Sept. 20, 1960 J. MULLER 2,953,161

APPARATUS FOR DISPENSING LIQUID

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FIG. 1

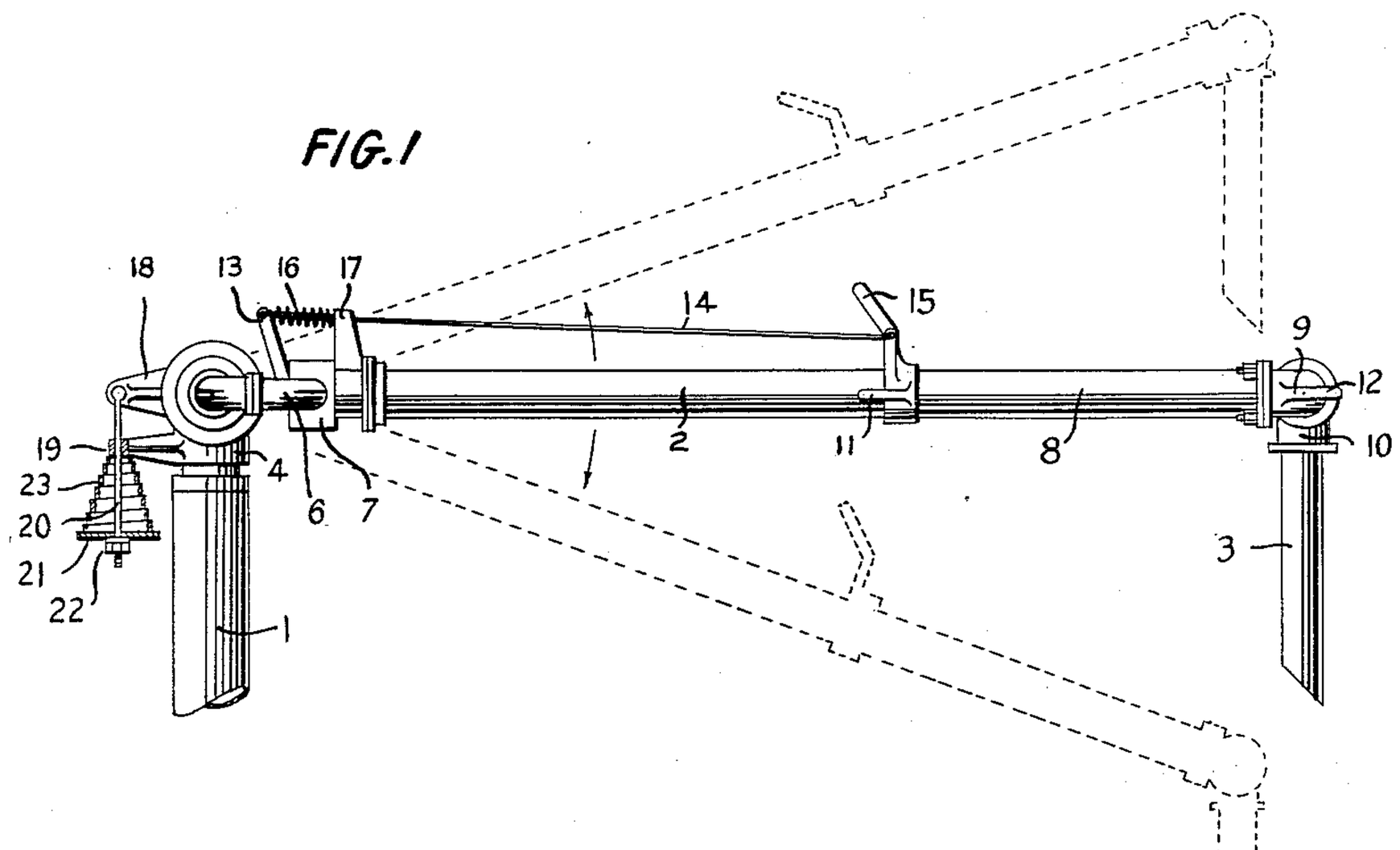


FIG. 2

