Nov. 22, 1955 G. F. PERSSON ET AL 2,724,275

LABORATORY PUMP FOR DRAWING UP FLUIDS IN A PIPETTE

Filed March 21, 1952 3 Sheets-Sheet 1

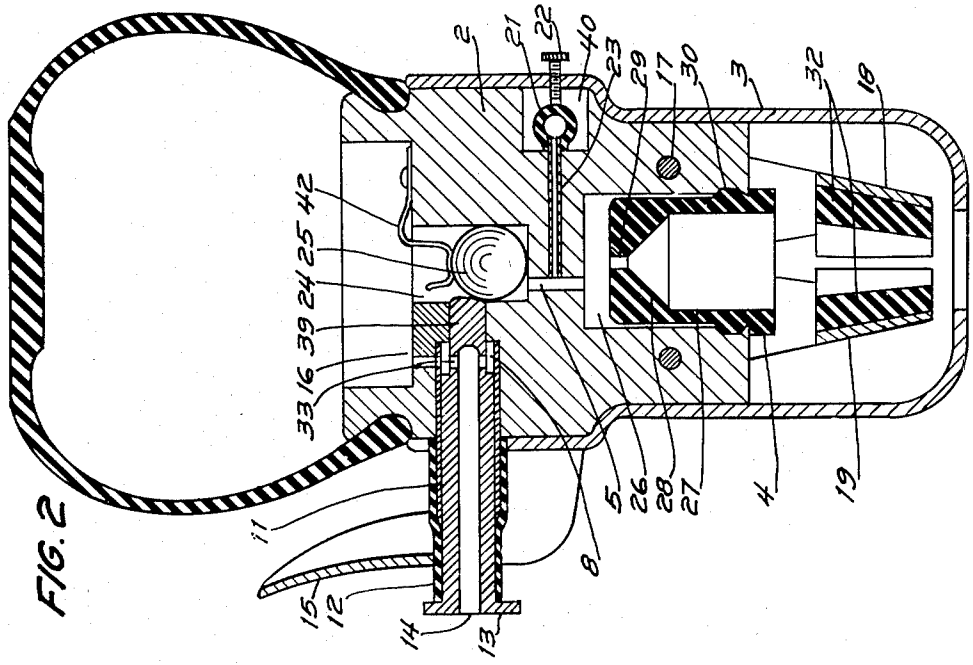


