Feb. 23, 1937. W. CZARNECKI 2,071,920

SPRAY NOZZLE AND STRAINER

Filed Dec. 18, 1934 2 Sheets-Sheet 1

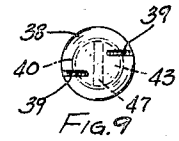

FIG. 9

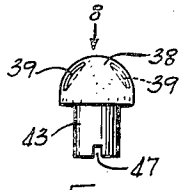

FIG. 8

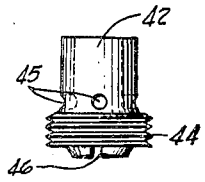

FIG. 10

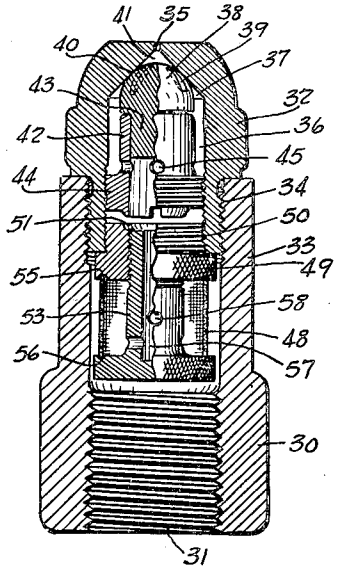

FIG. 1

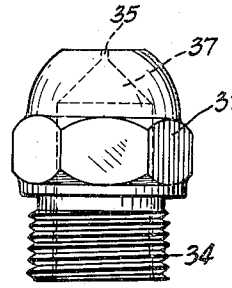

FIG. 2

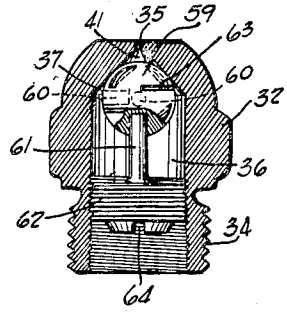

FIG. 12

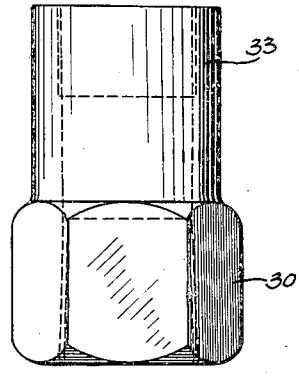

FIG. 3

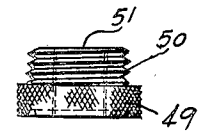

FIG. 20

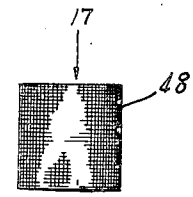

FIG. 16

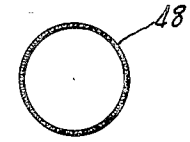

FIG. 17

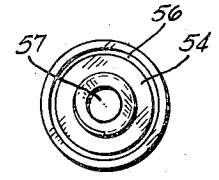

FIG. 19

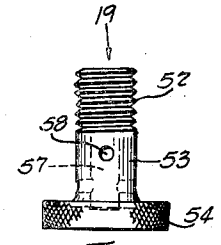

FIG. 18

WITNESSES:

Jackson L. Mosmann

Anna M Ward

INVENTOR:

WALTER CZARNECKI

BY Joshua R. H. Potts

ATTORNEY

Feb. 23, 1937. W. CZARNECKI 2,071,920

SPRAY NOZZLE AND STRAINER

Filed Dec. 18, 1934 2 Sheets-Sheet 2

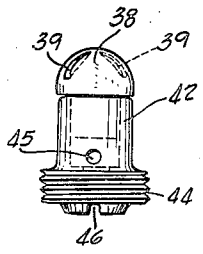

FIG. 11

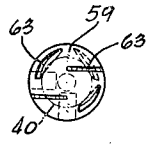

FIG. 14

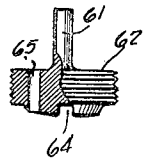

FIG. 15

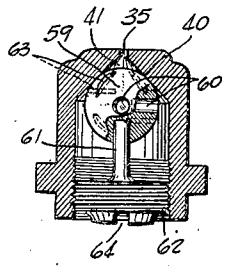

FIG. 13

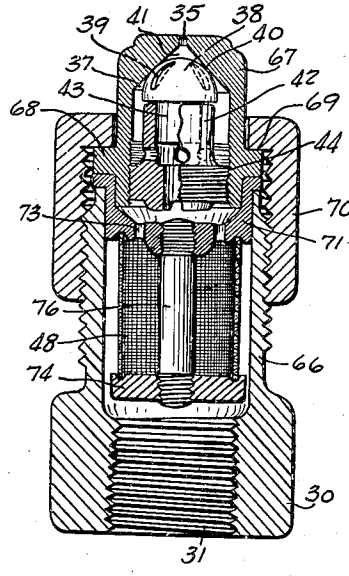

FIG. 4

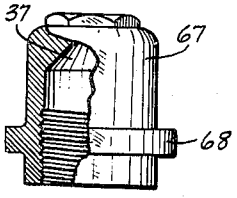

FIG. 7

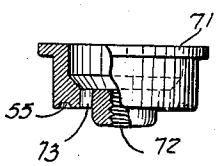

FIG. 22

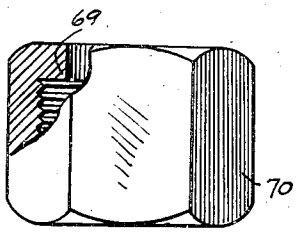

FIG. 5

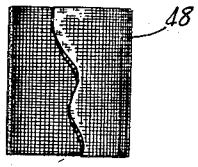

FIG. 21

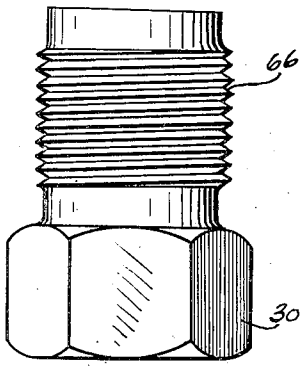

FIG. 6

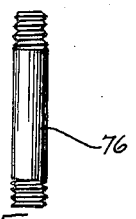

FIG. 24

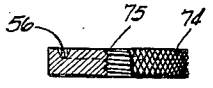

FIG. 23

WITNESSES:

Jackson F. Murnane

Anna M. Ward

INVENTOR:

WALTER CZARNECKI

BY Joshua R. H. Potts

ATTORNEY

Patented Feb. 23, 1937

2,071,920

UNITED STATES PATENT OFFICE

2,071,920

SPRAY NOZZLE AND STRAINER

Walter Czarnecki, Eddington, Pa., assignor to Eddington Metal Specialty Co., Eddington, Pa., a corporation of Pennsylvania

Application December 18, 1934, Serial No. 757,995

4 Claims. (Cl. 299—120)

This invention relates to spray nozzle and strainer, and has for an object to provide a device of the type embodying new and improved features of structure, providing new and improved functions in the device.

A further object of the invention is to provide a device of the type wherein the swirl chamber, provided by a taper in the nozzle, is contacted by a terminal member contoured to fit tapers of various inclinations.

A further object of the invention is to provide a device of the type having a nozzle tip provided with an internal conical bore communicating with the discharge orifice, and a terminal member fitting said conical bore and presenting thereto a spherical segment with kerfs formed therein extending across the circumference of contact, and projected into the swirl chamber provided thereby tangental to a circle, the center of which is the discharge orifice.

A further object of the invention is to provide a terminal member of spherical form having a plurality of sockets therein with tangentally arranged kerfs diametrically opposite said sockets, the kerfs being cut to different depths, providing, when applied, passages of different capacities.

A further object of the invention is to provide a device of the type having an improved type of strainer therein.

A further object of the invention is to provide a device of the type having a strainer formed as a cylinder, with separable heads contacting the ends of the cylindrical strainer.