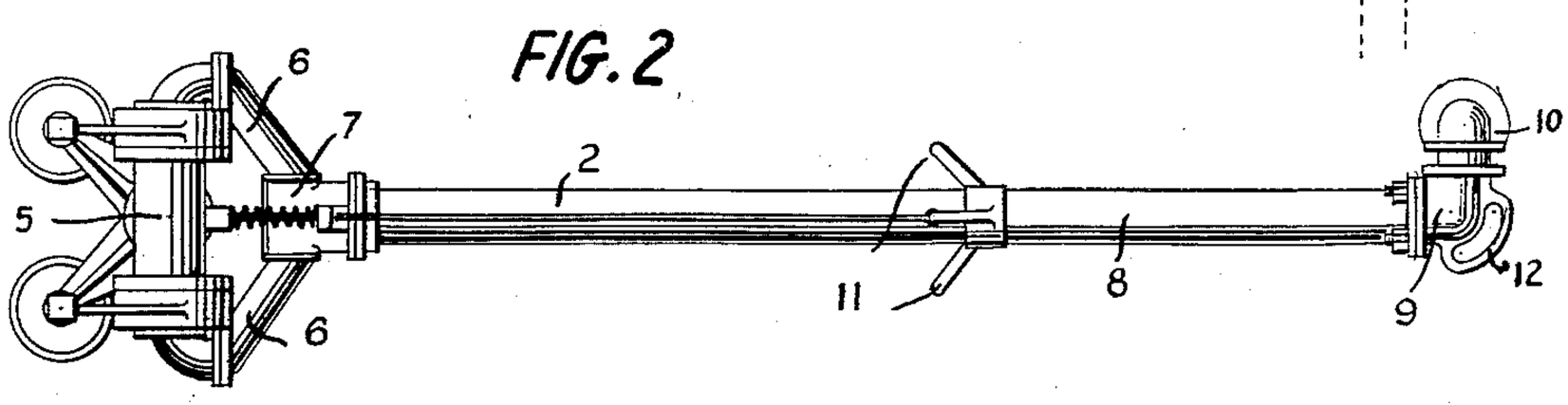
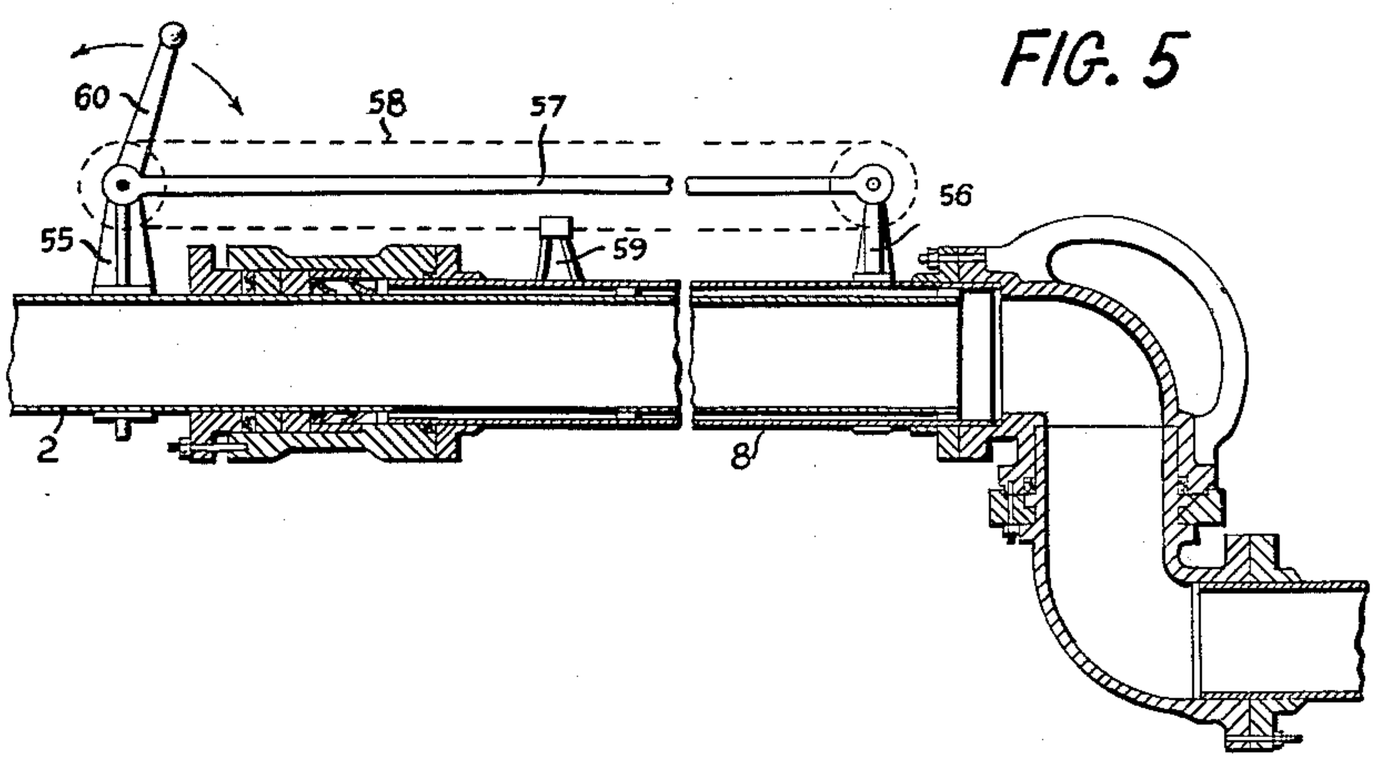


FIG. 5



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APPARATUS FOR DISPENSING LIQUID