FIG. 2

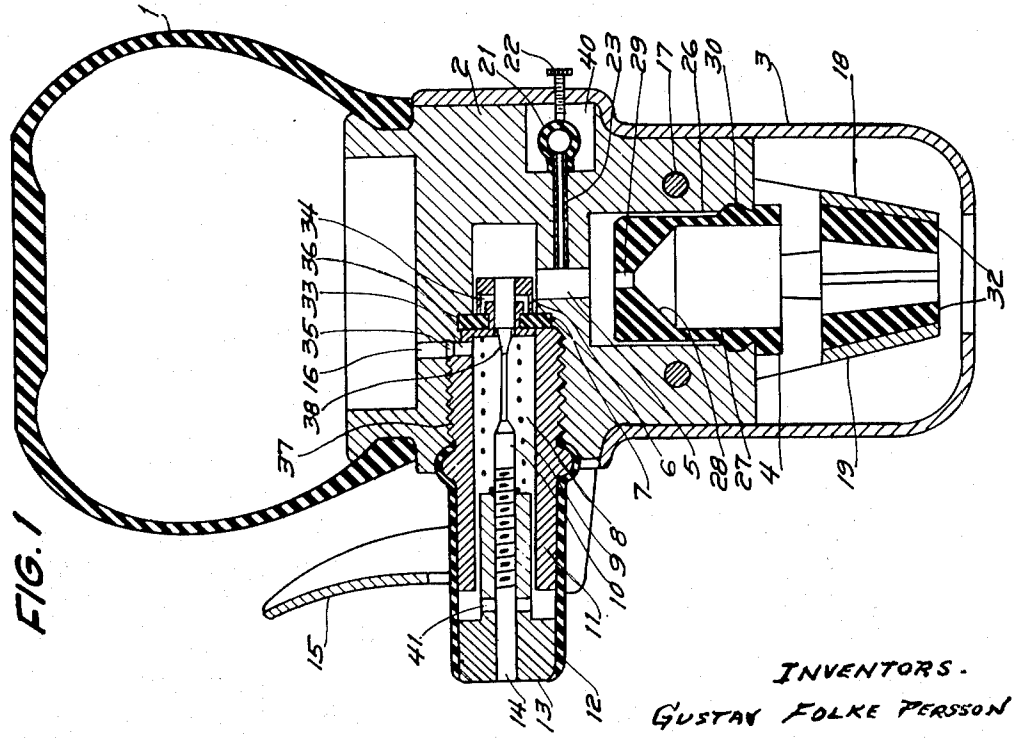


FIG. 1

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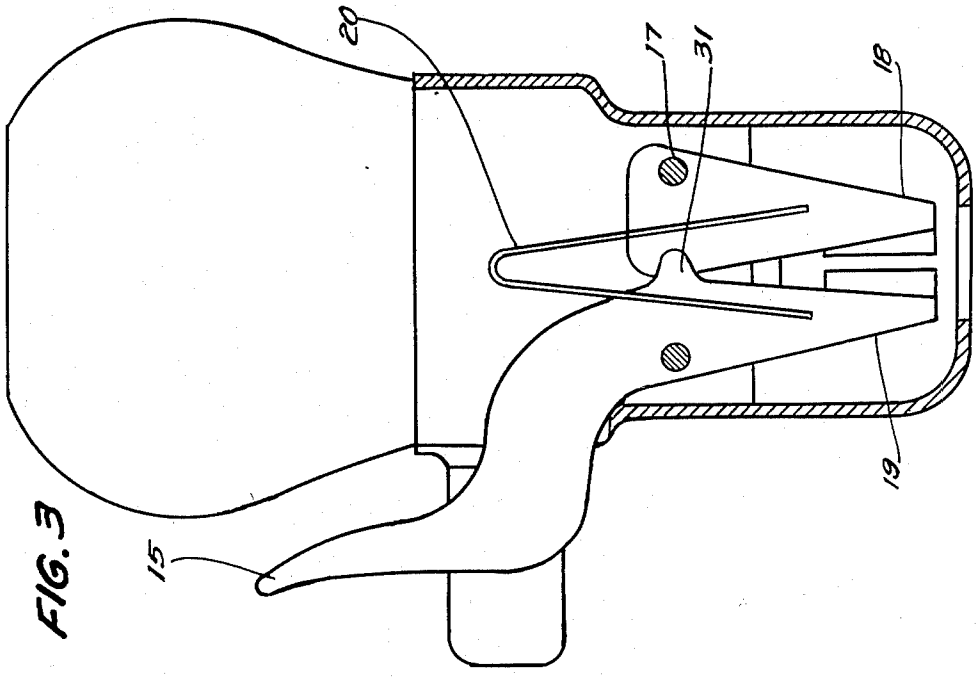


