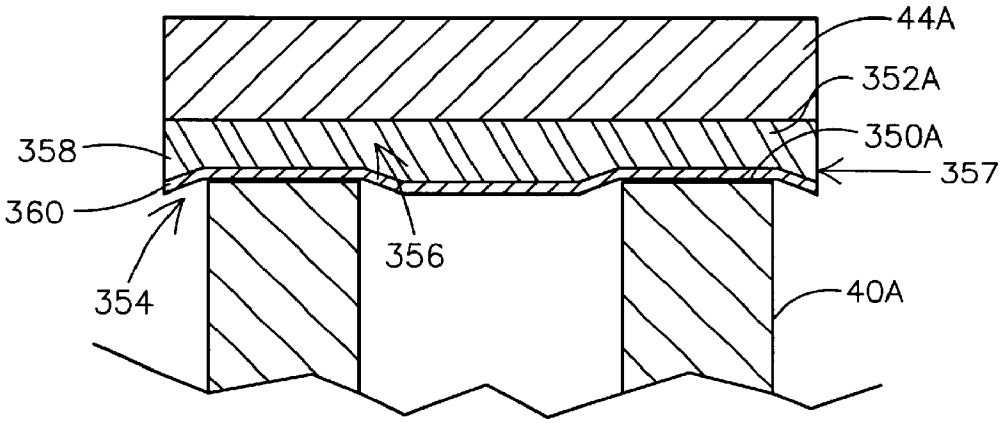
Fig. 13



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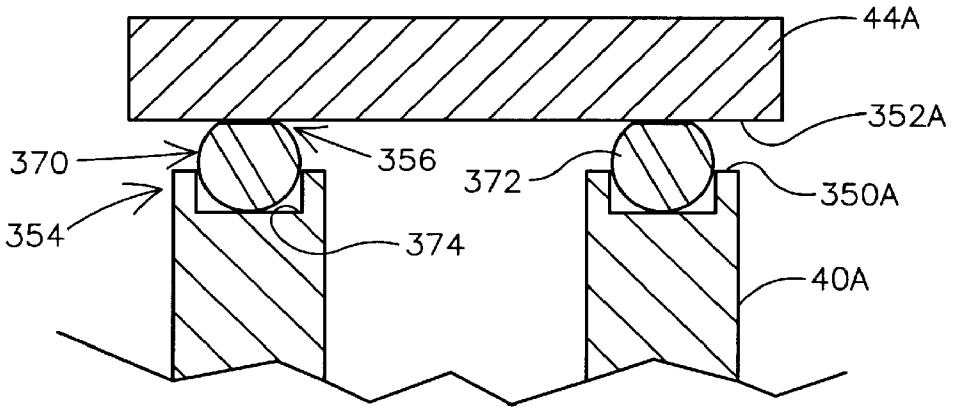

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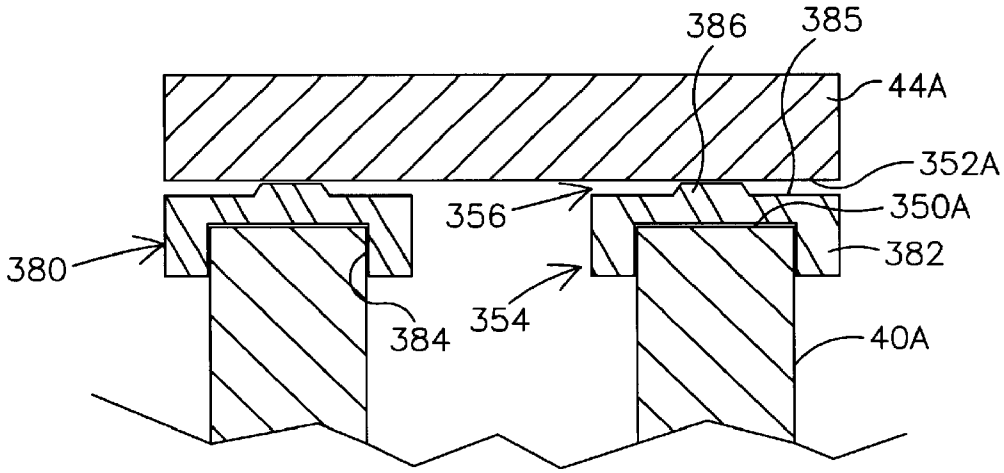

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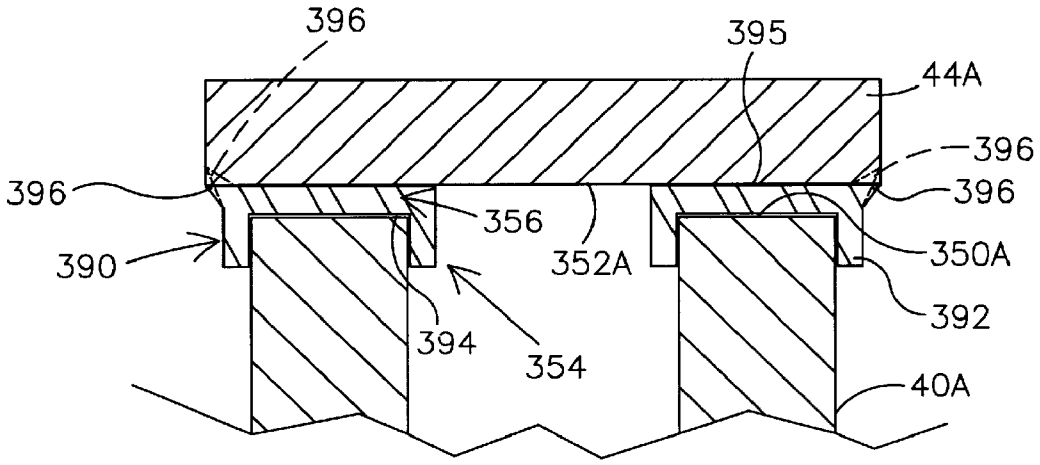

Fig. 14D

FLUID SEAL FOR A POUR SPOUT OF A PAINT CONTAINER LID MEMBER

CROSS REFERENCE TO RELATED APPLICATIONS

This patent application is related to U.S. patent application Ser. No. 09/189,338, entitled "Paint Container Lid For A Semi-Automated Automotive Paint Dispensing System"; and Ser. No. 09/189,214 entitled "SemiAutomated System For Dispensing Automotive Paint", both of which were filed on Nov. 10, 1998, assigned to the same assignee as herein, and incorporated herein by reference thereto. In addition, this patent application is related to U.S. patent application Ser. No. 09/417,933, entitled "Semi-Automated Automotive Paint Dispensing System" filed on even date herewith, assigned to the same assignee, and incorporated herein by reference thereto; to U.S. patent application Ser. No. 09/416,729, entitled "Lid Member For A Paint Container Useable With A Semi-Automated Automotive Paint Dispensing System" filed on even date herewith, assigned to the same assignee, and incorporated herein by reference thereto; and to U.S. patent application Ser. No. 09/416,728, entitled "Universal Paint Container Lid Member" filed on even date herewith, assigned to the same assignee, and incorporated herein by reference thereto.