The invention, therefore, comprises a housing member including a tip part, said tip part being provided with a discharge orifice and a conically tapered bore communicating concentrically therewith, with a terminal member having one or more spherical segments provided with kerfs arranged tangentally to the circle of contact between the segment and the conical chamber, with means for supporting the terminal member in fitting contact with said conical bore, and to conduct liquid upon the exterior of the terminal member and through the tangental kerfs into a swirl chamber provided by the tapered bore interlying the segment and the discharge orifice, with a strainer formed as a cylinder with heads proportioned to make fitting contact with the ends of the said cylinder, the heads being interconnected by a central connecting member which makes provision for separating the heads to remove the cylindrical strainer for cleaning or replacement.

The drawings illustrate several embodiments of the invention and the views therein are as follows:

Figure 1 is a view partly in diametrical section and partly in elevation of one embodiment of the improved nozzle and strainer,

Figure 2 is a view in elevation of the tip of the type shown at Figure 1,

Figure 3 is a view in elevation of the casing shown in diametrical section at Figure 1,

Figure 4 is a view partly in diametrical section and partly in elevation of a modified type of the tip-burner,

Figure 5 is a view partly in elevation and partly in section of the union nut shown in diametrical section at Figure 4,

Figure 6 is a view in elevation of the housing connection shown in diametrical section at Figure 4,

Figure 7 is a view partly in elevation and partly in section of the tip member,

Figure 8 is a view in elevation of the terminal member, as shown at Figures 1 and 4,

Figure 9 is a view of the terminal member in end elevation, as indicated by arrow 8 at Figure 8,

Figure 10 is a view in end elevation of the terminal-member-supporting sleeve,

Figure 11 is a view in elevation of the terminal member and its supporting sleeve combined,

Figure 12 is a view partly in diametrical section and partly in elevation of the tip member, as shown at Figure 1, with a modified type of terminal member shown therein,

Figure 13 is a view partly in diametrical section and partly in elevation of the type of tip member shown at Figure 4, with the modified type of terminal member therein,

Figure 14 is a view of the terminal member disassociated from its supporting parts and being a sphere; all views are alike.

Figure 15 is a view partly in elevation and partly in section of the sphere supporting member,

Figure 16 is a view in elevation of the cylindrical strainer as shown at Figure 1.

Figure 17 is a view of the cylindrical strainer in plan, as indicated by arrow 17 at Figure 16,

Figure 18 is a view in elevation of one of the heads for the cylindrical strainer showing the connection with the opposite head,

Figure 19 is a view in end elevation of the strainer head, as indicated by arrow 19 at Figure 18,

Figure 20 is a view in elevation of the other strainer head cooperating with the head shown at Figure 18,

Figure 21 is a view partly in elevation and partly in section of the strainer shown at Figure 4,

Figure 22 is a view partly in elevation and partly in section of one of the heads for the strainer shown at Figure 21,

Figure 23 is a view partly in elevation and partly in section of the other head for the strainer shown at 21, and

Figure 24 is a view in elevation of the connection between the heads shown at Figures 22 and 23.

Like characters of reference indicate corresponding parts throughout the several views.

The spray nozzle and strainer which enters into the present application is adapted more particularly as a spray nozzle for an oil burner, and, therefore, comprises a base **30** with a threaded connection **31** for application to a pipe or conduit.

In the type shown at Figure 1 the tip **32** attaches directly to the base **30** through the medium of an integral sleeve **33**. The connection is through the screw threads **34** and the tip is provided with a discharge orifice **35**, such as is well-known in the art. The interior of the tip is provided with a bore **36** tapered conically at **37** with the discharge orifice as the apex. Cooperating with this tip is a terminal member **38** presenting within the conical bore a spherical segment which has kerfs **39** formed therein spanning the circle of contact **40** so that the kerfs form passages from the chamber **36** through said kerfs to the swirl chamber **41** interposed between the terminal member and the discharge orifice **35**.