FIG. 3

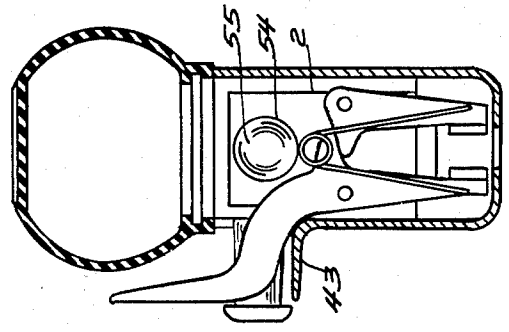


FIG. 6

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FIG. 5

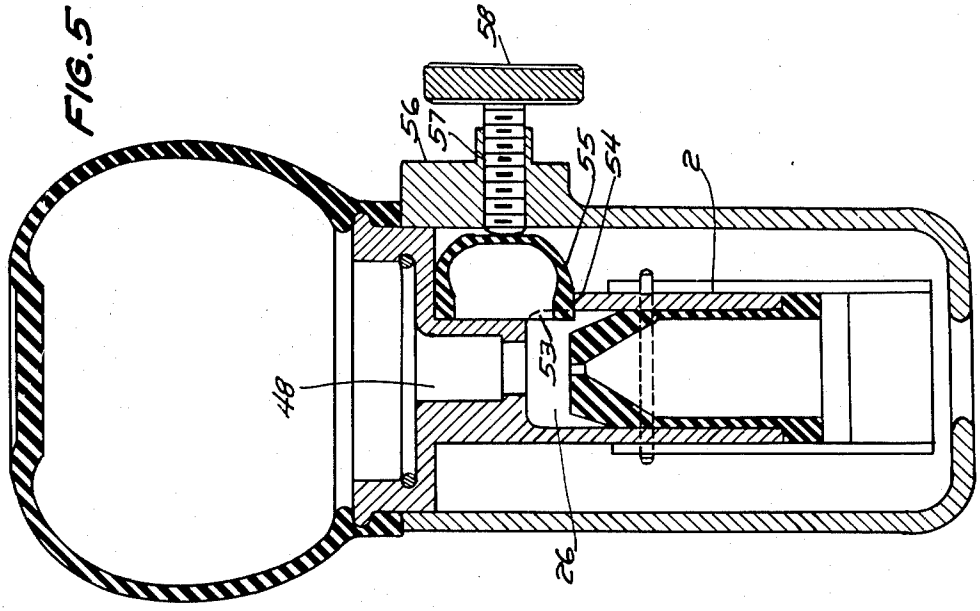
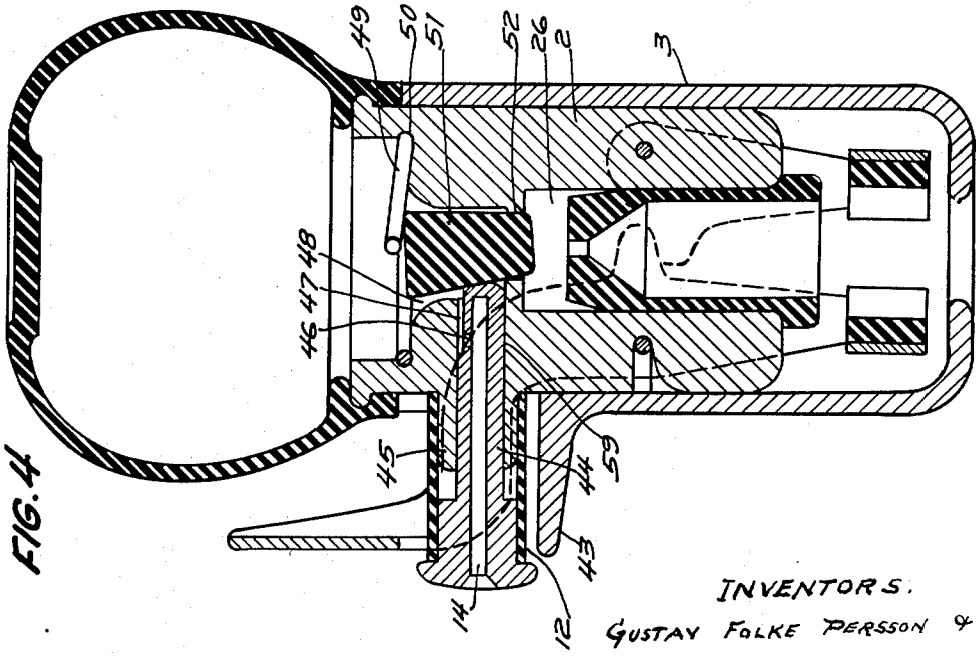


FIG. 4



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LABORATORY PUMP FOR DRAWING UP FLUIDS IN A PIPETTE

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Application March 21, 1952, Serial No. 277,802