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FIG. 4

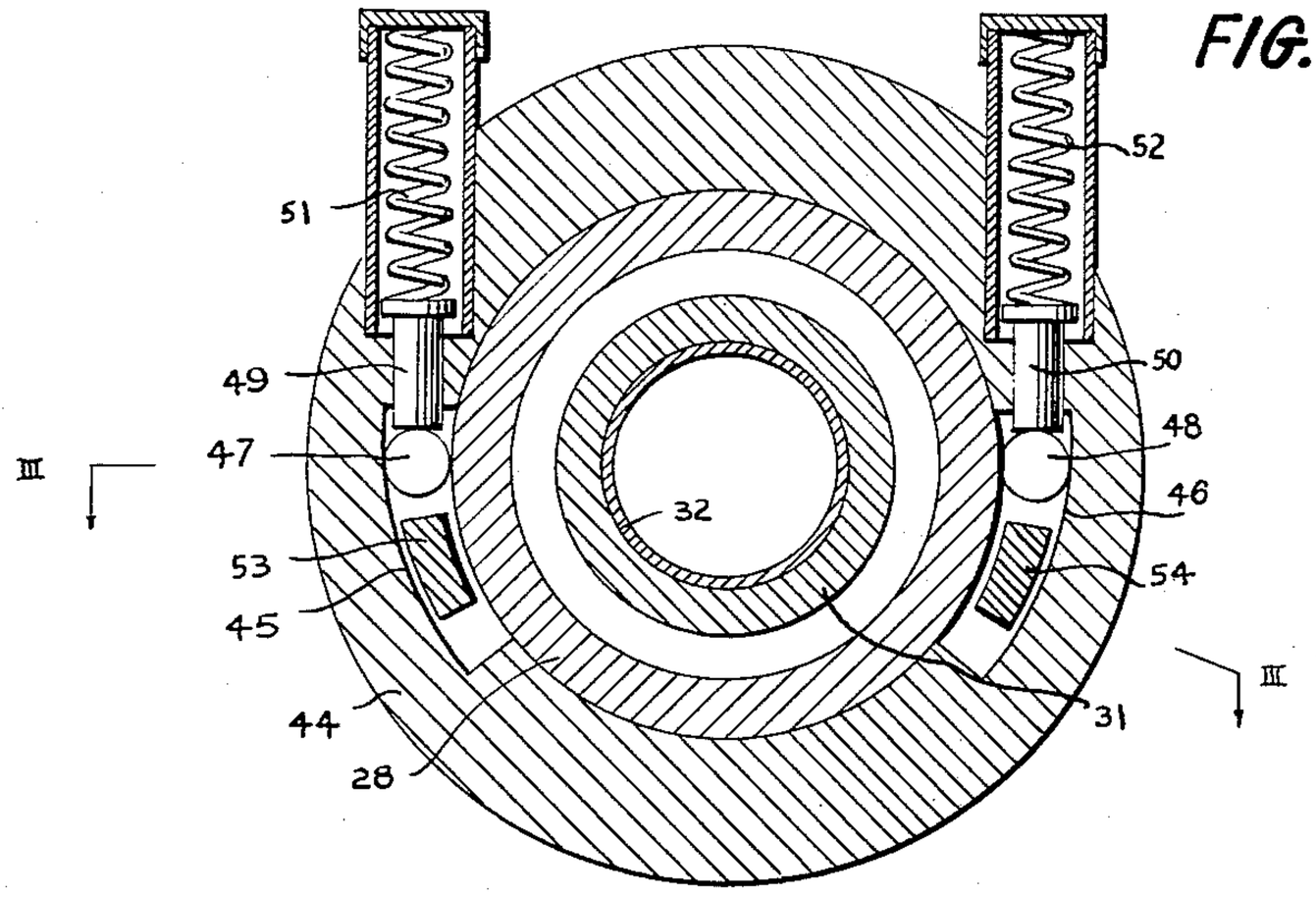
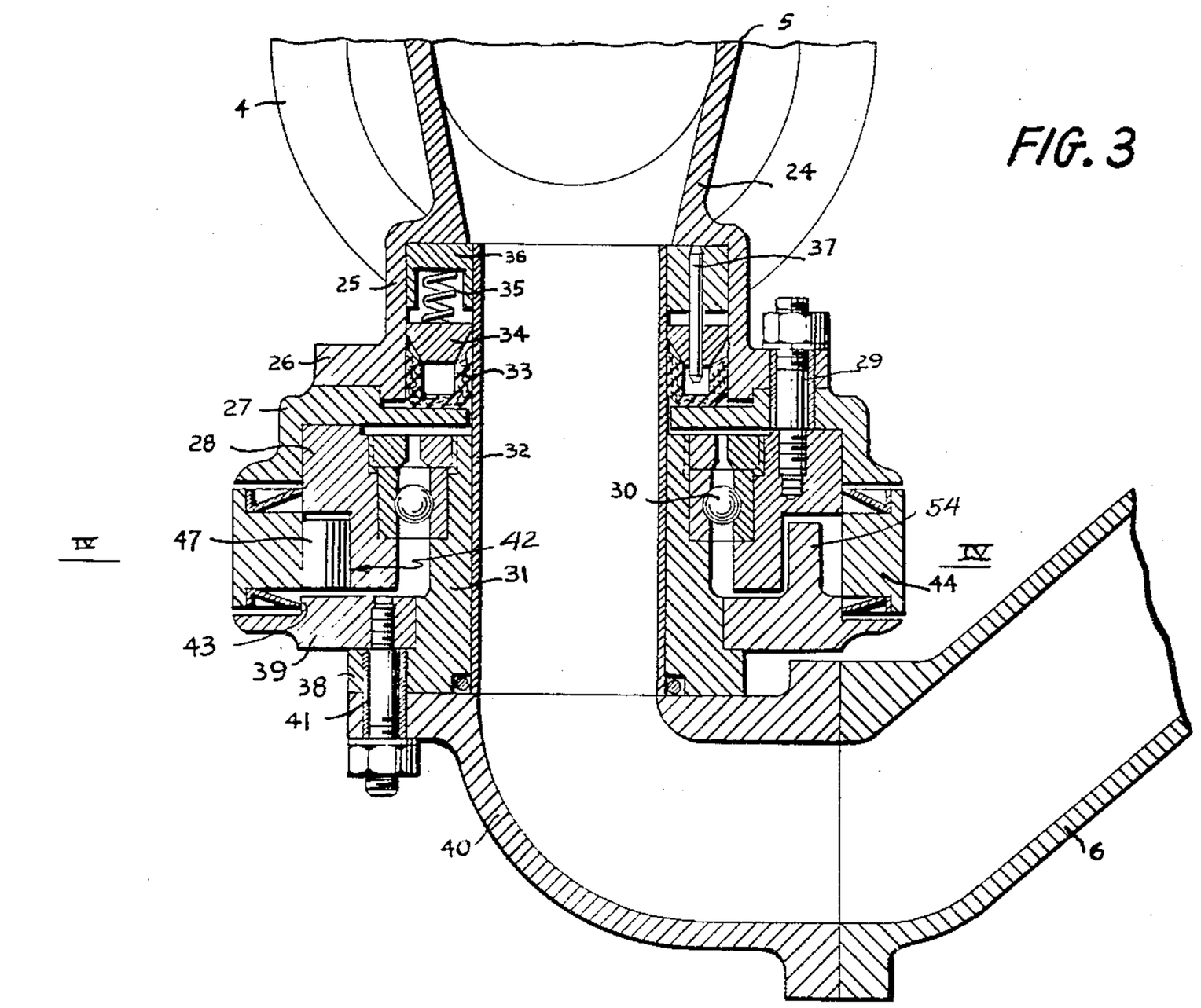


