July 18, 1950 R. K. CHRISTIE 2,515,336

SPARK PLUG CLEANING APPARATUS

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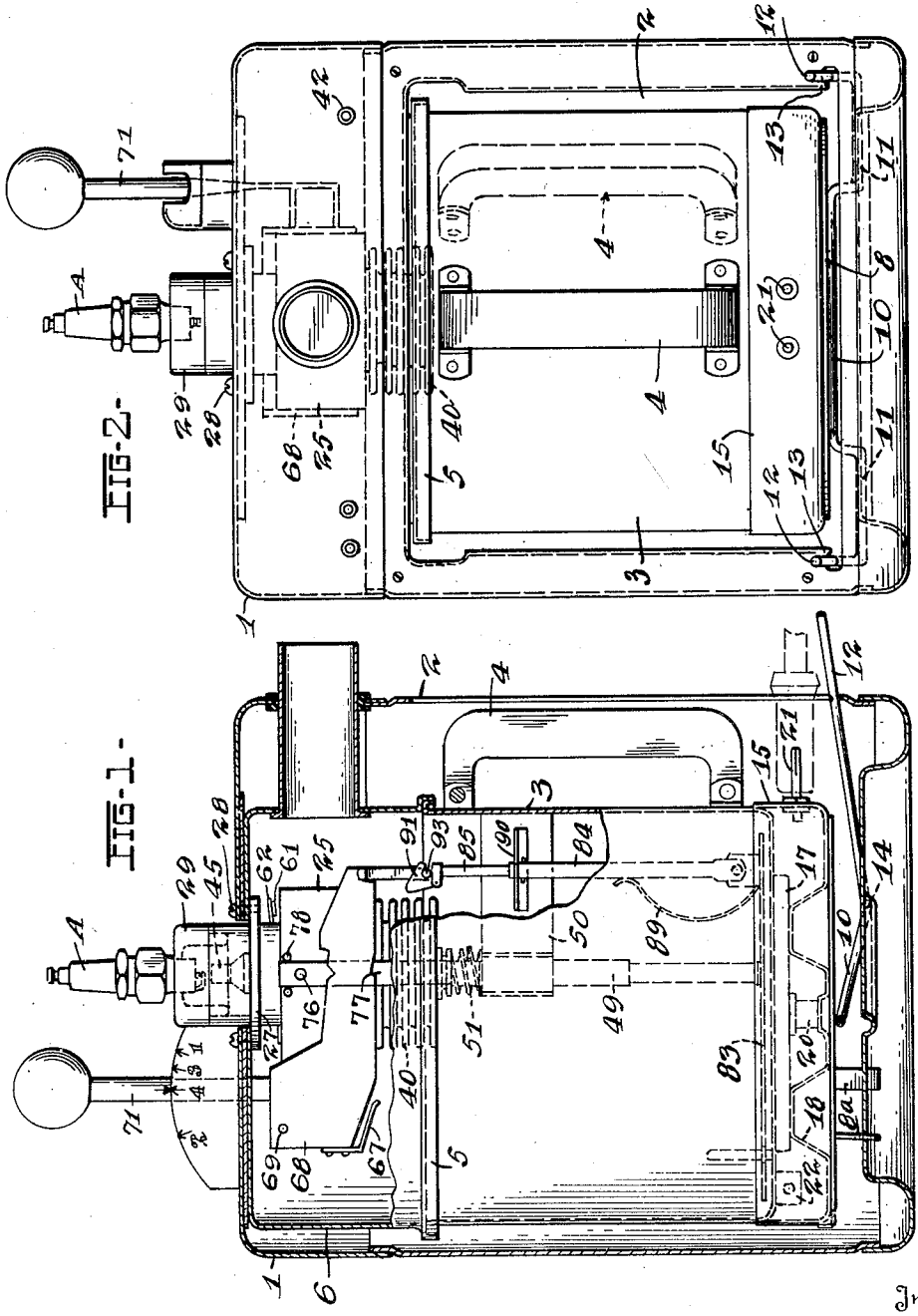


FIG-2-

FIG-1-

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SPARK PLUG CLEANING APPARATUS