TECHNICAL FIELD

This invention relates to mixing paint components, such as colorants, tints and pearls, to create automotive paint formulas. In particular, the present invention is a fluid seal mechanism positioned between a pour spout and a linearly movable cover element of a paint container lid that can be secured to an original paint component container and is useable with a semi-automated system for dispensing paint components according to a desired paint formula. The fluid seal mechanism prevents contaminants from entering the original paint component container through the pour spout and prevents undesired leakage of the paint component out of the pour spout and past the cover element.

BACKGROUND OF THE INVENTION

In the automotive body repair industry, paint vendors provide auto body repair businesses, such as body shops and jobbers, with their paint formulas. Generally, these paint formulas are a composition (i.e., mixture) of paint components, such as colorants, tints, pearls, metallics, binders and/or balancers, that, once mixed, produce the desired color of paint to be applied to a repaired vehicle. The paint formulas of the paint vendors are formulated to match the colors that have been applied to vehicles by new car manufacturers over the years. In addition, these paint formulas include variants, to match the color fading of paint that can occur to a vehicle over years of service. Moreover, the palettes of paint formulas of the paint vendors also have custom colors (i.e., unconventional colors not typically used by vehicle manufacturers) that may be used to produce special finishes for custom or show cars. Hence, paint vendors provide body shops and jobbers with literally thousands of paint formulas for producing the vast spectrum of colors needed in the automotive body repair industry.

In the past, paint vendors would provide the body shops and jobbers with microfiche containing their paint formulas. Today the paint formulas are stored in computer memory. To determine the particular paint formula for a particular vehicle repair/paint job, a system operator, such as an employee of the body shop or jobber, first obtains the color code from the vehicle. This color code is typically part of the vehicle's identification number. In the case of an unconventional color, to be used to produce a custom paint finish, the code for a particular color is obtained from a catalog. This color code is then entered into the microprocessor of the computer, which accesses the computer memory, and displays, via a monitor, the paint vendor's paint formula which matches the identified vehicle color code.

The paint formulas are displayed according to the weight of the different paint components for mixing specific quantities of the paint formula, and the order in which the displayed paint components are to be mixed. Typically, paint formula mixing quantities are listed in quart, half gallon and gallon sizes, while the weight of the particular paint components needed to mix the desired quantity of paint, are listed in grams to a precision of a tenth of a gram. Generally, the paint components comprising tints, colorants, pearls and/or metallics are mixed first, while the paint components comprising binders and/or balancers are added last. Depending on the desired color, the paint formula can require just a few paint components, or over a dozen paint components, that must be mixed with a great degree of precision, to achieve a perfect color match.

Once the system operator determines that the correct desired paint formula is displayed on the computer monitor, the operator places a paint receptacle on a weigh cell that is linked to the microprocessor of the computer. Generally, a receptacle larger than the quantity of paint formula to be mixed is used to accommodate any excess paint inadvertently mixed by the operator. With the receptacle on the weigh cell, the weigh cell is zeroed by the operator, to make ready for the process of adding paint components to the receptacle to mix the desired color paint formula. Generally, the various paint components (of which there are dozens) are stored in containers kept within a rack. The rack has a mechanism that periodically stirs the paint components within the containers, so that the various paint components are ready to be dispensed as part of the paint formula mixing process. Typically, these containers are the original quart and gallon sized metal containers within which the paint components are shipped to the body shop or jobber. In metric system countries, these containers are the original one liter and four liter sized metal containers within which the paint components are shipped to the body shop or jobber. The original covers of these containers are replaced by specialized paint container lids that include stirring paddles that work with the stirring mechanism of the rack. These specialized paint container lids also have pour spouts that allow the paint components of the containers to be dispensed (i.e., poured out) into the receptacle atop the weigh cell. The pour spout of the specialized paint container lid is covered by a cover element that helps to protect the paint component within the container from contaminants. The cover element for the pour spout is movable between an opened state in which the paint component can be poured from its container through the pour spout by tipping (i.e., tilting) the container, and a closed state. The specialized paint container lid typically includes a vent to allow air to enter the container to displace the liquid paint component dispensed from the pour spout.

To reproduce the desired paint formula, the system operator begins by identifying the first listed paint component of the paint formula to be mixed. The operator then pours, by hand, the paint component into the weigh cell supported paint receptacle, until the weight of the paint component dispensed (i.e., poured) into the receptacle matches what is displayed on the computer monitor. The operator continues

along on this course (i.e., hand pouring the paint components from their containers), until the correct weight of all paint components, needed to mix the desired color paint formula, have been added to the paint receptacle atop the weigh cell.

Although the above described system for mixing paint components (according to a paint formula), using the original containers of the liquid paint components and the above described specialized container lids, allows a skilled system operator to dispense the needed paint components to adequately recreate paint colors needed for repair/paint jobs, there are some disadvantages to this system. For example, during the process of dispensing the liquid paint component from the specialized container lid, the liquid paint component often undesirably flows out of the pour spout past the cover element when the cover element is in the closed position. In addition contaminants can enter the original container through the cover element/pour spout interface thereby adversely affecting the quality of the paint component contained within the original container. Moreover, to mix a desired paint formula requires that the paint components be added to the paint receptacle, atop the weigh cell, with a great degree of accuracy. This accuracy, as stated earlier, is typically to a precision of 0.1 grams. For even a highly skilled operator this great degree of precision is difficult to obtain when hand pouring the paint components needed to mix the desired paint formula. It is especially difficult when many paint components must be poured into the paint receptacle in order to duplicate the paint formula.

The most common error on the part of the system operator of the body shop or jobber is over pouring which is due primarily to the manual labor intensive nature of the paint component dispensing process. Over pouring occurs when the weight of the paint component added to the receptacle atop the weigh cell, exceeds the weight of the component shown on the computer display for the desired paint formula. When this happens, the microprocessor of the computer recalculates the weights of the other paint components that need to be added to the receptacle to compensate for the over poured component. This recalculation is done automatically by the microprocessor since the weigh cell is linked to the computer. Based upon this recalculation, the system operator then needs to re-pour the other paint components to offset the over poured component of the paint formula.

While this re-pouring task may not be difficult when the paint formula only has a few paint components, the re-pouring task is particularly time consuming when there is a great number of components in the paint formula. Specifically, if an over pouring error is made in the last paint component of a series of ten components of a paint formula, then all of the previous nine components may have to be re-poured to compensate. This re-pouring task may be further complicated if another error is made during the re-pouring of the paint components, as this further error may require that some components be re-poured two or three times until the paint formula is finally accurately reproduced. Hence, over pouring errors can be costly to a body shop or jobber because of the additional man hours needed to mix the paint formula.

Not only are over pouring errors expensive because of the additional man hours needed to reproduce the paint formula, over pouring errors are also costly in the amount of additional paint formula that is mixed because of the errors. Automotive paint can cost in excess of $100.00 per quart. An over pouring error of just one pint may translate into an additional cost of $50.00 that a body shop or jobber may have to absorb, unless this additional paint cost can be justified to an automobile collision insurance carrier. Moreover, this additional paint, if not used in the repair/paint job, becomes a hazardous waste that must be disposed of properly, thereby adding still more costs that are attributable to paint component over pouring errors.

