June 3, 1969 H. A. CARTWRIGHT 3,447,755

SPRAY NOZZLE AND ALIGNMENT ARRANGEMENT THEREFOR

Filed Dec. 5, 1966 Sheet 1 of 2

Fig. 1.

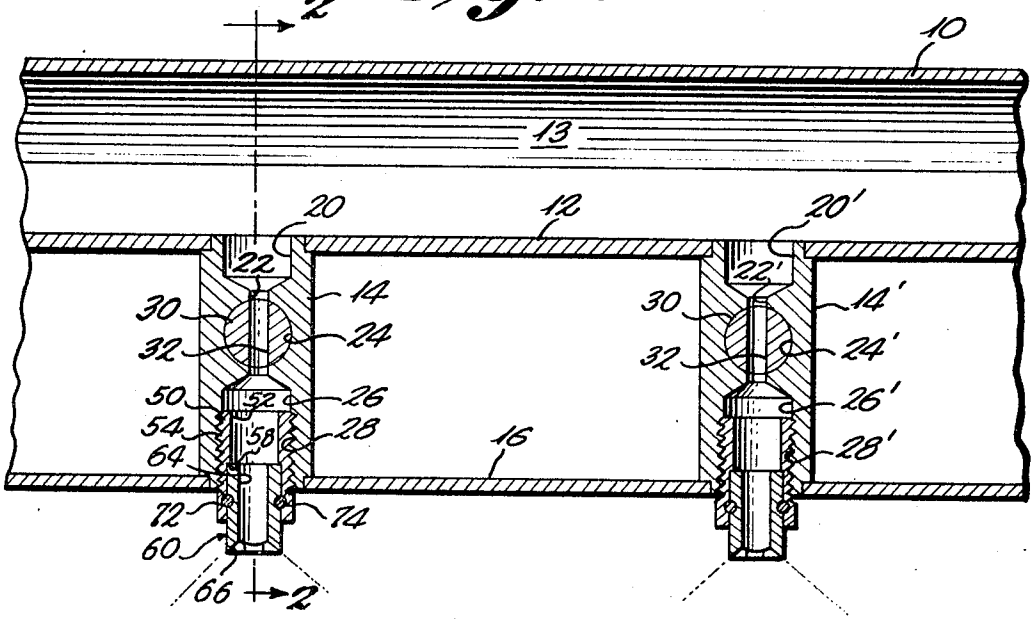


Fig. 2.

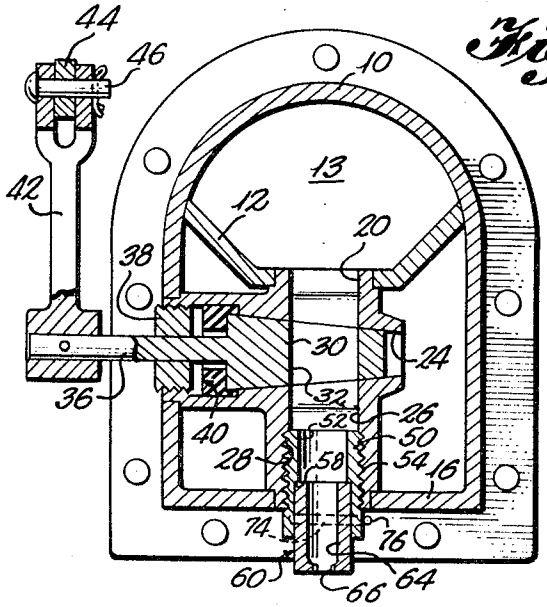


Fig. 3.

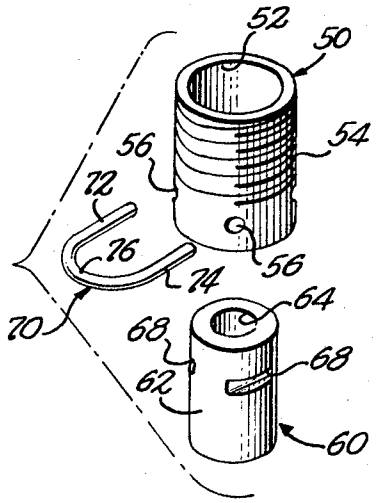
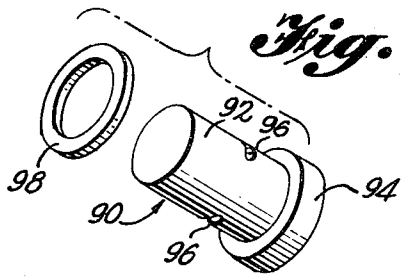


Fig. 7.