8 Claims. (Cl. 73—425.6)

In laboratory work it occurs often that fluids are to be measured or drawn up. Drawing up is usually effected by means of a pipette, which is dipped into the fluid, whereupon air is removed through the other end of the pipette, with the result that the fluid rises in the pipette. Suction is effected with the mouth or by means of a special suction device, such as a rubber ball or a pump. To draw up the fluid with the mouth is convenient, to be sure, but it is often attended with great disadvantage. When drawing up a fluid with the mouth, there is always a risk of the fluid or vapour from the fluid finding its way into the mouth and from there into the lungs and/or into the stomach. If the fluid is corrosive, poisonous or mixed with bacteria, severe damage may result. Another disadvantage is the fact that it is difficult to see the fluid level when drawing same up, and therefore it is necessary, when using the pipette, to draw the fluid up above the mark on the pipette and to close the upper end of the pipette with the finger and than let in so much air that fluid runs out to the volume desired. The adjustment of the volume is attended with certain difficulties, because it is difficult to adjust the volume of air with the finger. In the case of pipette balls and pumps of an older type, the suction and emptying speed of the air current, and consequently of the fluid, cannot be regulated satisfactorily, and therefore it is difficult to measure any desired volume. Other disadvantages are that both hands to a great extent have to be used, and that no convenient device is available for attaching the pipette or the suction tube to the pump or ball.

This invention refers to a pump for this purpose, consisting of a pump body provided with a suction device, a device for attaching pipettes, and a suction channel and connecting channels between pipette attaching device and the suction device, in addition to which there is arranged in the pump body a valve intended for closing or opening the connection between the pipette and the suction device and comprising a valve body at right angles to the pipette and/or a valve control rod, through or around which a channel is arranged, by means of which the suction device can be connected with or shut off from the outside air.

The invention is characterized in that the attaching device for pipettes includes a tightening device suitable to tighten against all normally available pipette diameters, and suitably consisting of a stopper of elastic plastic material placed into a cylindrical recess in the underside of the pump body, provided with a cylindrical recess with a diameter equal to or larger than the largest pipette diameter available, which recess merges into a funnel-shaped bottom, into which opens a cylindrical channel connected with the suction channel, having a smaller diameter than the smallest available pipette diameter.

The stopper may, moreover, be attached to the pump body by means of an annular ridge, extending into and tightening against a corresponding recess in the pump body. The attaching device for pipettes comprises also preferably two jaws covered with elastic plastic material,

which are arranged to swing on two axles fitted in the pump body and which are pressed against each other by a spring, one of the jaws being rigidly connected to a control arm suitable to be operated by one finger of the hand holding the pump. The covering of elastic plastic material is preferably provided with a V-shaped groove, widening while the bottom angle remains unchanged.

The invention is illustrated by drawings attached hereto, in which:

Fig. 1 shows a type of design of a pump according to this invention, in vertical section;

Fig. 2 shows a different type of design in vertical section; and

Fig. 3 shows the same in sideview, partly in section showing the control member of the jaws.

Fig. 4 shows another type of design in vertical section;

Fig. 5 shows said last device in a vertical section at right angle to Fig. 4; and

Fig. 6 shows the same device in a side view corresponding to the view of Fig. 4, partly in section.

In the following, the types of design shown will be described in detail, with reference to the drawings, when further characteristic features and advantages will become apparent.

In a pump body **2** a cylindrical recess **26** is made in its underside. This recess is provided with an annular groove **30**, arranged near its opening. In the recess **26** is placed a nipple **4** of elastic plastic material, which on its outside is provided with a corresponding ridge extending into and tightening against groove **30**. The nipple **4** is provided with cylindrical recess **27** merging into a funnel-shaped bottom **28**. From its top a channel **29** leads to the bottom in the recess **26**. The diameter of recess **27** is equal in size or larger than the largest pipette diameter available, and the diameter of channel **29** is smaller than the smallest available pipette diameter. From the bottom of recess **26** a channel **5** leads to a valve arrangement.