FIG. 3



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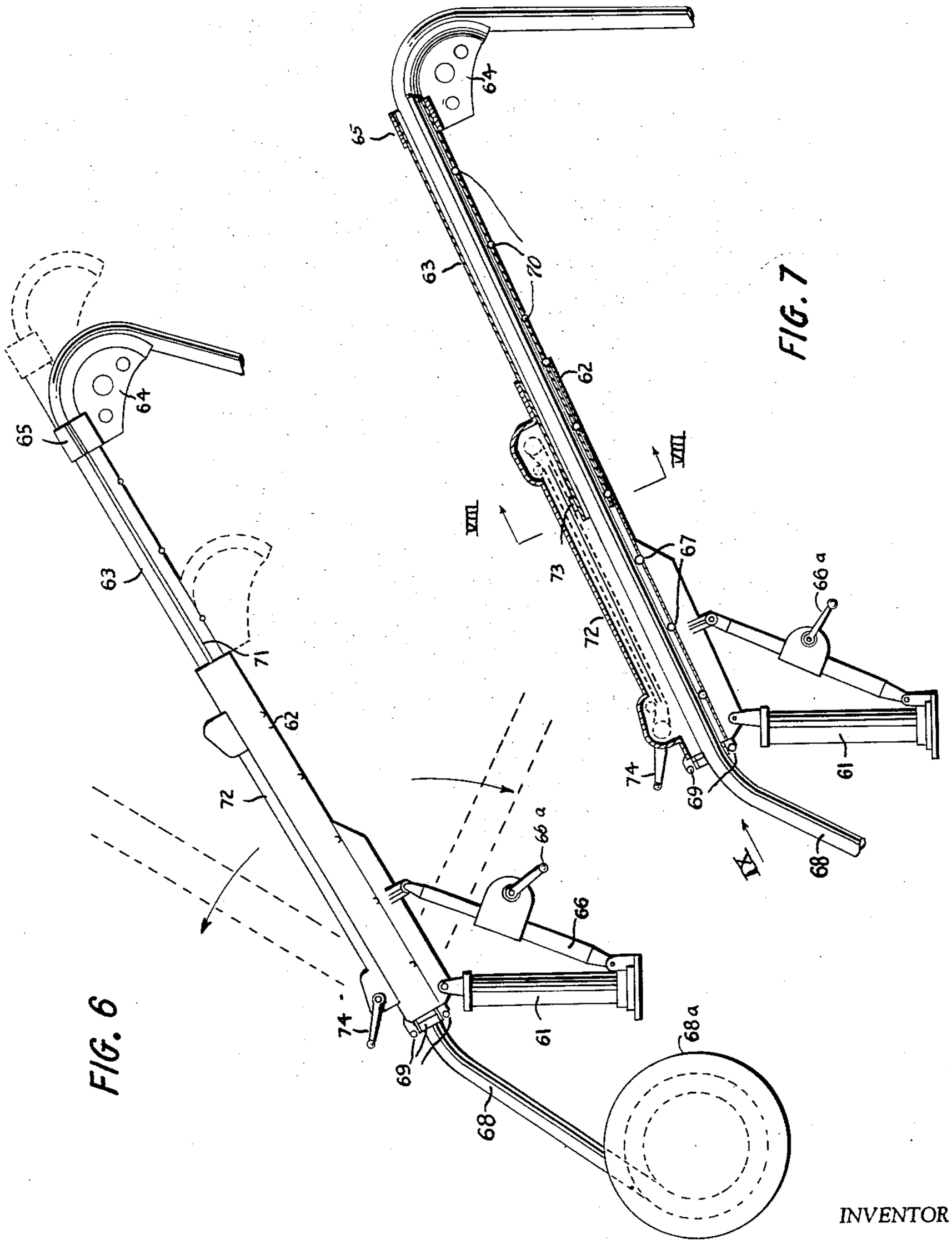