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SPRAY NOZZLE AND ALIGNMENT ARRANGEMENT THEREFOR

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Fig. 4.

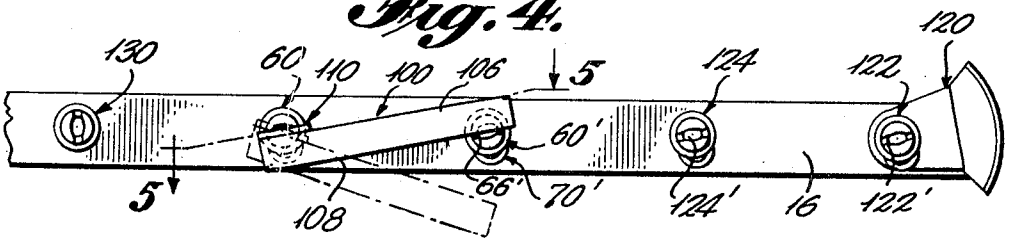


Fig. 5.

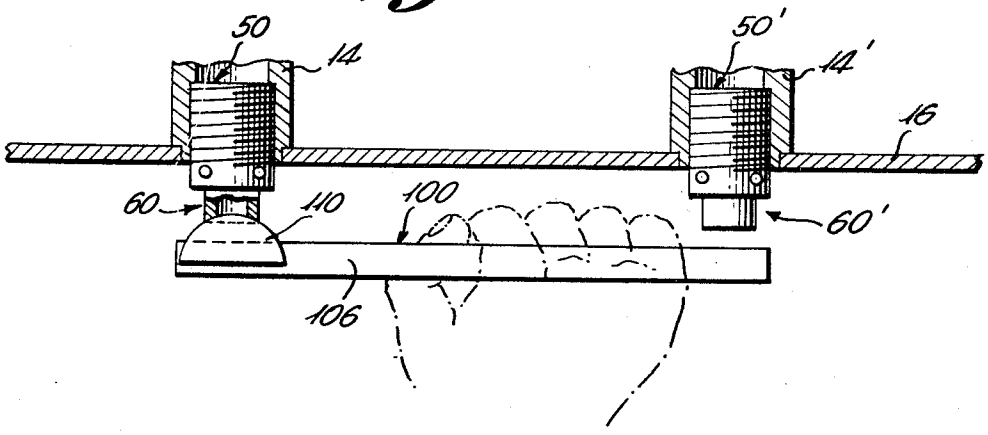


Fig. 6.

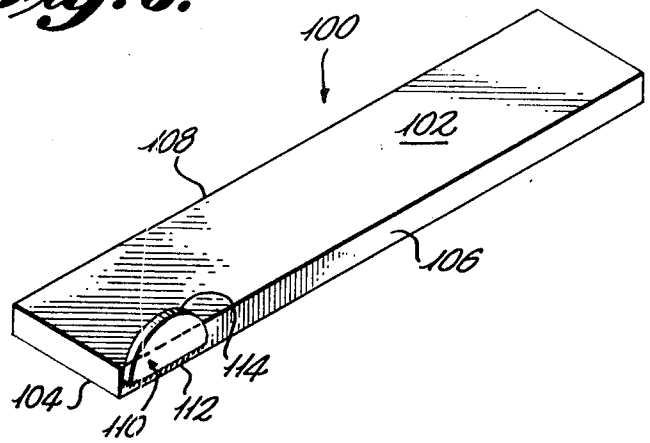
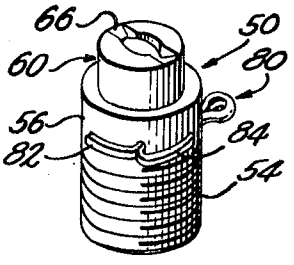


Fig. 8.



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United States Patent Office 3,447,755
Patented June 3, 1969

3,447,755

SPRAY NOZZLE AND ALIGNMENT ARRANGEMENT THEREFOR

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Filed Dec. 5, 1966, Ser. No. 599,056
Int. Cl. B05b 1/14, 1/30
U.S. Cl. 239—551 3 Claims

ABSTRACT OF THE DISCLOSURE

A spray nozzle assembly is provided including an adapter with external threads to be threaded within a bore in a supporting body. The nozzle tip means is mounted within the adapter by a quick disconnect arrangement including a U-shaped member which passes through holes provided in the adapter and is received within grooves formed in the nozzle tip. A tool is provided for adjusting the angular position of the nozzles and comprising a generally flat body having substantially straight parallel opposite edges spaced apart a distance substantially equal to the desired spacing of the spray orifices of adjacent spray nozzles, the tool including lug means on one edge thereof. A method of aligning the orifices includes placing the lug means of the tool in the orifice of a nozzle to be adjusted and then moving the adapter so that the edge of the tool opposite the lug is aligned with the center of the slot of an adjacent previously adjusted nozzle.