There is a need for an improved system for mixing paint components according to a paint formula. In particular, there is a need for paint container lid members, that can be used with the original containers of the paint components, and are compatible with a system for dispensing paint components according to a paint formula that substantially eliminates system operator errors, specifically over pouring errors, that can be costly to a body shop or jobber. The paint container lid members together with the paint component dispensing system should be easy to use, so as not to require a highly skilled operator, and should make better use of an operator's time to allow an operator to mix a greater number of paint formulas during a work day. Moreover, the paint container lid members should prevent contaminants from entering the original paint component container through the pour spout/cover element interface and prevent undesired leakage of the paint component out of the pour spout and past the cover element in the closed state of the cover element. In addition, the paint component lid members and the paint component dispensing system should comply with all regulations and laws governing the handling and mixing of paint components for the duplication of automotive paint formulas.

SUMMARY OF THE INVENTION

The present invention is a lid member for an original container of a pourable component, such as a liquid paint component. The lid member is usable with a system for dispensing the paint component from its original container into a paint receptacle according to a paint formula to form a liquid paint mixture. The lid member includes a base portion that is adapted to releasably engage an open top of a side wall of the paint component container. The base portion has a pour spout through which the paint component can be dispensed and a movable cover element. The cover element is movable between a closed state, wherein the cover element covers the pour spout, and an opened state, wherein the pour spout is uncovered and the paint component can be dispensed from its original container, through the pour spout, and into the paint receptacle upon tilting of the original cylindrical container. A resilient seal mechanism is positioned between the pour spout and the movable cover element. The resilient seal mechanism prevents leakage of the paint component, upon tilting of the original container, out of the pour spout past the cover element in the closed state of the cover element.

This lid member can be used with the original container of a liquid paint component, and the resilient seal mechanism prevents contaminants from entering the original paint component container through the pour spout/cover element interface. In addition, the resilient seal mechanism of this lid member prevents undesired leakage of the paint component out of the pour spout and past the cover element in the closed state of the cover element. Moreover, this lid member is compatible with a semi-automated system for dispensing liquid paint components from their original containers that virtually eliminates system operator errors, in particular over pouring errors, that can be costly to a body shop or jobber. The lid member and the semi-automated dispensing system are easy to use, and do not require a highly skilled operator, since operator interface with the lid members and the dispensing system is substantially limited to identifying the desired paint formula, and loading and unloading the proper containers of the liquid paint components to and from the dispensing apparatus.

The dispensing system automatically dispenses (i.e., pours) the liquid paint components from their containers, thereby ensuring a highly accurate, precision liquid paint component pour. This highly accurate liquid paint component pour substantially limits the additional cost of the added paint components attributable to over pouring errors. In addition, the lid members of the present invention together with the paint dispensing system makes efficient use of the operator's time, since the operator is free to perform other duties instead of manually pouring the proper amounts of the liquid paint components from their containers. This efficiency gain allows the operator to mix a greater number of paint formulas during a work day. Lastly, the paint component lid members, of the present invention, together with the semi-automated dispensing system complies with all regulations and laws (such as being explosion protected) governing the safe handling and mixing of liquid paint components for the duplication of automotive paint formulas.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings are included to provide a further understanding of the present invention and are incorporated in and constitute a part of this specification. The drawings illustrate the embodiments of the present invention and together with the description serve to explain the principals of the invention. Other embodiments of the present invention and many of the intended advantages of the present invention will be readily appreciated as the same become better understood by reference to the following detailed description when considered in connection with the accompanying drawings, in which like reference numerals designate like parts throughout the figures thereof, and wherein:

FIG. **1** is a perspective view illustrating a dispensing and control apparatus of a semi-automated system for dispensing liquid paint components from their original containers in accordance with the present invention.

FIG. **2** is an enlarged perspective view better illustrating the dispensing apparatus of the dispensing system of FIG. **1**.

FIG. **3**A is a side elevational view of a quart size original paint container and lid member for holding a liquid paint component with a cover element and vent mechanism shown in a closed position.

FIG. **3**B is a side elevational view similar to FIG. **3**A of the quart size original paint container and lid member for holding a liquid paint component with the cover element and vent mechanism shown in an open position.

FIG. **4** is a perspective view of the quart size lid member shown in FIG. **3**A.

FIG. **5** is top elevational view of the paint container and lid member shown in FIG. **3**A.

FIG. **6** is partial side elevational view with some parts omitted for clarity of the dispensing apparatus of FIGS. **1** and **2**, illustrating a quart size original container of a paint component being loaded into/unloaded from the dispensing apparatus.

FIG. **7** is a partial side elevational view with some parts omitted for clarity similar to FIG. **6**, illustrating the quart size original container ready for dispensing of the liquid paint component.

FIG. **8** is a partial side elevational view with some parts omitted for clarity similar to FIG. **7**, illustrating the liquid paint component being dispensed from its quart size original container.

FIG. **9**A is an enlarged, partial side elevational view of a force applying mechanism for a cover element of the lid member with the cover element shown in a closed position corresponding to FIG. **7**.

FIG. **9**B is an enlarged, partial side elevational view similar to FIG. **9**A with the cover element shown in an open position corresponding to FIG. **8**.

FIG. **10** is an enlarged, partial top elevational view of the force applying mechanism shown in FIG. **9**.

FIG. **11** is a partial side elevational view with some parts omitted for clarity similar to FIG. **7**, illustrating a gallon size original container ready for dispensing of a liquid paint component.

FIG. **12** is a partial side elevational view of an automatic bleeder valve of the semi-automated dispensing system of the present invention with the valve shown in a closed position.

FIG. **13** is a partial side elevational view similar to FIG. **12** illustrating the automatic bleeder valve in an opened position.

FIG. **14**A is a sectional view taken along line **14**A—**14**A in FIG. **5** illustrating a preferred embodiment of a resilient seal mechanism for the cover element/pour spout interface of the lid member in accordance with the present invention.

FIG. **14**B is a sectional view taken along line **14**B—**14**B in FIG. **5** illustrating an alternative embodiment of a resilient seal mechanism for the cover element/pour spout interface of the lid member in accordance with the present invention.

FIG. **14**C is a sectional view taken along line **14**C—**14**C in FIG. **5** illustrating another alternative embodiment of a resilient seal mechanism for the cover element/pour spout interface of the lid member in accordance with the present invention.

FIG. **14**D is a sectional view taken along line **14**D—**14**D in FIG. **5** illustrating still a further alternative embodiment of a resilient seal mechanism for the cover element/pour spout interface of the lid member in accordance with the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

A semi-automated dispensing system **10** for dispensing liquid paint components according to a paint formula to form a liquid paint mixture in accordance with the present invention is illustrated generally in FIGS. **1** and **2**. The dispensing system **10** generally comprises a dispensing apparatus **12** for dispensing a liquid paint component **14** from its original container **16**A and **16**B, and a control apparatus **18** for controlling the dispensing apparatus **12**. FIGS. **1**, **3**–**8** show the quart size original container **16**A having a lid member **20**A, while FIG. **11** illustrates the gallon size original container **16**B having a lid member **20**B. In metric system countries, the lid member **20**A fits a one liter size original container and the lid member **20**B fits a four liter size original container. The containers **16**A and **16**B (without the lid members **20**A and **20**B) are typical cylindrical shaped, metal vessels within which liquid paint components **14**, such as tints, colorants, pearls, metallics, binders and balancers (used to mix automotive paint according to a paint formula) are shipped from a liquid paint component manufacturer to customers, such as body shops and jobbers. Beyond their size differences, the quart size and gallon size containers **16**A and **16**B are substantially identical. Therefore, only the quart size original container will be described with particularity. The lid members **20**A and **20**B are substantially similar, therefore the quart size lid member **20**A will be described with particularity, and only the

differences in the gallon size lid member **20**B relative to the quart size lid member **20**A will be described with particularity.