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FIG-3-

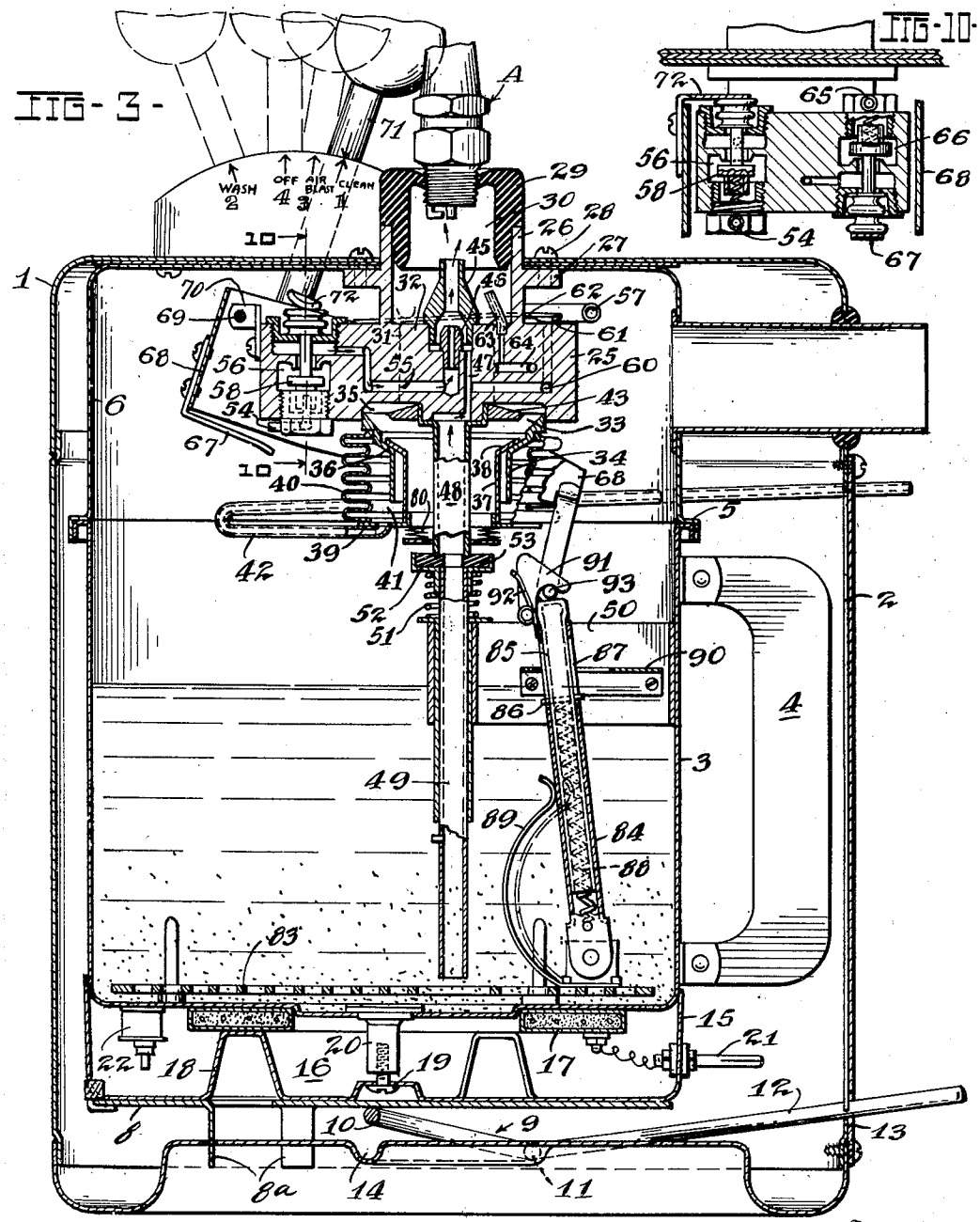


FIG-10-

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SPARK PLUG CLEANING APPARATUS

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FIG-5-

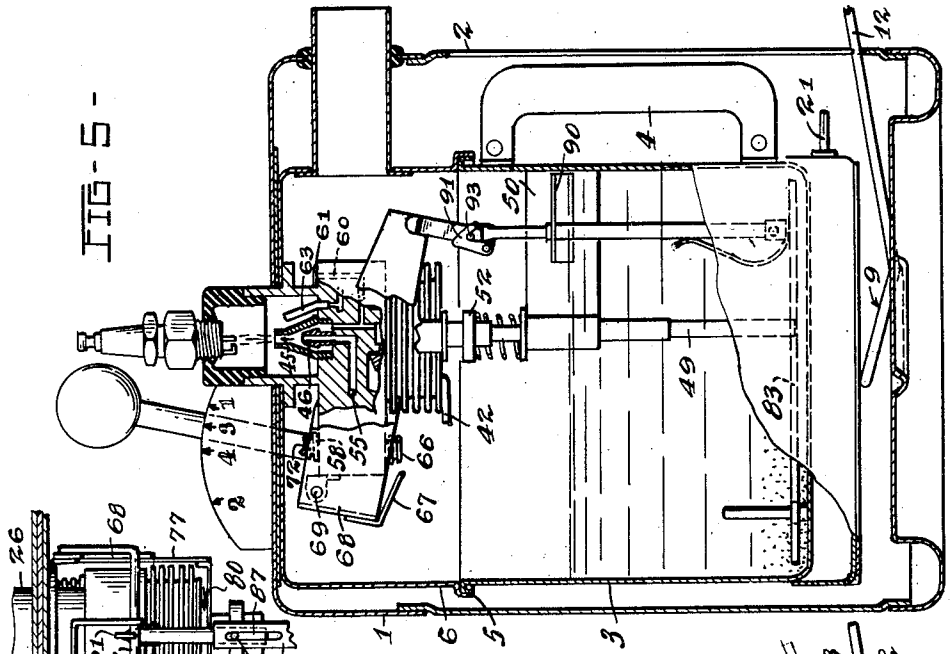


FIG-11-

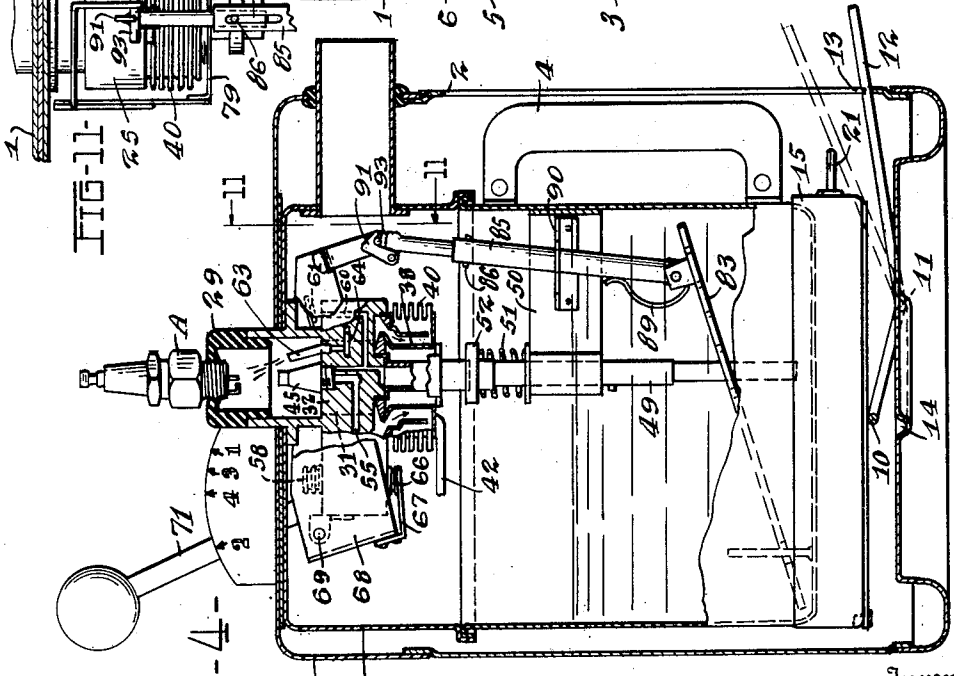


FIG-4-

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SPARK PLUG CLEANING APPARATUS