The present invention relates to a new and novel spray nozzle assembly and alignment arrangement therefor as used in connection with road coating or spraying machinery.

The present invention represents an improvement over the spray nozzle as illustrated in U.S. Patent No. 3,132,809 which also discloses spray nozzle means as used in road spraying machinery. In the operation of such machinery, it is frequently necessary to change the spray nozzles in accordance with the type of material being sprayed, and it is thereby desirable to include means for facilitating quick and easy changing of the spray nozzles.

In the aforementioned U.S. patent, means is disclosed for quickly and easily changing the spray nozzles, but this arrangement suffers from the disadvantage that the spray orifices of the nozzles are arranged in a fixed angular relationship to the supporting structure or spray bar of the road surfacing machine.

In the present invention, means is also provided for quickly and easily removing and replacing the spray nozzle assemblies, and at the same time the angular relationship of the spray orifices may be adjusted as desired, any angular relationship being readily obtained with this arrangement. Accordingly, the advantages of the aforementioned U.S. patent are obtained while additionally providing the further advantage of enabling ready adjustment of the angular relationship of the spray orifices to the supporting spray bar.

Another important feature of the present invention is the fact that the spray nozzle assembly of the present invention includes adapter means which enables the assembly to be employed either with present road coating or spraying machinery now in use or it may be installed on new equipment. Presently existing equipment may be readily modified by either threading the adapter means of the present invention into threaded holes which receive the spray nozzles now in use, or by boring out such holes and threading them to receive the adapter means of the present invention. For example, an arrangement as shown in U.S. Patent No. 2,330,568 may be readily modified

with the incorporation of the concepts of the present invention. As seen in this latter patent, spray nozzles **25** are simply threaded into operative position. It is apparent that with this type of arrangement adjacent spray nozzles in all likelihood are not properly aligned in parallel relationship, but in actual practice with spraying machines now in use, it has been found that the spray orifices of the various spray nozzles will be disposed at many different angles with respect to one another. There is no means provided in this kind of arrangement for aligning the spray orifices in proper orientation and then for quickly removing the spray orifices and subsequently replacing them in proper orientation without considerable difficulty. Due to the position of these spray nozzles on the machine, unless a special tool is available, the only way the spray nozzles can be replaced with the spray orifices in proper relationship is for a mechanic to lie down on the ground and then adjust the spray nozzle as it is replaced to obtain the proper orientation.

In the present invention, the adapter means is adapted to be threaded into position to replace the spray nozzle such as illustrated at **25** in the latter mentioned U.S. patent. The spray nozzle of the present invention is then secured in position within the adapter means and initially adjusted to its proper relationship. After this initial adjustment is made, the attaching means of the present invention enables the spray nozzle to be readily removed and replaced with respect to the adapter means in the exact same relative relationship each time so that once the initial adjustment is made, it is never necessary to re-adjust the nozzles.

Accordingly, with the arrangement of the present invention, it is evident that the assemblies including the adapter means and the nozzle tip means supported thereby may be initially adjusted to any desired angular relationship with respect to the supporting spray bar whereupon the nozzle tip means may be removed and replaced from time to time without the necessity of making any further adjustments.

It is apparent that the arrangement of the present invention is equally adaptable for use with new equipment or with prior art equipment now in use.

An object of the present invention is to provide a new and novel spray nozzle assembly including adapter means whereby the assembly is equally adaptable for use with presently existing road coating or spraying machinery or with new equipment.

Another object of the invention is the provision of a new and novel spray nozzle assembly which can be initially accurately adjusted such that a plurality of nozzles can be arranged in desired orientation to one another at any suitable angle to the support structure and wherein means is provided for easily and quickly removing and replacing the nozzle tip means of the nozzle assembly so that the spray orifices will be disposed in the same relative position to the support structure each time.

Still another object of the invention is to provide a new and novel tool for aligning a plurality of adjacent spray nozzles.

A further object of the invention is the provision of a novel method of aligning the plurality of adjacent spray nozzles.