As seen best in FIGS. **3**A and **3**B, the original container **16**A is cylindrical shaped having an open top **22**A defined by a circumferential lip **24**A. As seen best in FIGS. **3–5**, the lid member **20**A includes a base portion **26**A adapted to engage and seal the open top **22**A of the container **16**A to protect the liquid paint component **14** within the container **16**A. The base portion **26**A of the lid member **20**A includes a pair of spaced, pivotable cam lock mechanisms **28**A that are used to releasably secure the lid member **20**A to the original container **16**A. Each of the cam lock mechanisms **28**A is defined by a cam element **30**A connected to a cam actuator **32**A by way of a post member **34**A. Pivotally moving the cam actuators **32**A by hand, as represented by double headed arrow **36** (see FIG. **4**), moves the cam elements **30**A into and out of engagement with the lip **24**A to secure and release the lid member **20**A from the original container **16**A.

The lid member **20**A further includes a handle **38**A, for easy handling of the original container **16**A when the lid member **20**A is secured thereto. The handle **38**A includes a first portion **39**A generally parallel to the lip **24**A of the original container **16**A, a second portion **41**A (grasped by a user) that extends substantially perpendicular to the first portion **39**, and a pair of oppositely directed dispensing system latch lugs **43**A positioned at the intersection the first and second portions **39**A, **41**A. The purpose of the pair of dispensing system latch lugs **43**A will become clear below. In the gallon size lid member **20**B, as illustrated in FIG. **11**, the pair of oppositely directed dispensing system latch lugs **43**B are positioned along the length of the first portion **39**B of the handle **38**B instead of at the intersection of the first and second portions **39**A and **41**A as in the quart size lid member **20**A. Other than the size differences between the quart size lid member **20**A and the gallon size lid member **20**B, this different positioning of the dispensing system latch lugs **43**A, **43**B constitutes the main and only real difference between the lid members **20**A and **20**B.

The lid member **20**A also includes a liquid paint component pour spout **40**A. The pour spout **40**A is covered by a linearly movable, as represented by double headed directional arrow **42** (see FIGS. **3**A and **3**B), cover element **44**A. The cover element **44**A is linearly movable between a closed state (shown in FIG. **3**A) and an opened state (shown in FIG. **3**B). In the closed state of the cover element **44**A, the liquid paint component **14** is prevented from being poured (i.e., dispensed) from the original container **16**A through the pour spout **40**A. In the opened state of the cover element **44**A, the liquid paint component **14** can be poured from the original container **16**A through the pour spout **40**A by tilting the container **16**A using the handle **38**A.

As seen when comparing FIGS. **3**A and **3**B, the cover element **44**A is movable between its closed and opened states via a thumb actuator **46**A that is pivotally secured to the base portion **26**A by way of a pivot pin **48**A. The thumb actuator **46**A is pivotally movable as shown by double headed directional arrow **47**. As seen best in FIG. **4**, the thumb actuator **46**A is connected to the cover element **44**A via a wire loop **50**A. When the thumb actuator **46**A is positioned as shown in FIG. **3**A, the cover element **44**A is in its closed state. The thumb actuator **46**A is biased to this normal position in a known manner by a coil spring element **54**A (see FIGS. **3**A and **3**B). The coil spring element **54**A acts between the base portion **26**A and the thumb actuator **46**A. When the thumb actuator **46**A is positioned as shown in FIG. **3**B, the cover element **44**A is in its opened state. The cover element **44**A is moved, from its closed state to its opened state, through the connecting wire loop **50**A by pivoting the thumb actuator **46**A about the pivot pin **48**A against the bias of the spring element **54**A. The cover element **44**A is allowed to return to its closed state from the opened state by simply releasing the thumb actuator **46**A. The lid member **20**A also includes a rotatable roller element **51**A (see FIGS. **4** and **5**) that bears against the wire loop **50**A to help maintain a seal between the cover element **44**A and the pour spout **40**A. As seen in FIGS. **3–5**, the cover element **44**A also includes a slot **49**A the purpose of which will be made clear below.

As seen best in FIGS. **5** and **14**A–D, the pour spout **40**A includes a circumferential, planar edge surface **350**A, and the cover element **44**A includes a planar lower surface **352**A. A resilient seal mechanism **354** is positioned at an engagement interface **356** between the circumferential, planar edge surface **350**A of the pour spout **40**A and the planar lower surface **352**A of the cover element **44**A. The resilient seal mechanism **354** prevents leakage, upon tilting of the original container **16**A, of the liquid paint component **14** out of the pour spout **40**A past the cover element **44**A in the closed state of the cover element **44**A.

As illustrated in FIG. **14**A, in one preferred embodiment, the resilient seal mechanism **354** is defined by a resilient seal member **357** that covers the entire planar lower surface **352**A of the cover element **44**A. The resilient seal member **357** comprises a first substrate **358** of a resilient material, such as foam, and a second substrate **360** of a smooth material, such as polyethylene. Alternatively, the second substrate **36** could comprise TEFLON. In one preferred embodiment, the first substrate **358** has a thickness of approximately 0.0003 inches and the second substrate **360** has a thickness of 0.0001 inches. The resilient seal member **357** is secured, via the first substrate **358**, to the planar lower surface **352**A of the cover element **44**A via a suitable adhesive. The second substrate **360** engages the circumferential, planar edge surface **350**A of the pour spout **40**A. The smoothness of the second substrate **360** allows the cover element **44**A to readily move relative to the pour spout between the open and closed states. As seen in FIG. **14**A, the resiliency of the first substrate **358** allows the resilient seal member **357** to conform to the shape of the circumferential, planar edge surface **350**A of the pour spout **40**A. By conforming to the shape of the pour spout **40**A, the resilient seal member **357** provides an excellent fluid seal that prevents contaminants from entering the original container **16**A through the pour spout **40**A, and prevents leakage, upon tilting of the original container **16**A, of the liquid paint component **14** out of the pour spout **40**A past the cover element **44**A in the closed state of the cover element **44**A.

FIG. **14**B illustrates an alternative resilient seal member **370**. The resilient seal member **370** is defined by a rubber O-ring **372** that is mounted within a circumferentially extending channel **374** in the circumferential, planar edge surface **350**A of the pour spout **40**A. The resiliency of the rubber O-ring **372** allows the resilient seal member **370** to conform to the shape of the planar lower surface **352**A of the cover element **44**A. By conforming to the shape of the cover element **44**A, the resilient seal member **356** provides an excellent fluid seal that prevents contaminants from entering the original container **16**A through the pour spout **40**A, and prevents leakage, upon tilting of the original container **16**A, of the liquid paint component **14** out of the pour spout **40**A past the cover element **44**A in the closed state of the cover element **44**A.