Fig. 1 shows a valve arrangement in a valve sleeve **11**, which is threaded into a recess **37** in pump body **2**, at right angles to channel **5**, and projects from the pump body. The sleeve **11** is open at the outer end, and is fitted with a plug **34** pointing centrally inwards. This plug **34** is at its base fitted with an annular groove, suitable to hold a flat, annular elastic packing **7**, tightened between the bottom of sleeve **11** and a shoulder **36** in recess **37**. In plug **34** there is a central hole. Sleeve **11** is at its inward end provided with an annular, external shoulder **35** so that an annular channel is obtained between sleeve **11** and recess **37**, to which is arranged a crosswise extending channel **33** from the interior of sleeve **11** as well as a channel **16** from suction device **1**. A control rod **13** is provided with an exterior part with the same external diameter as sleeve **11**, and an internal part with a smaller external diameter than the internal diameter of sleeve **11**, so that an annular channel is obtained between the sleeve **11** and the control rod **13**, when same is inserted in the sleeve. Control rod **13** is provided with a central hole **14**, the inner part of which is threaded. Into this hole **14**, a valve shaft **10** is threaded, which at its other end is provided with a needle valve **38** with its point turned towards valve shaft **10** and so arranged that its cylindrical part provides good packing against the central hole in plug **34**. Needle valve **38** is at its free end provided with a cylindrical extension, to which is attached an elastic, hood-shaped packing **6**, arranged to tighten against packing **7**. Over the wider outside part of control rod **13** and the projecting part of sleeve **11** is placed a rubber hose **12**, which tightens the annular channel between these two against the outside air. Between control rod **13** and the bottom of sleeve **11** is arranged a pressure spring **9**, which presses control rod

13 outward. The control rod 13 is immediately inside its outer part provided with a cross-channel 41, so that free connection is obtained between the outside air and suction device 1.

In Fig. 2, a different arrangement of the valve is shown. In pump body 2, a cylindrical recess 24 facing the suction device is arranged, in the bottom of which channel 5 ends. In recess 24 an elastic plastic stopper 25 is arranged, for instance in the shape of a ball with the same diameter as the former, so that it tightens against its walls. A control rod 13 is arranged axially movable in a guide sleeve 11, which is placed in a recess arranged at right angles to recess 24 in pump body 2 and extending toward same without reaching it, and from the bottom of which a recess 39 with a smaller diameter continues to recess 24. The control rod 13 is provided with an interior part with a smaller diameter fitting into recess 39, and with a central hole 14 extending into its interior with a blind end. It is also provided with transverse hole 33 near the base of its interior part, by which a free connection is obtained between hole 14 and the annular channel 8, which is provided between this interior part and sleeve 11. A channel 16 is arranged from this annular channel to the suction device 1, by which same gets direct connection with the outside air through hole 14. Over control rod 13 and the part of sleeve 11 projecting from pump body 2 is arranged a rubber hose 12, which tightens against both and at the same time holds them mutually. The control rod 13 is so arranged in pump body 2 that its point when pressed inward meets ball 25 from the side, deforming it so that it no longer tightens against the walls of recess 24.

On pump body 2, two axles 17 are arranged in parallel and at right angles to a plane through the centre lines of control rod 13 and recess 26, on which two jaws 18 and 19 are arranged to swing, with mutually compulsory motion by means of meshing teeth 31, and covered with a layer 32 of elastic plastic material. These covering layers are provided with a vertical, V-shaped groove each, widening inwards with the bottom angle unchanged. The jaws 18, 19 are pressed with covering 32 against each other by a hairpin spring 20. One jaw, 19, is extended to serve as a bent control arm 15, which is so shaped that jaws 18, 19 are separated, when arm 15 is forced inwards against the pump body 2.

In the pump body may suitably be arranged an extra channel 23 beginning at channel 5 and ending at the bottom of recess 40, where it is shaped as a nozzle, to which is attached a rubber receptacle 21, which is so small that there is room enough for it in recess 40. In an envelope 3 outside recess 40 a screw is threaded, and by screwing this in or out, the shape of rubber receptacle 21 can be changed in shape and volume as desired.

When the laboratory pump is to be used, control arm 15 is pressed inward against the pump body, to begin with, so that jaws 18, 19 are forced apart and a pipette is inserted between them and pressed with the nozzle against the funnel-shaped bottom 28 in nipple 4, whereupon the control arm 15 is released. The pipette is now held between jaws 18, 19, and its point is dipped into the fluid to be drawn up. The rubber ball 1 is squeezed together, suitably with the thumb, hole 14 is covered with a finger, and the rubber ball 1 is released, whereupon control rod 13 is pressed in so that the valve arrangement opens the connection between rubber ball 1 and the pipette, by which air in the pipette is drawn from same into the rubber ball, and the fluid rises in the pipette. When the latter is filled to the mark, control rod 13 is released, which will close the valve and let air into rubber ball 1 through hole 14. When the pipette is to be emptied, the control rod 13 is again pressed inwards without hole 14 being closed with the finger, by which air is let through hole 14, rubber ball 1 and the valve arrangement into the pipette, causing the fluid to run out. If one wishes to hasten the running-out of the fluid, hole 14 is closed, and rubber ball 1 is squeezed together, by which overpressure is obtained in the pipette.