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FIG-7-

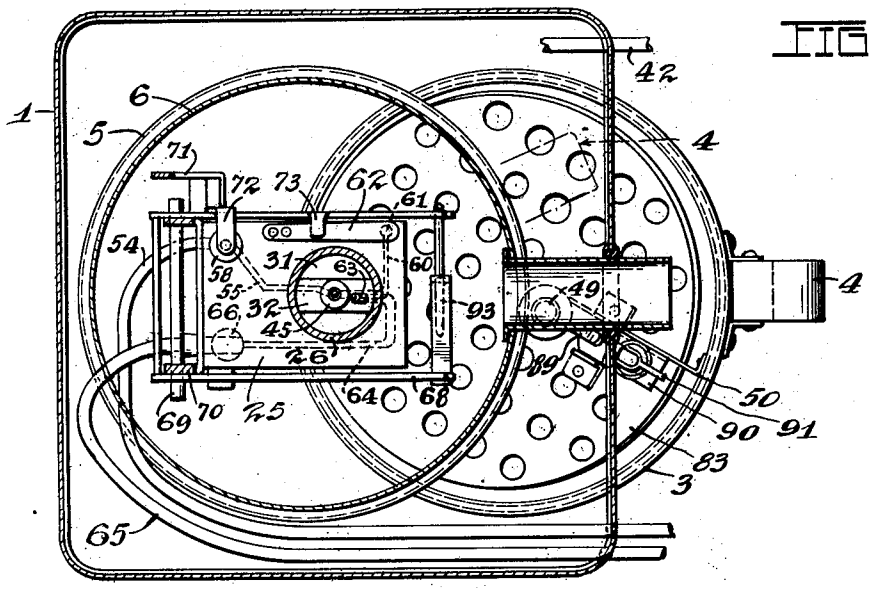
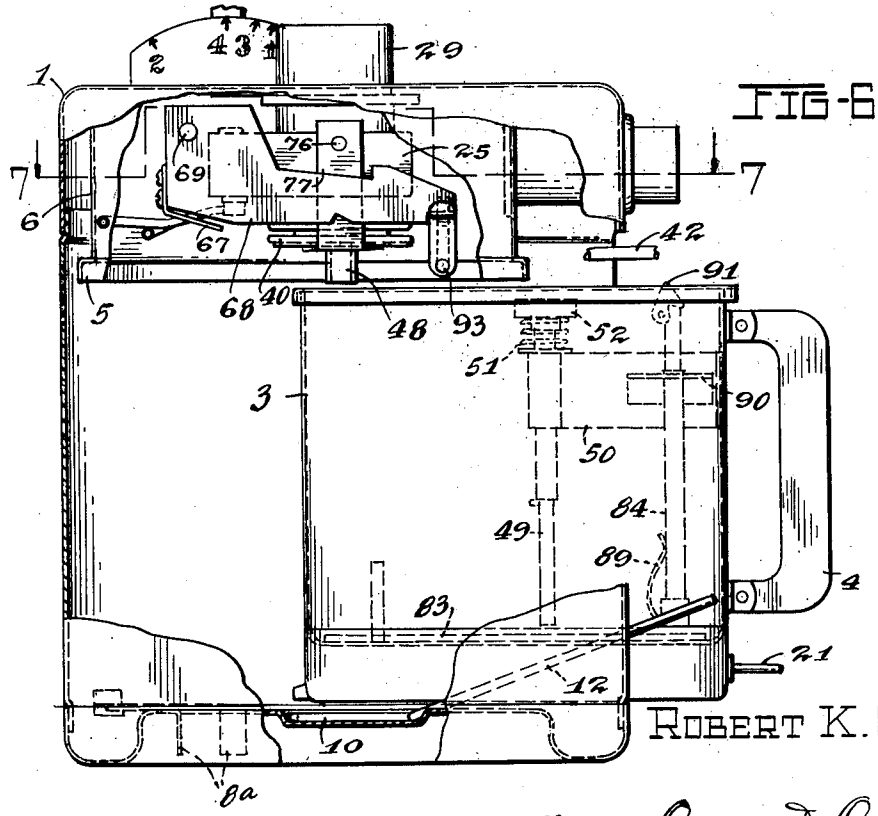


FIG-6-



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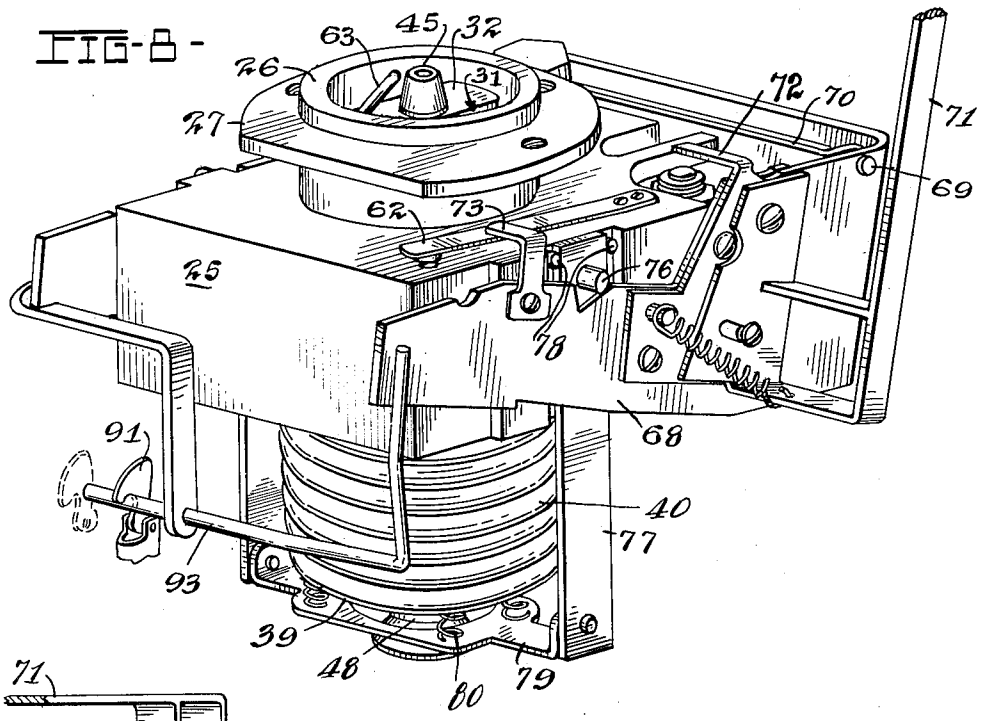
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July 18, 1950 R. K. CHRISTIE 2,515,336