FIG. **14**C illustrates another alternative resilient seal member **380**. The resilient seal member **380** is defined by a

generally U-shaped, rubber seal element **382** having an engagement channel **384** for receiving the circumferential, planar edge surface **350**A of the pour spout **40**A for mounting the resilient seal member **380** to the pour spout **40**A. An upper surface **385** of the seal element **382** includes a circumferential ridge **386** that engages the planar lower surface **352**A of the cover element **44**A. The resiliency of the ridge **386** allows the resilient seal element **382** to conform to the shape of the planar lower surface **352**A of the cover element **44**A. By conforming to the shape of the cover element **44**A, the resilient seal element **382** provides an excellent fluid seal that prevents contaminants from entering the original container **16**A through the pour spout **40**A, and prevents leakage, upon tilting of the original container **16**A, of the liquid paint component **14** out of the pour spout **40**A past the cover element **44**A in the closed state of the cover element **44**A.

FIG. **14**D illustrates a further alternative resilient seal member **390**. The resilient seal member **390** is defined by a generally U-shaped, rubber seal element **392** having an engagement channel **394** for receiving the circumferential, planar edge surface **350**A of the pour spout **40**A for mounting the resilient seal member **390** to the pour spout **40**A. An upper surface **395** of the seal element **392** includes a circumferential extension **396** that is directed exterior to the pour spout **40**A and engages the planar lower surface **352**A of the cover element **44**A. The dashed line representation of the extension **396** is the normal inoperative state of the extension **396**. The solid line representation of the extension **396** is the flexed operative state of the extension **396**. The resiliency of the extension **396** allows the resilient seal element **392** to conform to the shape of the planar lower surface **352**A of the cover element **44**A. By conforming to the shape of the cover element **44**A, the resilient seal element **392** provides an excellent fluid seal that prevents contaminants from entering the original container **16**A through the pour spout **40**A, and prevents leakage, upon tilting of the original container **16**A, of the liquid paint component **14** out of the pour spout **40**A past the cover element **44**A in the closed state of the cover element **44**A.

As seen in FIGS. **3–4**, the base portion **26**A of the lid member **20**A includes a vent member **53**A defining a vent passage **55**A that has a first open end **57**A and an opposite second open end **59**A. The vent passage **55**A passes through the base portion **26**A such that the first open end **57**A communicates with an interior region **61**A of the original container **16**A and the second open end **59**A communicates with atmosphere. The second open end **59**A is sealable by way of a linearly movable plug element **63**A. As seen best when comparing FIGS. **3**A and **3**B, the plug element **63**A is linearly movable between a sealed position (see FIG. **3**A) wherein a cone shaped end **65**A of the plug element **63**A is engaged with the second open end **59**A of the vent passage **55**A, and an unsealed position (see FIG. **3**B) wherein the cone shaped end **65**A of the plug element **63**A is disengaged from the second open end **59**A of the vent passage **55**A.

The plug element **63**A is linearly movable between the sealed and unsealed positions by actuation of the thumb actuator **46**A. The thumb actuator **46**A is coupled to the plug element **63**A by way of a wire loop element **67**A that engages a groove **69**A in the plug element **63**A. Movement of the thumb actuator **46**A between the positions shown in FIGS. **3**A and **3**B moves the plug element **63**A (by way of the wire loop element **67**A) between the sealed and unsealed positions. In the sealed position of the plug element **63**A, contaminants are prevented from entering the vent passage **55**A. In the unsealed position of the plug element **63**A (which occurs when the liquid paint component **14** is being dispensed from the original container **16**A through the pour spout **40**A upon actuation of the thumb actuator **46**A), air is allowed to enter the vent passage **55**A through the second open end **59**A so that the air passes into the interior region **61**A of the original container **16**A through the second open end **57**A to fill the void of the dispensed liquid paint component **14**.

As seen best in FIGS. **3–8**, the second open end **59**A of the vent passage **55**A is located radially exterior to the cylindrical side wall **71**A of the original container **16**A. This location of the second open end **59**A of the vent passage **55**A prevents the liquid paint component **14** from flowing out of the original container **16**A through the vent passage **55**A and the subsequent fouling of the exterior portions of the lid member **20**A. This undesirable condition is prevented because the second open end **59**A of the vent passage **55**A is located above the fluid level of the liquid paint component **14** in the dispensing state of the liquid paint component illustrated in FIGS. **8** and **11**. The vent passage **55**A extends substantially perpendicular to and radially from a central axis **73** of the original container **16**A (see FIG. **3**A).

As seen best in FIGS. **3** and **4**, the lid member **20**A further includes an alignment slot **56**A positioned at a first portion of the lid member **20**A at the pour spout **40**A adjacent to the cover element **44**A. As seen in FIGS. **3**A and **3**B, the alignment slot **56**A is positioned so as to define a plane **60** that is parallel to an upper surface **62**A of the circumferential lip **24**A of the original container **16**A. The purpose of the alignment slot **56**A will become clear below. The alignment slot **56**A is formed integrally with the base portion **26**A of the lid member **20**A.

As seen best in FIGS. **3**A and **3**B, the lid member **20**A further includes a stirring device **68**A for stirring the liquid paint component **14** within the original container **16**A. The stirring device **68**A includes a plurality of paddles **70**A connected to a paddle actuator **72**A by way of a shaft member **74**A. Rotating the paddle actuator **72**A, as represented by double headed directional arrow **76**, causes rotation of the paddles **70**A and stirring of the liquid paint component **14**. The paddle actuator **72**A is driven (i.e., rotated) by a stirring mechanism (not shown) that is part of a storage rack (not shown) for holding various original containers **16**A of liquid paint components **14**.

As seen best in FIGS. **1** and **2**, the dispensing apparatus **12** of the dispensing system **10** includes a support frame **80**. As seen best in FIGS. **2** and **6**, the dispensing apparatus **12** further includes a receiving mechanism **98** for releasably engaging the original container **16**A, **16**B of the liquid paint component **14**. The receiving mechanism **98** is defined by first and second engaging mechanisms **100** and **102**, respectively.

As seen best in FIG. **2**, the first engaging mechanism **100** includes first and second spaced arms **104***a* and **104***b* rigidly mounted to the support frame so as to be fixed against movement relative thereto. A registration rod **108** rigidly connects together the first and second arms **104***a* and **104***b* at their free ends **110***a* and **110***b*. The registration rod **108** is adapted to releasably receive (i.e., engage) the alignment slot **56**A of the lid member **20**A. As seen in FIG. **6**, interengagement of the alignment slot **56**A with the registration rod **108** mounts (i.e., secures) and aligns a first portion of the container **16**A and lid member **20**A combination to the receiving mechanism **98** of the dispensing apparatus **12**.