FIG. 6

FIG. 7

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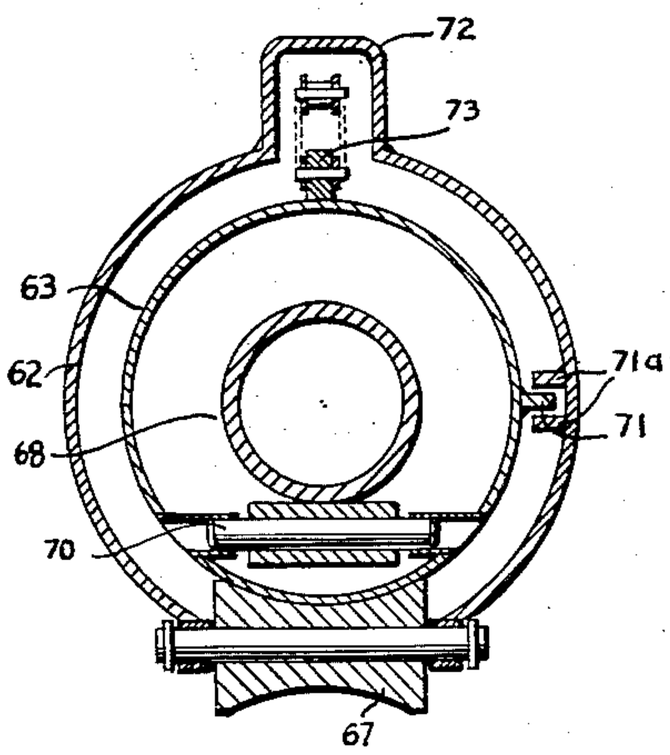

FIG. 8

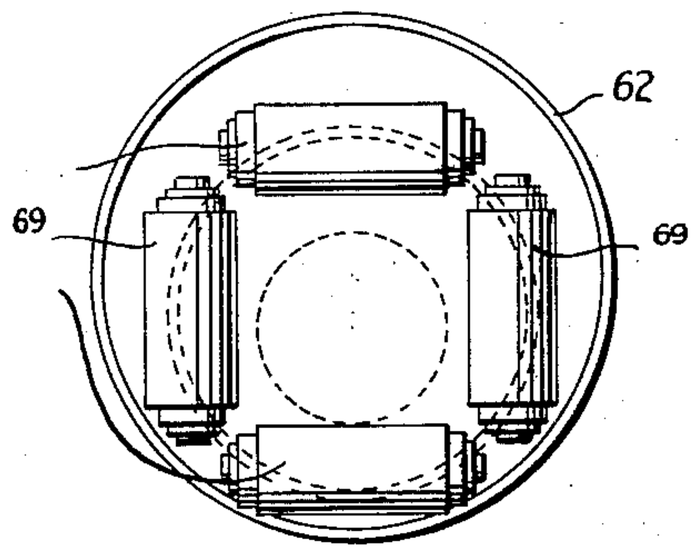

FIG. 9

FIG. 10

FIG. 11

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APPARATUS FOR DISPENSING LIQUID

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5 Claims. (Cl. 137—615)

This invention relates to an apparatus for dispensing a liquid, for example a motor fuel, particularly for fixed or mobile refueling stations, intended for example for refueling airplanes or the filling of all tanks or containers by gravity or under pressure.

In a general way, the liquid-dispensing apparatus according to the invention comprises a fixed column, an extensible pole or boom articulated or pivotally connected to the top of the column and movable in all directions, in height as well as in depth or laterally, and a filler tube or nozzle articulated or pivotally connected to the free end of the pole or boom and adapted to descend into a fuel tank through an orifice on the top of the latter; or to receive a flexible conduit terminating in a tight coupling device for the filling under pressure.

The invention will be better understood from the following detailed description of several modes of carrying out the same with reference to the appended drawings, in which:

Figure 1 is a view in lateral elevation of one form of the dispensing apparatus.

Figure 2 is a corresponding plan view.

Figure 3 is a view in axial section of a portion of an articulation or connection between the top of the column and the pole or boom, permitting the latter to pivot in a vertical plane. This section is taken on line III—III of Figure 4.

Figure 4 is a view in transverse section taken on line IV—IV of Figure 3.