If it is desired to obtain very exact measuring, this can be accomplished by filling the pipette to directly above the mark, whereupon screw 22 is screwed in until the fluid coincides exactly with the mark.

Instead of the two types of design of the invention which have been described above many others are conceivable without going beyond the scope of this invention. The rubber ball, for instance, can be replaced by a piston pump. Channel 23 and receptacle 21 can be omitted. Instead of nipple 4 and jaws 18 and 19, a cylindrical nipple with a cylindrical hole can be used, which is compressed axially in a cylindrical recess, so that it will expand inwards in the direction of the centre of the hole, by which its diameter is reduced.

According to a simplified design shown in Figs. 4 to 6, the pump body at its top is provided with a recess forming an internal flange as a seat for a mainly conical rubber stopper 51. The stopper is held in place by a spring 49 located in an appropriate recess 50 in the pump body 2. The stopper closes the communication between the recesses 26 and 48.

The control rod 13 has mainly the form of a tube 44 with an internal channel 14 and guided into a cylindrical bore 59 in the pump body 2. The inner end of the tube 44 is provided with a recess 47 into which an opening 46 in the tube wall emerges. On the outer end of control rod 13 and a cylindrical extension 45 of the pump body 2 surrounding the tube 44 is forced a rubber sleeve 12. When control rod 13 is pushed inward the stopper 51 is deformed and recesses 48 and 26 communicate with each other. If the external opening of channel 14 is not closed, for instance by the thumb, said recesses also communicate with the outside space via channel 14, opening 46 and recess 47.

The level adjusting means visible in Figs. 5 and 6 consists of a rubber hood 55 inserted in a circular recess 54 at a side of pump body 2 which recess communicates with the recesses 26 and 48 through the opening 53. The rubber hood 55 is pressed upon by a screw 58 threaded into an opening 57 in the part 56 of the envelope 3. Said envelope is also provided with a protruding tongue 43 serving as a rest when the device is gripped into the hand.

What we claim is:

1. In a pipette charging device, the combination of an elongated body member having a suction channel extending longitudinally therethrough with a pipette engaging orifice at one end, a bulbular suction producing member carried by said body member and disposed over the other end of said suction channel for establishing a suction at the pipette end of said suction channel, said suction channel being enlarged at one end and having a smaller diameter at the pipette end thereof, a deformable elastic valve member disposed within the portion of said suction channel of enlarged diameter and operating to close said suction channel at the portion thereof of smaller diameter, spring means for maintaining said deformable valve member in an operative condition within said channel, and a plunger means extending laterally into the side of said body member for deforming and rendering said elastic valve member inoperative to close said suction channel.

2. In a pipette charging device, the combination of a cylindrical body member with a suction channel extending centrally therethrough and having a pipette engaging orifice at one end, a bulbular suction producing member carried by said body member and disposed over the other end of said suction channel adapted to establish a suction in said suction channel, said suction channel being of a larger diameter at said other end and having a smaller diameter formed by an annular shoulder therein at the pipette engaging end thereof, a deformable elastic valve member disposed in the portion of said channel of larger

diameter and cooperating with said shoulder to close said suction channel, spring means for maintaining said deformable valve member against the shoulder in said suction channel, and a plunger means extending laterally into the side of said body member and engaging said elastic valve member above said shoulder for deforming and rendering said elastic valve member inoperative to close said suction channel.

3. In a pipette charging device, the combination of an elongated body member having a suction channel extending longitudinally therethrough and having a pipette engaging orifice at one end of said suction channel, a bulbular suction producing member carried by said body member and communicating with said suction channel for establishing a suction in said suction channel, a deformable elastic stopper mounted within and normally closing said suction channel, and a plunger type operating means extending laterally into the suction channel of said body member for deforming said elastic stopper and opening said suction channel, said plunger means having an internal bore open at its outer end and communicating with the interior of said bulbular suction producing member at its inner end adapted and arranged to be closed by the finger of an operator when said plunger means is operated to deform said elastic stopper.