The second engaging mechanism **102** includes first and second spaced plates **111***a* and **111***b* fixed to an upper end of

the support frame **80**. Free ends **113***a* and **113***b* of the plates **111***a*, **111***b* include latch slots **115***a* and **115***b*, respectively. The second engaging mechanism **102** further includes first and second spaced L-shaped arms **114***a* and **114***b* pivotally mounted to the support frame **80** via a pivot pin **116**. A handle member **118** rigidly connects together the first and second L-shaped arms **114***a* and **114***b* at their first ends **120***a* and **120***b*. Second ends **122***a* and **122***b* of the first and second L-shaped arms **114***a* and **114***b* include latching notches **124***a* and **124***b*. The latching notches **124***a* and **124***b* are adapted to releasably receive (i.e., engage) the latch lugs **43**A on the handle **38**A of the lid member **20**A for the original container **16**A to secure the latch lugs **43**A in the latch slots **115***a* and **115***b* of the plates **111***a*, **111***b*. The L-shaped arms **114***a* and **114***b* of the second engaging mechanism **102** are pivotally movable as a unit, as represented by double headed arrow **125**, between an unlatched state, wherein the original container **16**A of the liquid paint component **14** can be engaged with and disengaged from the first and second engaging mechanisms **100** and **102** (shown in FIG. **6**); and a latched state, wherein the original container **16**A is securely held between the first and second engaging mechanisms **100** and **102** (shown in FIG. **7**). As such the L-shaped arms **114***a* and **114***b* (i.e., the second engaging mechanism **102**) exhibits only a single-degree-of-freedom of movement (i.e., pivotal movement only) relative to the support frame **80** and the first engaging mechanism **100** (i.e., the first and second spaced arms **104***a* and **104***b*). A tension spring element **126** is coupled between a mounting peg **128** of the support frame **80** and a mounting peg **129** of an extension arm **130** on the L-shaped arm **114***a*. The tension spring element **126** biases the L-shaped arms **114***a* and **114***b* defining a portion of the second engaging mechanism **102** to the latched state against the stop **133**. A handle/stop member **134** limits movement of the L-shaped arms **114***a* and **114***b* in a clockwise direction as viewed in FIG. **6**.

As seen best in FIGS. **2** and **6**, the dispensing apparatus **12** of the dispensing system **10** further includes dispensing mechanism **140** mounted to the support frame **80** for moving the cover element **44**A of the lid member **20**A between its closed and open states. The dispensing mechanism **140** includes outwardly extending, first and second arms **142***a* and **142***b* that define an operating device **141** pivotally movable, as a unit, as represented by double headed directional arrow **143** (FIG. **8**), relative to the support frame **80** about an axle **145**. The free ends **146***a* and **146***b*, of the first and second arms **142***a* and **142***b*, include a force applying mechanism **147** (seen best in FIGS. **9–10**) adapted to releasably engage the slot **49**A in the cover element **44**A on the lid member **20**A (see FIGS. **6–10**). The force applying mechanism **147** includes U-shaped wire member **149** having legs **151** and a connecting portion **153**. The legs **151** are rigidly mounted to the operating device **141**. As seen best in FIGS. **9** and **10**, the connecting portion **153** is releasably received within the slot **49**A of the cover element **44**A. The force applying mechanism **147** further includes a force applying plate member **155** that is linearly movable relative to the U-shaped wire member **149** as represented by double headed arrow **330**. The force applying plate member **155** includes apertures **157** that freely receive the legs **151** of the U-shaped wire member **149** to permit movement of the plate member **155** along the legs **151**. A compression spring **159** surrounds each of the legs **151** and acts between the operating device **141** and the plate member **155** to provide a biasing force urges the plate member **155** against the cover element **44**A to prevent inadvertent leakage of the liquid paint component **14** from the pour spout **40**A of the lid member **20** atop the original container **16**A when the original container **16**A is mounted in the dispensing system **10** (see FIG. **7**) and the cover element **44**A is in a closed position.

As seen in FIG. **8**, with the connecting portion **153** of the force applying mechanism **147** of the operating device **141** engaged with the slot **49**A of the cover element **44**A, a transit mechanism **150** of the dispensing mechanism **140** can pivotally move the operating device **141** between a first position and a second position. In the first position of the operating device **141** (FIG. **7**), the cover element **44**A of the lid member **20**A is in its closed state which prevents the liquid paint component **14** from being dispensed from the original container **16**A with the help of the force applying mechanism **147**. In the second position of the operating device **141** (FIG. **8**), the cover element **44**A is in its opened state which allows the liquid paint component **14** to be dispensed (i.e., poured) from the original container **16**A into a paint receptacle **152** (FIG. **1**).

As set forth previously, the handles **38**A and **38**B of each of the lid members **20**A and **20**B include the latch lugs **43**A, **43**B. The difference in positioning of these latch lugs **43**A and **43**B between the quart size lid member **20**A and the gallon size lid member **20**B results in the latch lugs **43**A, **43**B being the same position relative to the alignment slot **56**A, **56**B. This allows the receiving mechanism **98** (defined by the first and second engaging mechanisms **100** and **102**) and the dispensing mechanism **140** to accommodate quart size original containers **16**A (FIGS. **6–8**) and gallon size original containers **16**B (FIG. **11**).

As seen best in FIG. **6**, the transit mechanism **150** of the dispensing mechanism **140** includes a piston member **154** linearly movable, along directional arrow **143** (FIG. **6**), relative to a cylinder member **156**. Opposite ends **253***a* and **253***b* of the first and second arms **142***a* and **142***b* (defining the operating device **141**) are coupled to the piston member **154**. A pad member **158** of the piston member rides on a roller member **259** rotatably mounted to the arms **142***a*, **142***b*. Therefore movement of the piston member **154** within the cylinder member **156** causes the operating device **141** to move between its first and second positions. Tension spring elements **160** are coupled between the opposite ends **253***a*, **253***b* of the arms **142***a*, **142***b* and a mounting member **162** on the support frame **80**. The tension springs **160** bias the operating device **141** to its first position (also known as the primary position of the piston member **154**).

As seen in FIG. **1**, a drive mechanism **170** of the transit mechanism **150** moves the piston member **154** relative to the cylinder member **156**. The drive mechanism **170** includes a piston member **172** linearly movable, along double headed directional arrow **173**, relative to a cylinder member **174** mounted to a frame **176** via bracket structure **177**. A drive motor, such as a stepper motor **178**, is also mounted to the frame **176**. The drive motor **178** includes a drive screw **179** that is telescopically received within a drive tube **180** that is secured at one end to the piston member **172**. The drive tube **180** is slidably received within a bearing **181** of the frame **176** to allow movement of the drive tube **180**, and the piston member **172** therewith, relative to the frame **176**, drive motor **178** and cylinder member **174**. An opposite end of the drive tube **180** includes a drive nut **183** that threadably receives the drive screw **179** of the stepper motor **178**. Operation of the stepper motor **178** turns the drive screw **179** within the drive nut **183**. This in turn moves the drive tube **180** and therewith the piston member **172** within the cylinder member **174** along directional arrow **173**. A fluid reservoir **182** containing a hydraulic fluid **184** is in fluid com-

munication with the cylinder member **174**. A fluid line **188** couples the fluid reservoir **182** to the cylinder member **156**. In operation, movement of the piston member **172**, via the stepper motor **178**, forces hydraulic fluid **184** to move to and from the cylinder member **174** and the fluid reservoir **182** through the line **188** then into and out of the cylinder member **156** to move the piston member **154**. Movement of the piston member **154**, via the above described hydraulic fluid pressure, in turn moves the operating device **141** which in turn moves the cover element **44A** of the lid member **20A** between its opened and closed states.