SPARK PLUG CLEANING APPARATUS

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FIG-8-



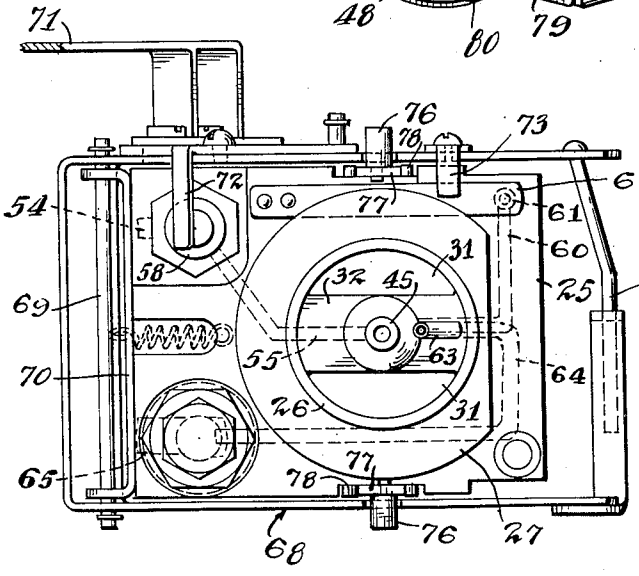


FIG-9-

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Patented July 18, 1950 2,515,336

UNITED STATES PATENT OFFICE

2,515,336

SPARK PLUG CLEANING APPARATUS

Robert K. Christie, Toledo, Ohio, assignor to Champion Spark Plug Company, Toledo, Ohio, a corporation of Delaware

Application October 15, 1945, Serial No. 622,407

30 Claims. (Cl. 134—97)

1

This invention relates to spark plug cleaning means of the type in which a cleaning action is obtained by discharging a chemical solution containing an abrasive material against the electrodes and surfaces of the plugs which become coated with fuel deposits in service.

In order that plugs cleaned in this manner may be suitable for further use, it is essential that all the abrasive material as well as the chemicals used in the solution be removed after the cleaning operation. It is, therefore, important to wash the portion of the plug subjected to the cleaning operation and also to dry the plug surface to prevent the detrimental rusting which would otherwise occur.

An object of the invention is the provision of means which is effectively operable to successively perform the three operations of cleaning, washing and drying without necessitating removal of the plug from its holder.

Another object of the invention is the provision in combination with separate means for cleaning, washing and drying a spark plug, of a unitary control therefor which is operable by manual movements to different predetermined positions to effect separate successive operations of said means in a simple, effective and economical manner and in any desired order.

Another object of the invention is the provision of simple and efficient means for effecting a drainage of the cleaning solution from the spark plug back into the container for re-use, and which is automatically operable by a change from the cleaning operation to the washing operation to prevent the washing liquid from draining into the cleaning solution container whereby to dilute the solution, but instead to cause it to pass to a point of suitable drainage.

Another object of the invention is the provision of means in an apparatus of the class described, which is operable, by shifting from one operative condition to another, to effect an agitation of the cleaning solution to maintain the abrasive particles thereof in suspension during the cleaning operation.

Other objects and advantages of the invention will be apparent from the following detailed description, and from the accompanying drawings illustrating one embodiment of the invention, in which:

Fig. 1 is a central vertical section of an apparatus embodying the invention, with parts in full and with the control handle in "off" or neutral position; Fig. 2 is a side elevation thereof looking at its open side, with the container for the

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cleaning solution disposed therein and turned into position for removal; Fig. 3 is an enlarged central vertical section of the apparatus, with the parts in position for a cleaning operation; Figs. 4 and 5 are similar reduced views, with parts in full and with the movable parts in Fig. 4 in plug-washing position and in Fig. 5 in drying or air-blast position; Fig. 6 is a side elevation of the apparatus with parts broken away and with the container for the cleaning solution partly removed from within the apparatus; Fig. 7 is a horizontal cross-section on the line 7—7 in Fig. 6; Fig. 8 is a perspective view of the control and associated parts embodying features of the invention, with parts broken away; Fig. 9 is a top plan view thereof; Fig. 10 is a section on the line 10—10 in Fig. 3, and Fig. 11 is a section on the line 11—11 in Fig. 4.

Referring to the drawings, 1 designates what, in the present instance, is a portable housing of substantially square-form in cross-section, closed at top and bottom and having an opening 2 at one side through which a container 3 for the cleaning solution may be inserted into operative position within the housing or removed therefrom. The container is provided with a handle 4 and its top edge, when the container is raised as hereinafter described, is adapted to fit tightly, in a sealed manner, against a shoulder and within an overhanging flange provided, as shown at 5, at the lower edge of a hood 6 that is fixed permanently within the casing and against its top. The container and its hood are cylindrical to permit one to turn in seated engagement with the other.

The container 3 rests on an elevator plate 8 in the bottom portion of the casing and the raising and lowering of this plate is controlled by an elevator lever 9. This lever, in the present instance, is bent from a single length of rod to form a U-shaped inner end portion 10, which bears at its loop upwardly against the bottom of the plate 8, and it has the opposite ends of its legs terminating in laterally extending fulcrum portions 11 from the outer ends of which at right angles thereto and in opposition to the loop portion 10 project handles 12. These handles extend along the sides of the housing 1 and through the door opening 2 at each side thereof and are held in lowered position by engagement within the notches 13 in the lower end portion of the side walls of said opening. The loop portion 10 and fulcrum members 11 seat in registering recesses 14 in the casing bottom. The raising and lowering movements of the plate 8 are guided by tongues 8a projected downwardly therefrom

through registering openings in the housing bottom.

The container 3 is provided with a bottom extension 15 of cup-form and forming, with the main bottom of the container, a compartment 16 for an electric heating element 17. This element is of ring-form and is held up against the main bottom of the container by a series of indentations 18 rising from the bottom of the extension 15. In the present instance, the extension 15 is in slip fit connection with the container and is drawn up to force the heater 17 against the container bottom by tightening a screw 19 in engagement with a lug 20 depending from said bottom. Suitable electrical connector studs 21 are attached to the extension 15 and have connection with the heater wires. 22 designates a thermostatic control switch for the heater element. A raising of the elevator plate 8 with the container thereof forces the upper edge of the container up against the centering flange 5.

The plug cleaning, washing and drying means of the invention includes a body block 25 located within the container hood 6 and having an upward cylindrical extension 26 projected through an opening in the top of the hood 6 and housing 1. This extension has a radial flange 27 which seats up against the hood top and is clamped thereto and to the casing by screws 28. An adapter 29, preferably of a yielding material such as soft rubber, is mounted on the top of the extension 26 and has a central top opening to receive the threaded end of a spark plug A with its electrode end exposed to the interior of the chamber 30 formed by the extension and adapter.