By forming the terminal member with a contacting surface spherical in form, it will make positive contact with conical bores of different tapers. The taper of the bore and, therefore, of the swirl chamber, determines the divergence of the spray delivered from the orifice **35**. The wider the angle of the tapered bore the wider the angle of the spray, and conversely, the narrower the angle of the tapered bore the more condensed the spray.

For supporting the terminal member **38** and clamping it in such positive engagement, a sleeve **42** is provided properly proportioned to fit the shank **43** carrying the terminal member **38**. This sleeve **43** is provided with an enlarged threaded section **44** making threaded engagement with the interior of the chamber **36**, as shown more particularly at Figure 1.

It is also provided with perforations **45** which form communication from the interior of the sleeve to the exterior. The sleeve member is provided with a kerf **46** for cooperation with a screw driver or like implement for screwing home the section **44** and, therefore, clamping the terminal member firmly in position. The kerf **47** in the terminal member is merely for loosening the terminal member from the sleeve **42** when occasion may require.

For cooperation with the spraying structure thus provided a strainer **48** is employed constructed as a cylinder. For mounting this cylinder a head **49** is provided having threads **50** which engage the internal screw threads of the tip beneath the threaded part **44** of the terminal member support.

The member **49** is provided with a threaded opening **51** for engaging the threads **52** upon the shank **53** of the head **54**. The heads **49** and **54**, respectively, are provided with grooves **55** and **56** in which the ends of the cylindrical strainer are respectively seated. The shank **53** is also hollow, as shown at **57**, throughout the greater part of its length, and is provided with lateral passages **58** forming communication between the interior of said shank and the annular chamber formed thereabout by the strainer **48**.

In different installations of oil burners, even though the structure installed is substantially identical, the delivery of different quantities of oil per hour is desirable. For this purpose, instead of constructing the terminal member as a semi-sphere, as suggested at Figure 8, it may be constructed as a complete sphere, as shown at **59** at Figures 12, 13 and 14.

This spherical member **59** is provided with a plurality of sockets **60**, any one of which will provide a sliding fit for the stud **61** carried upon the threaded base **62**. Kerfs **63** are formed in the faces of this sphere opposite each of the sockets **60**, so that, irrespective of which socket may be occupied by the stud **61**, an opposite face will be presented similar to that shown at Figures 9 or 14 having kerfs formed therein properly proportioned and positioned to discharge into the swirl chamber **41** a quantity of oil depending upon the depth to which the kerfs are cut, it being the intent that such kerfs are cut different depths in said sphere for the purpose of controlling the flow.

The base **62** is provided with a kerf **64** for the application of a screw driver or like implement to force the spherical terminal member into the position shown by the hemispherical member at Figures 1 and 4. This base **62** is provided with one or more passages **65** therein for the passage of oil or other liquid from the strainer to the chamber surrounding said terminal member.

At Figure 4 a slight variation of the structure is shown, the base **30** being provided with a threaded sleeve **66** and the tip **67** provided with an annular shoulder **68** against which the flange **69** of the lock nut **70** engages to hold the tip member **67** in engagement with the head **71** of the strainer combination shown therein.

This strainer combination differs from the strainer combination heretofore described only in that the head **71** is provided with a central screw-threaded opening **72** and with passages **73** spaced in an annular circle about said central opening **72**. It is provided with an annular groove **55** exactly as shown in the head **49**. The opposite head **74** is likewise provided with the groove **56** corresponding to the groove in the head **54**, but is provided with a central threaded opening **75**. A stud **76**, screw-threaded at its opposite ends, is adapted to make connection between the head **71** and the head **74** with the strainer **48** clamped therebetween, as shown at Figure 4.

The difference between the strainer shown in Figure 1 and that shown in Figure 4 is that merely that at Figure 1 is composed of three parts, while that at Figure 4 is composed of four parts, but the cooperation of the parts and the association with other parts is identical, and the two strainers are intended to be interchangeable as are the terminal members **38** and **59**.

The housings and tips shown at Figures 1 and 4 may be used as may be found necessary or desirable, together with any of the internal structure, as shown and described.