Figure 5 is a partial view in axial section of a modification of the extensible pole or boom.

Figure 6 is a view in lateral elevation of a second modification of the dispensing apparatus.

Figure 7 is a similar elevational view with the extensible boom shown in section.

Figure 8 is a partial view in transverse section taken on line VIII—VIII of Figure 7.

Figure 9 is an end view made in the direction of arrow IX of Figure 7.

Figure 10 is a partial view in axial section of the crank mechanism permitting the lengthening and shortening of the extensible boom. This section is taken on line X—X of Figure 11.

Figure 11 is a partial view in transverse section taken on line XI—XI of Figure 10.

Figures 1 to 4 show the liquid-dispensing apparatus in its simplest form. It comprises a fixed column 1, an extensible boom 2 which is vertically and laterally orientable and mounted on the top of the column, and a filling tube or nozzle 3 articulated or connected to the free end of the boom. All these elements are tubular and form the liquid-distributing conduit.

Column 1 is permanently installed at an appropriate point close to the tanks which must be filled, for example the departure area of an airport, and it communicates through a pipe with a subterranean source, for example. This column mounts at its top a hollow liquid-tight fitting 4 extending upwardly by a T-connection 5. To the two lateral branches of the T-connection are articulated or connected by rotary joints the two lateral tubes 6 of a fork whose central body is formed by a casing with a valve 7, to which is connected the boom 2. The said boom contains a telescopic tube 8 terminating in an elbow 9 to which the nozzle 3 is articulated or connected by a rotary joint 10.

The boom 2 is provided at its free end with two lateral handles 11, whereas the elbow 9 of the telescopic tube carries a handle 12.

It can be seen that this general arrangement makes it simple to fill one or more tanks of vehicles to be refueled. It suffices for this purpose to bring the vehicle close to column 1, on either side of the latter. The operator grasps with two hands the handles 11 and 12, orients the boom 2 in the direction of the filling orifice of the tank, raises the boom so that the lower end of the nozzle 3 is over the tank, withdraws the telescopic tube 8 by means of handle 12 so as to bring the nozzle 3 over the filling orifice, and lowers the boom so as to introduce the nozzle 3 into the tank. Since the refuelings are generally made under pressure, it is well understood that all the joints, as well as the telescopic tube, must be perfectly liquid-tight.

It is also necessary to provide the apparatus with a closing device that can be actuated easily by the operator. Since the casing with the valve 7 is provided at the base of the boom 2, the lever 13 actuating the valve is connected kinematically by a rod 14 to a control lever 15 articulated or pivoted to the free end of the boom 2 between the two lateral handles 11 and above the latter. After positioning the apparatus, and while continuing to hold the handle 12 with one hand, the operator can very easily actuate the control lever 15 so as to open the valve. The closure of the valve is assured by a return spring 16 interposed between the lever 13 and a bracket 17 which is integral with the casing of valve 7.

To avoid the necessity for the operator to hold the boom during the entire filling operation, it is desirable to equip the apparatus with a device permitting the substantially balancing of the boom in all its positions of height. In the example represented, the rotary joints of the two lateral tubes 6 of the fork connecting the casing of valve 7 to the T-connection 5 are prolonged by arms 18 in a direction opposite that of the boom 2. The fitting 4 carries guiding and buttressing arms 19 oriented in the same direction as the arms 18 and extending below them. To the arms 18 are connected downwardly extending rods 20 which pass through openings in the guiding and buttressing arms 19. Each rod 20 carries at its lower end a support disc 21 resting on an adjustable nut 22 screwed onto the rod. Between the discs 21 and the buttressing arms 19 are interposed helicoidal compression springs 23 which in this example are conical springs. It can thus be seen that an appropriate adjustment of the preliminary tension of the springs 23 permits the obtaining of an average balancing of the boom 2, eliminating or substantially reducing the effort which the operator must exert to keep it in position at a certain height.

Figures 3 and 4 show a device permitting the locking of the boom in height by wedging, in combination with the balancing springs.

There is seen at 4 the turret or fitting, and at 24 one of the lateral branches of the T-connection 5. At 6 is indicated one of the tubes of the fork of the valve 7 (Figure 1). The end of the lateral branch 24 is in the form of a cylindrical socket 25 provided with an exterior flange 26. Against this flange is applied a dish-like member 27 having a central opening, and in which there is a cylindrical chamber. The rim of this dish-like member is flat and perpendicular to its axis. In the cylindrical

chamber of the member **27** is housed an annular element **28**. The three elements **25**, **27** and **28** are rigidly assembled by threaded studs **29**. In the annular element **28** and on one side of the dish-like element **27** is housed a ball bearing **30** the internal race ring of which is fixed in rotation with a hollow pivot **31** penetrating to the bottom of the dish-like element and in which is forcibly fitted a tube **32** passing through the central opening of the dish-like element **27** and extending to the bottom of the socket **25**. Between this tube and the socket is interposed a sealing joint formed by a cuff **33**, between the flaps of which is engaged an annular wedge **34** pushed by springs **35** bearing on a support ring **36**. This annular wedge is also guided axially by pins **37** integral with the ring **36**. The cuff **33** is thus not only tightened against the bottom of the dish-like element **27** but also against the external periphery of the tube **32**. The external end of the pivot **31** is provided with a flange **38** interposed between a circular disc **39** and the flange of a tubular elbow **40**. These three elements are assembled rigidly to each other by threaded studs **41**. The elbow **40** is connected to the tube **6** of the fork.