As seen in FIGS. **12** and **13**, the dispensing system **10** includes an automatic bleeder valve **300** to aid in initially filling the dispensing system **10** with hydraulic fluid **184**. The hydraulic bleeder valve **300** includes a body member **302** defining an orifice **304** that extends through the body member **302** from a first end **306** to a second end **308**. The orifice **304** is in fluid communication with the fluid line **188** and the cylinder member **156**. A linearly movable ball valve **310** is positioned at the first end **306** of the body member **302**. The ball valve **310** is movable between a first position, wherein the ball valve **310** forms a fluid seal and air/hydraulic fluid **184** is prevented from passing into the orifice **304** (see FIG. **12**), and a second position wherein the ball valve **310** acts as a check valve and air and/or hydraulic fluid **184** may pass through the orifice **304** from the first end **306** to the second end **308** (see FIG. **13**). The body member **302** threadably engages the support frame **80** via threads **307** so as to be movable linearly relative thereto. The body member **302** includes a nut **314** at the second end **308** used to twist the body member **302** to move the body member **302** relative to the support frame **80**. Near the first end **306**, the body member **302** includes an O-ring seal member **312** to prevent air/hydraulic fluid **184** from flowing past the body member **302** through the threads **307**. An inner end **316** of the body member **302** bears against a compression spring **318** that in turn bears against the ball valve **310**.

In operation, to fill the cylinder member **156** with hydraulic fluid **184**, the body member **302** is loosened using the nut **314** which decompresses the spring **318** and allows the ball valve **310** to move to the position shown in FIG. **13**. Hydraulic fluid **184** is then pumped through the fluid line **188** from the reservoir **182** via the piston member **172** of the drive mechanism **170**. The hydraulic fluid **184** passes from the fluid line **188** into the cylinder member **156** primarily due to gravity and because this is the fluid path of least resistance. Air within the fluid line **188** and the cylinder member **156** is automatically bled out (by the introduction of the hydraulic fluid **184**) through the automatic bleeder valve **300**. The air passes around the ball valve **310**, through the spring **318** and through the orifice **304** as represented by the arrows **325** in FIG. **13**. The fluid line **188** and cylinder member **156** are full of hydraulic fluid **184** when the hydraulic fluid **184** passes out of the orifice **304**. The body member **302** is then tightened using the nut **314** which causes the inner end **316** of the body member **302** to bear against the spring **318** which compresses the spring against the ball valve **310** sealing off the orifice **304** of the bleeder valve **300**, thereby completing the filling process (see FIG. **12**).

As seen in FIG. **1**, the control apparatus **18** of the dispensing system **10** includes a weigh cell **190** for supporting the paint receptacle **152** and a control module **192**. The weigh cell **190** determines the weight of the liquid paint component dispensed (i.e., poured) from the original container **16A** into the paint receptacle **152**. The control module **192** includes a display monitor device **194** having a display **195**, a microprocessor device **196**, a data storage device **198** and a user interface device, such as a keyboard **200**. The keyboard **200** is coupled to the microprocessor device **196** via a communication line **202**. The microprocessor device **196** and the data storage device **198** are linked through a communication line **204**. The microprocessor device **196** is linked to the stepper motor **178** and to a sensor **205** for monitoring the position of the drive screw **179** through the communication line **206**. The microprocessor device **196** is linked to the display monitor device **194** through communication line **208** and is further linked to the weigh cell **190** via communication line **210**. Since the control module **192** (i.e., microprocessor device **196**) is linked to the stepper motor **178** and the sensor **205**, the control module **192** can control operation of the stepper motor **178**, and thereby movement of the piston members **172** and **154**, and hence movement of the cover element **44A** to dispense the liquid paint component **14** from the original container **16A**. In addition, since the control module **192** is further linked to the weigh cell **190**, the control module **192** can control the amount (i.e., the weight) of the liquid paint component **14** dispensed from its original container **16A** to the paint receptacle **152** (atop the weigh cell **190**) based upon data (i.e., information) obtained from the weigh cell **190**. Moreover, since the control module **192** (i.e., the data storage device **198**) stores the paint formulas, the control module **192** can determine which liquid paint components **14** and the weights of these components needed to duplicate a particular paint formula and can control the dispensing mechanism **140** in accordance therewith.

As seen in FIG. **1**, the control module **192** and the drive mechanism **170** are positioned in another room such that the communication line **210** and the fluid line **188** pass through a wall **212** so as to provide explosion protection for the dispensing system **10**. Alternatively, one or more of the display monitor device **194**, the microprocessor device **196**, and the keyboard **200** could be located next to the dispensing system **10** provided that these components are explosion protected.

In operation, to mix a particular paint formula, the operator of the semi-automated dispensing system **10** first accesses the control module **192** through the keyboard **200** to call up the desired paint formula using the microprocessor device **196** the data storage device **198**. The paint formula (i.e., the liquid paint components **14**) is then displayed on the display **195** of the display monitor device **194**. The operator then loads the first container **16A**, **16B** of the needed liquid paint components into the dispensing apparatus **12**.

As seen in FIG. **6**, to mount (i.e., load) an original container **16A** of a liquid paint component **14** to the receiving mechanism **98** of the dispensing apparatus **12**, the operator of the dispensing system **10** first needs to pivot the second engaging mechanism **102** (defined by the L-shaped arms **114***a*, **114***b*) clockwise (as viewed in FIG. **6**) from its normal latched state to its unlatched state, against the handle/stop member **134** mounted to the support frame **80**. The operator, while gripping both the handle member **118** and the handle/stop member **134** to hold the second engaging mechanism **102** in its unlatched state (against the bias of the spring element **126**), then engages the alignment slot **56A** of the lid member **20A** with the registration rod **108** of the first engaging mechanism **100** (FIG. **6**). Next, while still holding the second engaging mechanism **102** in its unlatched state, the operator pivots the container **16A** and lid member **20A** combination clockwise (as viewed in FIG. **6**) until the connecting portion **153** of the force applying mechanism **147** of the operating device **141** is fully seated in the slot **49A**

of the cover element **44**A, and the latch lugs **43**A are fully seated in the latch slots **115***a*, **115***b* of the plates **111***a*, **111***b*. With the alignment slot **56** now fully seated on the registration rod **108**, the connecting portion **153** of the operating device **141** fully seated in the slot **49**A of the cover element, and the latch lugs **43**A fully seated in the latch slots **15***a*, **115***b*, the operator pivots the second engaging mechanism **102** counter-clockwise to its latched state, so that the latching notches **124***a* and **124***b* engage the latch lugs **43**A of the lid member **20**A securing the original container **16**A lid member **20**A combination to the receiving mechanism **98** the dispensing apparatus **12**. To remove the container **16**A for the dispensing apparatus **12**, this above described process is simply reversed.

The operator then starts the dispensing process using the keyboard **200** of the control module **192**. Since the control module **192** (i.e., microprocessor device **196**) is linked to the stepper motor **178** and the sensor **205**, the control module **192** controls operation of the stepper motor **178**, and thereby movement of the piston members **154** and **172**, and hence movement of the cover element **44**A to dispense (i.e., pour) the liquid paint component **14** from the original container **16**A into the paint receptacle **152**. The arrangement of the second engaging mechanism **102** and the latch lugs **43**A prevents movement of the cover element **44**A from inadvertently disengaging the alignment slot **56**A from the first registration rod **108**. The weight of the liquid paint component **14** dispensed into the paint receptacle **152** is monitored by the control module **192** through the weigh cell **190**, thereby ensuring an accurate liquid paint component pour. Once the first liquid paint component **14** is poured, its container **16**A, **16**B is removed and is replaced with the next paint component container **16**A, **16**B and so on, until all paint components **14** of the paint formula have been added to the paint receptacle **152**, thereby completing the paint formula mixing process.