In assembling the type shown at Figure 1, if the hemispherical terminal member is employed, the shank **43** is inserted into the sleeve **42** and by the use of a screw driver or like implement, the combined structure is then screwed into the chamber **36** until firm and complete contact has

been made between the spherical segment and the tapered walls of the bore **37** to form the swirl chamber **41**. If the type including the whole sphere is employed, then the stud **61** is inserted into the selected socket **60**, and the structure thus combined screwed home in exactly the same manner. This arrangement of parts will be identically carried out in the structure shown at Figure 4.

With the type of strainer shown at Figures 16–20 inclusive, the cylindrical strainer **48** will be seated in the groove **55** of the head **49** and the shank **53** inserted axially through said cylindrical strainer into the threaded part **51** of the head **49** and screwed home until the heads **49** and **54** make contact with the ends of the strainer to exclude oil except such as passes through the strainer.

With the type of strainer shown at Figures 21–24 inclusive, the strainer **48** will be seated in the groove **55** of the head **71** and the stud **76** seated in the threaded opening **72** either before or after the seating of the strainer. The head **74** will now be screwed upon the opposite end of the stud **76** until the ends of the cylindrical strainer are properly and firmly seated in the grooves **55** and **56**.

With either arrangement, the strainer is now combined with the housing in the type shown at Figure 1 by screwing into the tip **32**, and in the type shown at Figure 4, by seating the flange of the head between the tip **67** and the sleeve **66** of the body.

When assembled in any of these relations the tip is applied to the inlet conduit at the threaded part **31** in the usual manner.

As has been explained, the taper of the tip will be varied in accordance with the type of spray designed to be discharged therefrom, and the terminal member of the sperical type will be associated therewith for the employment of the kerfs adapted for delivery of the required volume of oil.

In operation, the type assembled, as at Figure 1, the oil will enter within the sleeve **33**, passing through the strainer **48**, about the shank **53** and through the lateral passages **58** into the central passage **57**. From this passage the oil will pass upwardly into the sleeve **42** and outwardly through the lateral passages **45** into the annular chamber **36**, thence upwardly into the conically tapered part and through the kerfs **39** into the swirl chamber **41** to be discharged through the orifice **35**.

In the device assembled, as at Figure 4, the oil will likewise pass into the sleeve **66** and through the strainer **48**, then through the passage **73** and into the sleeve **42**, out through the lateral passages **45**, and as before disclosed.

Of course, when the spherical contact member is employed, the oil passes through the passages **65** instead of into the sleeve **42** and outwardly through the lateral passages **45**, but otherwise the operation is identical.

Of course, the spray nozzle and strainer illustrated may be modified and changed in various ways without departing from the invention herein set forth and hereinafter claimed.

I claim:—

1. A nozzle unit comprising a housing and tip, said tip having a conically tapered chamber and a discharge orifice extending from the apex of said conical chamber, a spherical terminal member presenting a spherical segment within the taper of the conical chamber, said spherical member having a plurality of sockets, means engaging one of said sockets selectively to clamp the spherical member within said conical chamber, and kerfs formed in the spherical surface of said member opposite each of said sockets spanning the circle of engagement of the spherical member with the conical taper.

2. A nozzle unit comprising a housing and tip, said tip being provided with a chamber cylindrical in part and conical in part, said conical part having a discharge orifice continuing from the apex thereof, internal threads formed in the cylindrical part of the chamber, a disc externally threaded engaging the internal threads of the chamber and having a stud upstanding therefrom, and a spherical terminal member having a plurality of sockets proportioned to fit upon said stud, said spherical member further having kerfs formed in the spherical segment opposite each of the sockets, the kerfs in the several segments varying in depth and positioned to by-pass the line of contact of the terminal member with the taper of the conical part of the chamber.

3. In a nozzle unit, a spherical terminal member having a plurality of radial sockets, and kerfs cut in spherical segments opposite each of said sockets.

4. In a nozzle unit, a spherical terminal member having a plurality of radial sockets, and kerfs formed in groups in segments opposite each of said sockets, the kerfs of the different groups being formed of different depths.

WALTER CZARNECKI.