The bottom of the chamber 30, which is formed by the block 25, has drainage passages 31 extending down through the block at opposite sides of a centrally disposed cross-part 32 (Figs. 7, 8 and 9) and opening into the top of a drainage passage 33 formed by a funnel drainage discharge tube 34. The upper large end of this part is fitted into a recess 35 in the bottom of the block, and the lower annular edge portion of its taper or enlargement is provided interiorly with a conical seat 36. A valve tube 37 projects downwardly through the restricted portion of the funnel part 34 in spaced relation thereto and has at its upper end a conically flaring part 38 for resting on the conical seat 36 of the tube 34. The lower end of the valve tube 37 projects below the tube 34 and is provided with an outwardly projecting radial flange 39 that is connected through a bellows 40 to the enlarged upper end portion of the tube 34. The drainage chamber 41 thus formed within the bellows 40 has a drainage tube 42 extending therefrom through an opening in the flange 39 to any suitable point of discharge without the apparatus. The valve tube 37 may be raised by means hereinafter described to unseat its flange 38 from the seat 36 and cause it to seat against the edge of a deflector flange 43 attached to the bottom of the block 25 centrally of its recess 35. When the valve tube is in raised position drainage from the recess 35 is through the tube 34 to the chamber 41 within the bellows 40, and when the valve tube is in lowered position the drainage is therethrough and into the container 3 into which its lower end opens.

Mounted on top of the cross-part 32 of the body block concentric to the extension 26 and to each other are outer and inner nozzles 45 and 46, the first for discharging a cleaning liquid up against the spark plug end and the second to discharge an air jet through the first to create a suction action therethrough and a lifting and discharge of the cleaning liquid. The bore of the nozzle 45 is in connection through a passage 47 with a short suction tube section 48 that projects down from the bottom of the block centrally through the valve tube 37 in spaced relation thereto.

When the container 3 is in raised position in the housing 1, the tube section 48 is in sealed connection with the upper end of a lower suction tube section 49 carried by the container and which extends down to near its bottom. The section 49 is supported and guided for vertical movements by a bracket 50 on the interior of the container and has an upward pressure exerted thereon by a spring 51 interposed between the top of the bracket and a flange 52 on the tube. This flange supports a gasket 53 against which the upper tube section is adapted to seat to maintain a sealed joint between the sections when the container is in elevated position. The upward spring-actuated movement of the tube section 49 is limited relative to the container 3 so that the gasket 53 will only have engagement with the tube section 48 when the container is raised within the housing in position for its upper edge to seat against the lower edge 5 of the hood 6. Thus, a lowering of the container in the housing by a manipulation of the handle 12, whereby to permit a removal of the container from the housing, will lower the upper end of the tube section 49 from engagement with the tube section 48.

The air nozzle 46 receives its air supply from a passage 55 (Fig. 3) in the block 25, which passage communicates through a valve chamber 56 with an air pressure supply line 54 that has connection with a suitable source of air pressure supply. A valve 58 normally seats in the chamber 56 to close its communication with the passage 55 and is opened by means hereinafter described.

When it is desired to utilize the air jet from the air nozzle 46 to dry the plug after a cleaning and washing operation, a vent line 60 from the suction passage 47 is opened, thus relieving the lifting action on the cleaning liquid so that only air will discharge through the nozzle 45. The outer end of the vent passage is normally open and is closed by the depression of a valve 61 that is carried by a spring finger 62 mounted on the top of the block 25 near one side thereof, as shown in Figs. 3, 8 and 9.

A water stream for washing the plug after a cleaning operation is discharged against the plug end from a nozzle 63 in the block 32. This nozzle is connected by a passage 64 to a water supply line 65 (Fig. 7) and has a control valve 66 (Fig. 10) disposed therein. This valve is normally retained in closed position and has its stem projecting below the block 25 in position to be pressed by a finger 67, as hereinafter described.

The manual control for the operative parts will now be described. This control includes, in the present instance, a U-form of rocker yoke 68, which straddles the block 25 and is pivotally supported at its closed end by a shaft 69 mounted in a bracket 70 on the adjacent end of the block. The handle 71 projects upwardly from one side of the yoke 68 near its closed end to a manually operable position through and without the top of the casing 1. In the operation of the apparatus, it is desirable (1) to clean a spark plug by directing a chemical cleaning solution there-

against; (2) to wash the cleaning solution from the spark plug by directing a stream of water thereagainst; (3) to dry the spark plug after washing, and (4) to then place the handle in neutral or "off" position. These various positions of the handle are indicated in Figs. 1, 3, 4 and 5. These operations will be taken up in their order.

For cleaning, the handle 71 is thrown to the extreme right position (Fig. 3) which causes a downward swinging of the free end of the yoke 68 to the position shown in Figs. 3 and 5. In this position a finger 72 on one top edge of the yoke engages the upper end of the stem of the air valve 58 and moves the valve to open position to admit air from the supply line 54 to the passage 55 leading to the air nozzle 46 in the block 25. Air thus discharges from said nozzle through the nozzle 45 to create a suction through the latter and to discharge, upwardly against the spark plug, the cleaning solution that is drawn upward from the container 3 through the passage 47 and tubes 48 and 49. The solution, after striking the spark plug, drains down through the chamber 30, passages 31, drainage passage 33, funnel part 34 and valve tube 37 into the container 3. During this action a finger 73 projecting upwardly and inwardly from one leg of the yoke 68 engages the spring finger 62 and draws it down to cause the valve 61 to move to vent closing position. The vent 60 that is closed by said valve has communication with the discharge passage 47 for the cleaning solution.