It results from the foregoing that the pivot **31** is mounted so as to rotate in the annular element **28** which is fixed to the socket **25** of the T-connection. The disc **39** can turn in relation to this annular element **28** which has in its side near the disc **39** a peripheral channel **42** provided in the external periphery. The arrangement is such that a very small degree of play is allowed between the annular element **28** and the disc **39**. The external diameter of the latter is equal to that of the dish-like disc **27**. On its internal surface the disc **39** has a cylindrical bearing surface **43**, the diameter of which is equal to that of the annular element **28**. It results from this arrangement that the elements **27**, **28** and **39** form when assembled a peripheral groove in which is mounted with free rotation a wedging ring **44**. In the internal periphery of this ring are cut two notches **45** and **46** with incurved outer peripheral walls but which are slightly eccentric with relation to the axis of the pivot **31**. The outer peripheral walls of the two notches are eccentric in opposite peripheral directions. Between the outer peripheral walls of the notches and the cylindrical bearing surface forced by the inner peripheral wall of the channel **42** are interposed two diametrically opposed rollers **47**, **48**, the diameter of which are chosen such that they touch the walls of the notches and the wall of the channel at a certain point between the ends of the notches. Plungers or push rods **49**, **50** mounted to slide tangentially in the wedging ring **44**, and on which act adjustable springs **51**, **52**, push the rollers **47**, **48** in the direction of narrowing the space between the ring and the pivot, so that these rollers are wedged and prevent the rotation of the ring in both directions since the annular part **28** is immobilized in rotation.

The disc **39** carries on its internal surface two fingers **53**, **54**, arranged so as to enter laterally into the notches on the side of the rollers opposite the push rods **49**, **50**. Since the disc and pivot are independent in rotation from the wedging ring, the fingers **53**, **54** can be brought into contact with the rollers. If the pivot **31** is turned in a clockwise direction (on Figure 4) by exerting an angular force greater than the resistance of the springs, the finger **53** will push the roller **47** against the action of the spring and overcome the wedging action, which makes it possible to also turn the ring **44** since the roller **48** on the opposite side is automatically disengaged. If the pivot **31** is turned in a counterclockwise direction, the finger **54** pushes the roller **48** against the action of the spring **52**, and the ring turns in the opposite direction since the roller **47** on the opposite side is in turn automatically disengaged.

Insofar as the immobilization of the boom **2** in height is concerned, it is sufficient to adjust the springs **51**, **52** in such a way that the pressure exerted on the rollers is

sufficient to prevent their disengagement under the action of the balancing springs, and then it is only necessary to exert a slight effort on the boom for the fingers **53**, **54** to disengage the rollers against the action of the springs **51**, **52**. It can thus be seen that this device is capable of holding the boom in all angular positions in height, while permitting it to be raised and lower with a relatively small effort.

Figure 5 represents a device permitting the extension and retraction of the boom by maneuvering a crank. In this case, the movable tube **8** is mounted so that it can slide on the fixed tube **2**. A bracket **55** is mounted by a clamping collar or in some other manner on the fixed tube **2**, whereas another bracket **56** is mounted by a collar, but so that it can slide on the movable tube **8**. The two brackets **55**, **56** are rigidly connected to each other by a spacing bar **57**. In the two brackets are rotatably mounted sprocket wheels over which there extends a transmission chain **58**. On the inner part of this chain is coupled a driving finger **59** which is rigidly affixed to the movable tube **8**. On the pivot of the sprocket wheel carried by bracket **55** is mounted a crank **60**. If the crank is turned in a clockwise direction (Figure 5), the inner part of the transmission chain **58** is drawn toward the left together with the finger **59** and the movable tube **8**, whereas the bracket **56** is held in place by the spacing bar **57** and slides on the movable tube. Operation of the crank in the counterclockwise direction assures the displacement of the movable tube in the direction of extending the boom. In order to eliminate the possibility of accidental displacement of the movable tube, the crank control contains an automatic brake device according Figures 10 and 11 and described hereinafter.

In the modification of the dispensing apparatus shown in Figures 6 and 7, the elements of this apparatus do not themselves form the conduit intended to carry the liquid, but carry a flexible hose which makes it possible to eliminate all the sealing joints from the connections.

In this example, the apparatus still comprises a column **61** which can be fixed or mounted so as to pivot about a vertical axis. At the top of this column is pivotally connected an extensible tubular boom in such a manner that it can pivot in a vertical plane. The boom is formed by a fixed tube **62** and a telescopic tube **63** provided at its free end with a semicircular guide **64** affixed by a collar **65** and having a gutter of semicircular section connected to the bore of the tube **63**. A mechanical jack **66** with an automatic brake, similar to the device shown in Figures 10 and 11 described hereinafter, connected at one end to the base of the column **61** and at the opposite end to an intermediate point on the fixed tube **62**, permits the raising and lowering of the boom by operating a crank **66***a*. The movable tube **63** is supported inside the fixed tube **62** on a train of rollers **67** (Figure 7), which facilitate its longitudinal displacement.