4. In a pipette charging device of the character described, the combination of an elongated body member having a suction channel extending substantially centrally therethrough, a nipple at the lower end of said channel against which the end of a pipette is adapted to engage, a bulbular suction producing member secured upon said body member and over the other end of said suction channel, a deformable elastic stopper in said suction channel normally operative to prevent the flow of air therethrough, an operating plunger extending laterally into said body member for engaging and deforming said elastic stopper and rendering it inoperative to prevent the flow of air through said suction channel, and spring means operating to hold said deformable elastic stopper into sealing relation with said suction channel when said plunger is released.

5. In a pipette charging device of the character described, the combination of an elongated body member having a suction channel extending axially therethrough and having an orifice at the lower end of said suction channel against which the end of a pipette is adapted to engage, a bulbular suction producing member carried by said body member positioned over the upper end of said suction channel, a deformable stopper disposed in said suction channel for controlling the flow of air therethrough, an operating plunger extending laterally into said body member for laterally deforming said stopper to thereby permit a suction in the pipette end of said suction channel when said bulbular suction producing member is in an operating condition, and means for axially positioning said valve means into sealing relation within said suction channel.

6. In a pipette charging device, the combination of an elongated body member having a suction channel extending therethrough and adapted to be encircled by three fingers when grasped in the hand of an operator, a plunger extending laterally from the side of said member adapted to be operated by the index finger of an operator, a deformable elastic valve member mounted within said suction channel adapted and arranged to be deformed and rendered inoperative to seal said suction channel by inward movement of said plunger, a bulbular suction producing member mounted upon and extending over one end of said body member and communicating with said suction channel for establishing a suction in said suction channel, whereby said bulbular suction producing member may be conveniently depressed by the thumb when said body member is held in the hand, a pair of opposed spring operated clamping members pivotally mounted at the other end of said body member for holding a pipette in cooperating relation with the suction channel of said body member, and lever means formed as a part of one of said clamping members operable by the index finger of the operator for rendering said clamping means inoperative to hold a pipette.

7. In a pipette charging device, the combination of an elongated body member having a suction channel extending longitudinally therethrough and adapted to be grasped in a hand of an operator, a bulbular suction producing member mounted upon and extending over one end and communicating with the suction channel of said body member and compressible by the thumb when said body member is held in the hand of an operator, the suction channel of said body member being formed of two diameters with a bypass area in the larger diameter thereof, a deformable elastic valve member disposed in said suction channel for normally closing said suction channel to the passage of air therethrough, means operating axially of said body member for positioning said deformable elastic valve member in sealing relation within said suction channel, a plunger member extending into said body member laterally of said suction channel adapted and arranged to deform said elastic valve member and render it inoperative to prevent the flow of air through said suction channel, said plunger means having an open central bore extending from its outer end and terminating short of its inner end where it communicates with the interior of said bulbular member to provide an air passageway from the atmosphere to the interior of said suction producing member when said plunger means is released by the finger of an operator.

8. In a pipette charging device the combination of an elongated body member having a suction channel extending axially therethrough, a bulbular suction producing member mounted upon and disposed over one end of said body member and in communicating relation with said suction channel, a pair of axles extending laterally of said body member intermediate the ends and one at each side of said suction channel, pipette clamping jaws pivotally mounted in opposed relation upon said axles, said pivotally mounted jaws having extending portions concentric with said axles forming an interlocking connection therebetween, spring means for biasing said clamping jaws toward each other when in engagement with a pipette, and a single lever means carried by one of said jaws disposed outwardly of said body member for opening said jaws against the bias of said spring means.

References Cited in the file of this patent

UNITED STATES PATENTS

2,153,105	Szecsi	Apr. 4, 1939
2,410,552	Rosen	Nov. 5, 1946
2,544,541	McCarthy et al.	Mar. 6, 1951
2,599,370	Caulfield	June 3, 1952

FOREIGN PATENTS

599,818	Germany	July 10, 1934
698,619	Germany	Nov. 14, 1940