The cleaning of the spark plug having been completed, the handle 71 is thrown over to "washing" position, which is at the extreme left of its throat, thus rocking the yoke 68 to the limit of its upward swinging movement to the position noted in Fig. 4. This permits a closing of the air valve 58 so as to discontinue the air discharge through the nozzle 45 and also permits an opening of the vent valve 61 to release the suction pressure in the discharge passage 47 and communicating passages, thus permitting the cleaning fluid therein to return to the container 3. At the same time the finger 67 at the lower edge of the looped end portion of the yoke 68 swings into valve opening engagement with the exposed stem portion of the water valve 66 so as to permit water to pass from the supply line 65 through the water passage 64 in the block 25 and up through the discharge nozzle 63 into the chamber 30 and against the end of the spark plug to wash the latter. At the same time the upper edges of the yoke legs engage respective lugs 76 projecting laterally from the upper ends of the arms of a vertical U-shaped cradle 77 and raise such cradle. These cradle arms are guided for vertical movements between guide pins 78 on the block 25. The loop or cross-piece 79 of this cradle is provided with a central opening through which the suction tube 48 for the cleaning solution extends and it has upward thrust engagement with the radial flange 39 through a plurality of coiled springs 80. It is thus apparent that the raising of the cradle 77 by the upward swinging movements of the yoke 68 causes the valve tube 37, to which the flange 39 is attached, to be raised to close the drainage communication through said valve tube and to open the drainage passage through the tube 34 into the drainage chamber 41. This causes the washing water to be directed into said chamber and thence out through the pipe 42 to a suitable drainage point rather than to permit it to enter the container 3 and dilute the cleaning solution.

The washing of the plug having been completed, the control handle 71 is thrown to the "air-blast" position, which is intermediate its "cleaning" and "off" positions, thereby moving the yoke 68 downwardly a sufficient distance to slightly but not fully open the air valve 58. This permits air to discharge through the air nozzle 46 upwardly against the plug for drying purposes. During this operation the vent valve 61 is open so as to relieve any suction action in the nozzle 45 effected by the discharge of the air jet therethrough, thereby preventing the drawing of the cleaning solution up from the container and its discharge against the plug.

When the drying operation has been completed, the control handle 71 is moved to its "off" position, which places the yoke 68 in the neutral position shown in Fig. 1, in which position the air valve 58 and water valve 66 are both closed, the vent valve 61 is open and the drainage valve tube 37 is in its lowermost position.

The container 3 is provided with means for agitating the liquid in the bottom thereof so as to maintain the heavier particles of the cleaning solution in suspension, and this agitating means is connected to and operated by swinging movements of the yoke 68 so that agitation of the solution will be effected during an operation of the apparatus. For this purpose a perforated plate 83 is loosely mounted in the bottom of the container 3, and pivotally rising from the edge portion of said plate disposed beneath the free end of the yoke 68 is a tube 84 in which the lower end of a tube 85 is received for telescopic sliding movements. The tube 85 has a cross-pin 86 operating in longitudinally extending side slots 87 in the upper end portion of the tube 84 whereby the relative longitudinal movements of the tubes are limited. The tubes are acted on by a coiled expansion spring 88 to normally retain them in lengthened relation, as best shown in Fig. 3. A spring finger 89 bears against the tube 84 to normally retain it in an upright position and the upper end of such tube is guided for limited swinging movements forward and rearward of the container by a slotted bracket 90. An agitator pick-up hook 91 is pivotally connected to the upper end of the tube 85 for pivotal movements in a vertical plane and with its bill portion extending over the tube end and toward the casing opening 2, as shown in Fig. 3. A spring 92 urges a swinging of the hook to the right, in the present instance, into stop coaction with the tube end. This hook is intended to engage over a horizontally disposed pick-up rod 93 pendently attached to the free swinging end portion of the yoke 68, as best shown in Fig. 8. It is thus apparent that the yoke 68 is connected to the agitating plate 83 through the pick-up members 91, 93, and the yieldingly connected tubes 84, 85, whereby the plate is raised and lowered with the control movements of the yoke 68 and agitation effected of the cleaning solution in the container 3.

The tubes 84, 85 are positioned in the container 3 at the handle side thereof, but slightly to the left of the handle so that when the container is inserted in the casing 1 through its side opening 2 with the handle centrally of the opening, the hook 91 will stand at the left of the vertical path of movement of the projecting end portion of the pick-up rod 93. A turning of the container to the right in elevated guided engagement with the flange 5 will turn the hook 91 horizontally into the path of swinging movement of the pick-up rod 93, so that a lowering of said rod from a

raised position will cause it to engage the registering inclined side of the hook 91 and force the hook rearwardly as the rod snaps into hook engagement thereunder. To release the hook 91 from engagement with the rod 93, it is only necessary to turn the container 3 to the left so as to bring the handle 4 thereof into centered relation to the casing opening 2. This action will slide the hook 91 from engagement with the engaged end portion of the rod 93 lengthwise thereof.

In the operation of the apparatus, the container 3 with the cleaning liquid therein is inserted into the casing 1 through the opening 2 thereof and placed with its bottom resting on the elevator plate 8. The handles 12 of the elevator lever 9 are then lowered to effect a raising of the elevator plate and container to place the upper edge of the latter into seating engagement with the centering flange 5 and to raise the upper gasket end of the tube 49 into seating engagement with the lower end of the tube 48. The lever arms 12 when lowered are engaged in notches 13 at the lower ends of the side edge walls of the opening 2, so as to hold the plate 8 and container in their elevated positions. The container is then turned to the right to place its handle in substantially the dotted line position indicated in Figs. 2 and 7, and in which position the inclined edge of the agitator pick-up hook 91 is in the lower portion of the arc of swinging movements of the pick-up rod 93, which is then in the partially raised position which it assumes when the yoke 68 and its control handle 71 are in "off" position. A lowering of the yoke 68 to "air-blast" position will cause the pick-up rod 93 to move into pick-up engagement with the hook 91. When the container has been placed in operative position within the casing 1, an electrical supply line socket is placed in engagement with the contact studs 21 of the heater circuit.

A plug A to be cleaned having been placed in the adapter 29, the control lever 71 is first thrown completely to the right to "cleaning" position, as shown in Fig. 3, so as to swing the yoke 68 to the limit of its lowering movement, thereby moving the trip finger 72 down into engagement with the stem of the air valve 58 to open such valve and permit air under pressure to pass to and be discharged from the air jet 46 upwardly through the nozzle 45. This air discharge causes the cleaning liquid to be raised from the container through the tubes 48, 49 and passage 47, and thence to be discharged through the nozzle 45 in spray-form against the end of the spark plug. During this operation the valve tube 37 is in its lowered position so that the cleaning fluid is drained back into the container through the tubes 34 and 37. When the cleaning operation has been completed, the yoke 68 and its control handle 71 are thrown to the "washing" position shown in Fig. 4, which permits a closing of the air valve 58 and effects an opening of the water supply valve 66, due to the pressure of the finger 67 against its stem. This permits water to be discharged up against the plug through the nozzle 63 to wash the cleaning fluid from the plug. The movement of the yoke 68 to this "washing" position raises the cradle 77, 79, so as to raise the valve tube 37 to seat against the flange 43, thereby closing the drainage passage through the valve tube and opening the water drainage passage through the lower end portion of the tube 34 to the drainage chamber 41 within the bellows 40. From this point the water is discharged without the apparatus through a drainage tube 42 instead of being permitted to pass into the