The flexible hose **68** can be wound on a drum **68**A. It enters into the lower end of the fixed tube **62** on four guiding rollers **69** arranged in the form of the sides of a square, is supported inside the said fixed tube on the rollers **67** disengaged by the movable tube **63**, and passes into the said movable tube on other rollers **70**. It then passes into the gutter of the semicircular guide **64** and descends freely from it. This permits the free part to be oriented in any direction.

The mechanism for lengthening and shortening of the boom is similar to that shown in Figure 5.

The rotation of the movable tube **63** inside the fixed tube **62** is prevented by a longitudinal rib **71** of the movable tube engaged in an internal guide **71**A (Figure 8) of the fixed tube.

The mechanism for lengthening and shortening of the boom is similar to that shown in Figure 5 except that, in this example, it drives a movable tube mounted in sliding fashion in the fixed tube. Over a longitudinal slot of the fixed tube **62** is mounted an elongated housing **72**

connected at its ends to two housings in which are rotatably mounted two sprocket wheels over which there passes a transmission chain, as in the previously described example. The interior part of this chain is coupled to the movable tube **63** by means of a driving finger **73**. On the shaft of the lower sprocket wheel is affixed a crank **74**. The functioning is substantially the same as that described with regard to Figure 5. Normally, the flexible hose **68** is retained sufficiently by the guide **64** so as to be displaced longitudinally on the rollers **67** during the elongation and retraction of the boom.

Figures 10 and 11 show a braking device which prevents the movable tube of the boom from descending under the action of its weight so as to return into the fixed tube. As it is represented, the braking device is devised so as to be applied to the crank **60** or **74** of Figures 5, 6 and 7. The lower sprocket wheel **75** is keyed to a tubular shaft **76** mounted rotatively in a fixed bearing **77** in which there is provided a cylindrical chamber centered on the axis of the shaft. The tubular shaft is provided, inside the cylindrical chamber, with a cylindrical enlargement **78** adapted to turn with slight friction in the chamber, and in the periphery of which are cut notches **79, 80**, the inner walls of which are eccentric in opposite peripheral directions. The crank **60** or **74** is part of a flange **81** keyed to a shaft **82** mounted rotatively in the tubular shaft **76**. The said flange **81** has on its inner face fingers **83, 84** which are arranged so as to enter laterally into the notches **79, 80**. The latter contain rollers **85, 86** which are interposed between the internal periphery of the chamber of the bearing **77** and the eccentric inner walls of the notches **79, 80**. Compression springs **87**, provided on the sides of the rollers opposite the fingers **83, 84**, push these rollers in the direction of the fingers so as to wedge them between the bearing and the bushing. The operation of the crank permits the disengagement of the rollers against the pressure of the springs **87** and the turning of the sprocket wheel **75**, whereas the pressure of the springs exerted on the rollers is sufficient to prevent their disengagement under the action of the weight of the movable tube. The functioning is thus similar to that which was described in detail with reference to Figures 3 and 4.

It is well understood that the embodiments described in reference to the figures in the drawings are not intended to serve as anything more than non-limiting examples, it being possible to conceive other variations and

modifications without departing from the scope of the invention.

Having described my invention, I claim:

1. A liquid-dispensing apparatus comprising a column, an extensible boom, means articulating said boom to the top of the column for movement in all directions, in height as well as laterally, including coaxial, relatively rotatable connections establishing an annular groove, a ring in said groove having open-sided notches with walls that are oppositely eccentric with relation to the pivotal axis of said connections, a wall of one of said connections closing the open sides of said notches, a roller in each of said notches, spring means urging said rollers into wedging engagement in said notches, and means connected to the other connection extending into said notches for disengaging said rollers from wedging engagement selectively upon opposite relative rotation of said connections, whereby upon the exertion of a slight force on said boom in either direction when said boom is in any position said last-mentioned means will disengage one or the other of said rollers and permit the relative rotation of said connections and thereby the placing of said boom in any position, and the subsequent locking of said boom in any second position.

2. The apparatus of claim 1, and means for placing said boom in position.

3. The apparatus of claim 1, and a filler nozzle pivotally connected to the free end of the boom by a sealed joint.

4. The apparatus of claim 1, and spring means operatively connected to said boom for balancing the same.

5. An apparatus according to claim 1 in which the boom comprises a fixed tube connected to the top of the column and a sliding tube telescopically associated with the fixed tube, and a sealing joint between the sliding and fixed tubes.

References Cited in the file of this patent

UNITED STATES PATENTS

121,991	Cheney	Dec. 19, 1871
719,483	Mansfield	Feb. 3, 1903
2,361,214	Krone	Oct. 24, 1944
2,492,049	Krone et al.	Dec. 20, 1949
2,503,281	Lynch	Apr. 11, 1950
2,722,230	Toussaint	Nov. 1, 1955
2,750,079	Trombley	June 12, 1956
2,777,426	Steele	Jan. 15, 1957