This lid member **20**A, **20**B can be used with the original container **16**A, **16**B of a liquid paint component **14** and the resilient seal mechanism **354** prevents contaminants from entering the original paint component container **16**A, **16**B through the pour spout/cover element interface **356**. In addition, the resilient seal mechanism **354** of the lid member **20**A, **20**B prevents undesired leakage of the paint component **14** out of the pour spout **40**A and past the cover element **44**A in the closed state of the cover element **44**A. Unwanted leakage of just four drops of the liquid paint component **14** from pour spout **40**A, when the container **16**A, **16**B is mounted the dispensing system **10**, can result in the addition of 0.1 grams of unwanted paint component **14** to the paint receptacle **152** which could require the operator of the dispensing system **10** to re-pour other paint components to compensate for this error. In addition, this lid member **20**A, **20**B is compatible with the semi-automated dispensing system **10**, for dispensing liquid paint components **14** from their original containers **16**A, **16**B that virtually eliminates system operator errors, in particular over pouring errors, that can be costly to a body shop or jobber. The lid member **20**A, **20**B together with the semi-automated dispensing system **10** is easy to use, and does not require a highly skilled operator, since operator interface with the lid members **20**A, **20**B and the dispensing system **10** is substantially limited to identifying the desired paint formula, and loading and unloading the proper containers **16**A, **16**B of the liquid paint components **14** to and from the dispensing apparatus **12**. The operator need no longer manually pour the paint components **14** from their containers **16**A, **16**B. The lid member/dispensing system interface automatically dispenses (i.e., pours) the liquid paint components **14** from their containers **16**A, **16**B, thereby ensuring a highly accurate, precision liquid paint component pour. Moreover, the vent passage **55**A, **55**B arrangement prevents liquid paint component from flowing out of the second open end **59**A, **59**B of the vent passage during dispensing of the paint component from the container **16**A, **16**B. In addition, the lid members **20**A, **20**B, of the present invention, together with the paint dispensing system **10**, makes efficient use of the operator's time, since the operator is free to perform other duties instead of holding the containers **16**A, **16**B and performing the task of manually pouring the proper amounts of the liquid paint components **14**. This efficiency gain allows the operator to mix a greater number of paint formulas during a work day. Lastly, the paint component lid members **20**A, **20**B, of the present invention, and the semi-automated dispensing system **10** comply with all regulations and laws, such as being explosion protected, governing the handling and mixing of liquid paint components **14** for the duplication of automotive paint formulas.

Although the present invention has been described with reference to preferred embodiments, workers skilled in the art will recognize that changes may be made in form and detail without departing from the spirit and scope of the invention. For example, although the lid members **20**A and **20**B and the semi-automated dispensing system **10** have s been described as useable to dispense liquid automotive paint components **14** from their original containers **16**A and **16**B, lid members and the dispensing system can be used to dispense other pourable components, such as primers, thinners and liquid or powdered chemicals. In particular the lid members **20**A and **20**B and the dispensing system **10** could be used in laboratory or pharmaceutical organizations to accurately dispense liquid and powdered chemicals according to a desired formula.

What is claimed is:

1. A lid member for an original container of a pourable component, the lid member being usable with a system for dispensing the pourable component from its original container into a receptacle according to a formula to form a mixture of pourable components, the lid member comprising:

a base portion adapted to releasably engage an open top of a side wall of the original container of the pourable component;

a pour spout on the base portion through which the pourable component can be dispensed from its original container, the pour spout having a circumferential, planar edge surface;

a cover element for the pour spout, the cover element having a planar lower surface and being movably mounted to the base portion such that the cover element is movable between a closed state, wherein the cover element covers the pour spout, and an opened state, wherein the pour spout is uncovered and the pourable component can be dispensed from its original container through the pour spout into the receptacle upon tilting of the original container; and

resilient seal means mounted to the circumferential, planar edge surface of the pour spout at an engagement interface between the circumferential, planar edge surface of the pour spout and the planar lower surface of the movable cover element, the resilient seal means preventing leakage of the pourable component, upon tilting of the original container, out of the pour spout past the cover element in the closed state of the cover element.

2. The lid member of claim 1 wherein the circumferential, planar edge surface of the pour spout includes a circumferentially extending channel, and wherein the resilient seal means is mounted in the channel.

3. The lid member of claim 2 wherein the resilient seal means is an O-ring.

4. The lid member of claim 3 wherein the O-ring is made of rubber.

5. The lid member of claim 1 wherein the resilient seal means is a U-shaped resilient seal member having an engagement channel for receiving the circumferential, planar edge surface of the pour spout for mounting the resilient seal member to the pour spout.

6. The lid member of claim 5 wherein a sealing surface of the resilient seal member includes a circumferential ridge that engages and conforms to the shape of the planar lower surface of the cover element.

7. The lid member of claim 5 wherein the resilient seal member includes a circumferential extension that engages and conforms to the shape of the planar lower surface of the cover element.

8. The lid member of claim 7 wherein the circumferential extension is directed exterior to the pour spout.

9. The lid member of claim 5 wherein the resilient seal member is made of rubber.

10. The lid member of claim 1 wherein the pourable component is a liquid paint component, the receptacle is a paint receptacle, the formula is a paint formula, and the mixture of pourable components is a liquid paint mixture.

11. A lid member for an original container of a pourable component, the lid member being usable with a system for dispensing the pourable component from its original container into a receptacle according to a formula to form a mixture of pourable components, the lid member comprising:

a base portion adapted to releasably engage an open top of a side wall of the original container of the pourable component;

a pour spout on the base portion through which the pourable component can be dispensed from its original container, the pour spout having a circumferential, planar edge surface;

a cover element for the pour spout, the cover element having a planar lower surface and being movably mounted to the base portion such that the cover element is movable between a closed state, wherein the cover element covers the pour spout, and an opened state, wherein the pour spout is uncovered and the pourable component can be dispensed from its original container through the pour spout into the receptacle upon tilting of the original container; and

resilient seal means mounted to the cover element so as to cover the planar lower surface of the cover element at an engagement interface between the circumferential, planar edge surface of the pour spout and the planar lower surface of the cover element so that the resilient seal means engages and conforms to a shape of the entire circumferential, planar edge surface of the pour spout, the resilient seal means preventing leakage of the pourable component, upon tilting of the original container, out of the pour spout past the cover element in the closed state of the cover element, the resilient seal means including: a first substrate of a resilient foam that engages the planar lower surface of the cover element; and

a second substrate of a smooth polyethylene that engages the circumferential, planar edge surface of the pour spout to allow the cover element to readily move between the closed and open states.

12. The lid member of claim 11 wherein the resilient seal means covers the entire planar lower surface of the cover element.

13. The lid member of claim 11 wherein the pourable component is a liquid paint component, the receptacle is a paint receptacle, the formula is a paint formula, and the mixture of pourable components is a liquid paint mixture.

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