cleaning fluid as would be the case if the drainage discharge was through the valve tube 37. The drainage to the upper end of the tube 37, both in the case of the cleaning fluid and of the cleaning water, is from the chamber 30 through the passages 31 in the block 25. Washing of the plug having been accomplished, the control lever 71 is moved to the "air-blast" position shown in Fig. 5. This effects a partial, but not complete, opening of the air valve 58 to cause a discharge of air from the nozzle 46 through the nozzle 45 and up against the plug for drying purposes. In this position of the yoke 68 the vent valve 61 is still open so that no cleaner lifting suction action through the tubes 48 and 49 can take place. This completes the operations on the plug so that the control handle 71 may then be moved to "off" position and another spark plug to be cleaned substituted for the cleaned plug.

I wish it understood that my invention is not limited to any specific construction, arrangement or form of the parts, as it is capable of numerous modifications and changes without departing from the spirit of the claims.

Having thus described my invention, what I claim as new, and desire to secure by United States Letters Patent, is:

1. In an apparatus of the class described, a frame, a container for a cleaning liquid mounted in said frame for limited turning movements relative thereto and for removal therefrom, and liquid agitating means in said container, a rockable control means, and a connection between said control means and agitator means for causing an agitation of the liquid during predetermined control movements of the control means, said connection being engageable with and releasable from said control means by predetermined turning movements of the container.

2. In an apparatus of the class described, a container for a cleaning liquid, means operable by air pressure to discharge a cleaning liquid from the container in spray-form against a spark plug to be cleaned, a liquid agitator means in said container, and a rockable control for said first means having connection with said agitator means and operable when rocked to actuate said agitator means.

3. In an apparatus of the class described, a container for a cleaning liquid, a liquid agitating means in said container, a rockable control means, and a releasable connection between said control means and agitator means for causing an agitation of the liquid during predetermined control movements of the control means.

4. In an apparatus of the class described, a container for a cleaning liquid, a liquid agitating plate in said container, a rockable control means therefor and a releasable connection between said control means and plate operable to communicate rocking movements from one to the other.

5. In an appratus of the class described, a container for a cleaning liquid, means operable by air pressure to discharge a cleaning liquid from the container in spray-form against a spark plug to be cleaned, said means having an air pressure control valve, an agitating member movably mounted in the bottom portion of the container, and a movable control means operable to open and close said air valve and having connection with said agitating member to impart agitating movements thereto during at least a portion of the valve controlling movement of said control means.

6. In an apparatus of the class described,

means operable by air pressure to raise a liquid by suction action from a container and to discharge it in spray-form against a spark plug to be cleaned and including a vent passage, a normally open valve for said passage, an air pressure control valve, and control means operable to open the air valve and to close the vent valve during a portion only of the opening movement of the air valve.

7. In an apparatus of the class described, a container for a cleaning liquid, means operable by air pressure to raise a cleaning liquid from the container by suction action and discharge it in spray-form against a spark plug to be cleaned, said means including a discharge nozzle having suction communication with the container, a vent passage for said communication, an air nozzle in communication with a source of air pressure supply for discharging air in relation to said first nozzle to create a suction action through said suction communication, a normally closed control valve for said air source communication, a normally open valve for said vent passage, and a control means operable to move said air valve to different open positions and to move the vent valve to closed position when the air valve is in one of its open positions.

8. In an apparatus of the class described, a container for a cleaning liquid, means operable by air pressure to discharge a cleaning liquid from the container in spray-form against a spark plug to be cleaned, said means including air and spray nozzles, the latter being in suction communication with the interior of the container and the former being in communication with an air pressure supply source to direct air therethrough to create a suction action in said first communication to raise a liquid from the container to the spray nozzle and to discharge it in spray-form therefrom, said suction communication having a normally open relief vent, a normally closed valve for said air pressure communication having different open stages, and rockable means operable to move said air valve to both open stages and to close said vent when the air valve is in one open stage position.

9. In an apparatus of the class described, a container for cleaning liquid, means operable by air pressure to raise a liquid from said container and discharge it in spray-form against a spark plug to be cleaned, means for discharging a washing liquid against the spark plug, said first and second means having communication respectively with a source of air pressure supply and a source of water pressure supply, separate valves normally closing said sources of air and water pressure supply, and control means operable to separately and selectively open either of said valves.

10. An arrangement as called for in claim 9 wherein the control means includes a rockable member which has connection with and operates to open said air and water valves at different predetermined stages of its movement.

11. In an apparatus of the class described, a container for a cleaning liquid, means operable by air pressure action to raise a liquid from the container and discharge it in spray-form against a spark plug to be cleaned and to discharge air alone against the spark plug when the suction communication of the spray means with the container is vented, said means including a vent passage for said purpose, means for discharging a washing liquid under pressure against the spark plug, a normally closed air pressure control valve for said first means, a normally closed valve for said washing means, a normally open valve for said vent passage, and control means movable to different predetermined positions to open said air valve and to one of said positions to close said vent valve, and also movable to a different position to open said washing liquid valve whereby selective cleaning, air-blasting and washing operations may be performed on the plug.

12. An arrangement as called for in claim 11 wherein the control means includes a rockable member to effect said various operations at various predetermined stages in its rocking movement.

13. In an apparatus of the class described, a container for a cleaning liquid, means operable to discharge a cleaning liquid in spray-form against a spark plug to be cleaned and including an air blast for effecting the spraying action and for raising a liquid by suction action from the container to a spraying point, a normally open vent for said suction communication, a normally open valve for said vent, a normally closed valve for said air blast means, and a control means manually operable to move the air valve to different open positions and to close said vent valve during a predetermined open stage of the air valve whereby a cleaning liquid may be discharged against a spark plug during one open stage of the air valve and an air blast alone discharged thereagainst during the other open stage of said valve.

14. An arrangement as called for in claim 13 wherein the control means includes a rockable member which and during a predetermined portion of its rocking movement effects an opening of the air valve and also effects a closing of the vent valve during only a portion of its air valve opening movement.

15. An apparatus of the class described, a container for a cleaning liquid, air pressure means for raising a liquid from the container and discharging it in spray-form against a spark plug to be cleaned and also for discharging an air blast alone against the plug, a normally closed control valve for said air pressure means, and a control means operable to open said valve and during a portion of the opening period of the valve to render said liquid lifting and spraying means inoperative so that an air blast alone is discharged against the spark plug.

16. In an apparatus of the class described, a container for a cleaning liquid, air pressure actuated means for raising a liquid from the container and discharging it in spray-form against a spark plug to be cleaned and also for discharging an air blast alone against the plug when the spraying feature is rendered inoperative, a valve operable to admit an operating air pressure to said means both for spraying and blast purposes, and control means operable to open said valve both for spark plug cleaning and air-drying operations and to render said cleaner spraying means inoperative when a drying operation is desired.

17. An arrangement as called for in claim 16 wherein the control means includes a rockable member which effects an opening of the air valve during a predetermined operation of its rocking movement and renders said cleaning feature of said first means inoperative during a predetermined portion only of said predetermined movement.

18. An arrangement as called for in claim 16, together with an agitating means in the container, and a connection between said agitating

means and the control means to impart agitating movements to one from control movements of the other.

19. In an apparatus of the class described, a container for a cleaning liquid, means including an air pressure discharge feature for raising a liquid by suction action from the container and discharging it in spray-form against a spark plug when the liquid discharging means is rendered inoperative, means for directing a washing liquid under pressure against the spark plug, a valve operable to control the air pressure supply to said first means, a second valve for controlling the water supply of the second means, and a movable control means operable to selectively open said air and water valves at predetermined stages in its movement and to render the cleaning liquid lifting and spraying action of said first means inoperative during a predetermined portion of the open stage of said air valve whereby the plug may be cleaned, washed and dried at different respective operating positions of the control means.

20. An arrangement as called for in claim 19 wherein the control means includes a rockable member which effects the different stated actions at different predetermined positions in its rocking movement.

21. An arrangement as called for in claim 19, together with a liquid agitating means in the container and a connection between said control means and agitating means whereby agitating means are communicated to the latter from control movements of the former.

22. In an apparatus of the class described, a container for a cleaning liquid, suction means operable by air pressure to raise a liquid from the container and discharge it in spray-form against a spark plug to be cleaned, means for discharging a washing liquid under pressure against the spark plug, separate control valves for said first two means, means forming a chamber in which the cleaning and washing liquids are discharged, a single control means operable to selectively and independently open said valves, and valve means controlled by said control means for causing liquid draining from said chamber to discharge into said container when the first means is in operation and to discharge to a drainage source when the second means is in operation.

23. An arrangement as called for in claim 22 wherein the control means includes a rockable member which during one stage in its rocking movement opens the control valve of the first means and during another stage in its rocking movement opens the control valve for said second means.

24. In an apparatus of the class described, air pressure operated means for raising a cleaning liquid by suction action from a container and discharging it against the spark plug to be cleaned, means for discharging a washing liquid under pressure against such spark plug, means forming a chamber in which the cleaning and washing liquids are discharged, said chamber having a drainage passage opening into the container, means associated with said drainage passage and forming a separate drainage source, means operable to direct the drainage from the chamber either into the container or to said separate source, separate control valves for said first and second means, and a single control means operable to selectively and independently open said control valves and also selectively operable to control said drainage directing means to cause drainage to return to the container when a cleaning fluid is being discharged and to be discharged to the separate drainage source when the washing liquid is being discharged.

25. In an apparatus of the class described, a container for a cleaning liquid, means forming a chamber in which a spark plug may be positioned for cleaning, means operable to cause discharge of the drainage from said chamber either into said container or to a point of drainage separate from said container, means for discharging cleaning liquid from the container against a spark plug in said chamber, means for discharging a washing liquid into the chamber against the spark plug, and a single means manually operable to selectively and independently control the discharge of cleaning liquid and washing liquid through said respective discharging means and to control said drainage discharging means so that when a spark plug is being cleaned the drainage will be into the tank and when being washed the drainage will be to a point without the container.

26. In an apparatus of the class described, a container for a cleaning liquid, means forming a chamber in which a spark plug may be positioned for cleaning, said chamber having a drainage passage, valve means cooperating with said drainage passage and movable to a position to cause drainage into the container or to a position to cause drainage to a point without the container, and a single control means including a rockable member operable to selectively and independently cause operation of the cleaning liquid and washing liquid discharge means and to control said drainage valve means to cause drainage into the container when a cleaning operation is being performed and to cause drainage to a point without the container when a washing operation is being performed.

27. In an apparatus of the class described, a container for a cleaning liquid, means forming a chamber for receiving a spark plug to be cleaned, means operable by suction action to discharge a cleaning liquid from the container in spray-form against a spark plug in said chamber, means operable to discharge a washing liquid against a spark plug in said chamber, said chamber having a drainage passage with a drainage discharge tube leading therefrom, a drainage chamber in connection with said tube and having provision for discharging the drainage outside of said container, a valve tube in said drainage tube operable to direct drainage from the passage either through the valve tube into the container or through the drainage tube and into said drainage chamber, control means operable to selectively and independently control the discharge from said cleaning liquid and washing liquid discharge means and to control the movement of said valve tube to cause drainage into the container when a spark plug is being cleaned and to cause drainage into said drainage chamber when a spark plug is being washed.

28. An arrangement as called for in claim 27 together with means for venting said cleaning liquid discharge means so that air only is discharged therefrom against a spark plug, and valve means controlled by said control means for closing said vent means during a portion of the operation of said liquid spraying means whereas when the control means is in a predetermined position of its movement an air blast only is discharged from the cleaning liquid discharge means.

29. In an apparatus of the class described, a

receptacle, a container for a cleaning liquid removably mounted in the receptacle, elevating means for the container when disposed in the receptacle, means for discharging a cleaning liquid in spray-form from the container, said means including a sectional delivery tube extending down into the container with one section attached to and movable with the container and adapted to have sealing connection with the other section when the container is elevated in the receptacle.

30. In an apparatus of the class described, a receptacle, a container for a cleaning liquid movably mounted in said receptacle and removable laterally therefrom, means operable to elevate the container to usable position in the receptable, spraying means operable to raise a liquid from the container when in elevated position, said spraying means including a suction tube extending down into the container and having separable parts one of said parts being associated with and carried by the container and movable into sealing joint connection with another tube part when the container is in elevated position, and means operable to control the operation of said spraying means.

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