Other objects and many attendant advantages of the invention will become more apparent when considered in connection with the specification and accompanying drawings, wherein:

FIG. 1 is a vertical section through a spray bar illustrating the nozzle means of the present invention supported thereby;

FIG. 2 is a sectional view taken substantially along line **2—2** of FIG. 1 looking in the direction of the arrows;

FIG. 3 is a top exploded perspective view of the nozzle assembly according to the present invention;

FIG. 4 is a bottom view of a spray bar illustrating the method of the present invention;

FIG. 5 is a view taken substantially along line 5—5 of FIG. 4 looking in the direction of the arrows with certain portions broken away for clarity;

FIG. 6 is a top perspective view of the novel tool according to the present invention;

FIG. 7 is an exploded perspective view of a blank plug to be mounted in the adapter means of the present invention; and

FIG. 8 is a top perspective view of the nozzle assembly showing a modified attaching means.

Referring now to the drawings wherein like reference characters designate corresponding parts throughout the several views, FIGS. 1 and 2 illustrate a portion of a supporting structure of spray bar including an outer wall portion **10** and an internal wall portion **12** defining with wall portion **10** a manifold **13** adapted to receive liquid to be sprayed from the associated spray assemblies. A pair of valve bodies **14** and **14'** have the opposite end portions thereof of reduced dimension and received within suitable holes provided in wall portion **12** and a lower wall portion **16**. The construction of the components associated with valve body **14'** is identical with that discussed in connection with valve body **14**, and accordingly the same reference numerals primed will be applied thereto.

Valve body **14** is provided with a first enlarged bore portion **20** which tapers to a smaller bore portion **22** which in turn communicates with a laterally tapered bore as seen most clearly in FIG. 2. Bore **24** in turn is in communication with an enlarged chamber portion **26** at the bottom of the valve body, the lower internal wall of chamber **26** being internally threaded as indicated by reference numeral **28**.

As seen most clearly in FIG. 2, a rotatable valve member **30** of tapered outer configuration is snugly received within the tapered lateral bore **24** in the valve body and has a passage **32** formed therethrough which is adapted to be aligned with the adjacent passages in the valve body so that when the passage **32** is so aligned, liquid will pass downwardly from the manifold **13** to the spray nozzle assembly.

Valve member **30** is integral with an outwardly extending shaft **36** supported within a member **38** and a seal assembly **40** provides a liquid-tight seal with shaft **36**. The outer end of shaft **36** is fixed to an arm **42** the upper end of which is bifurcated and pivotally interconnected with a suitable operating member **44** through the intermediary of a pivot pin **46**.

It is apparent that valve member **30** serves as a cutoff valve and may be selectively operated for cutting off any one or more of the individual nozzle assemblies along the spray bar. It should also be understood that this cutoff valve may be positioned at other suitable locations or eliminated if desired and do not form a part of the present invention.

As seen in FIGS. 1 and 2 as well as in FIG. 3, the adapter means of the present invention includes a generally cylindrical member **50** having a longitudinal bore **52** formed therethrough. The adapter means is provided with screw thread means **54** on the outer surface thereof extending downwardly from the top thereof and spaced from the bottom thereof, this screw thread means being adapted to cooperate with the internal threads **28** formed in chamber **26** of the body **14** for securing the adapter means in operative position within the supporting body. A pair of lateral bores **56** extend through the adapter means, these lateral bores **56** intersecting the previously described longitudinal bore **52** and extending substantially perpendicular thereto.

As seen most clearly in FIGS. 1 and 2, the lower part of the longitudinal bore formed through the adapter means is of greater cross sectional dimension than the upper part of this bore so as to form an internal annular shoulder **58** within the adapter means for limiting the inward movement of the nozzle tip means hereinafter described.

The nozzle tip means as seen in FIG. 3 is indicated generally by reference numeral **60** and includes a substantially cylindrical outer surface **62** which is adapted to be received within the lower enlarged part of the longitudinal bore formed through the adapter means. Nozzle tip means **60** has a longitudinal passage **64** formed therethrough which is in communication with an elongated spray orifice **66** at the lower or outer end of the nozzle tip means. A pair of grooves **68** are formed on the outer surface of the nozzle tip means at diametrically opposite sides thereof.

The attaching means as seen most clearly in FIG. 3 is indicated generally by reference numeral **70** and comprises a substantially U-shaped member formed of spring steel or similar material. The attaching means includes opposite leg portions **72** and **74** interconnected by a bight portion **76**.

Referring again to FIGS. 1 and 2, the assembled interrelationship of the adapter means and nozzle tip means is clearly illustrated. The inner or upper portion of the nozzle tip means is snugly received within the lower part of the longitudinal bore formed in the adapter means. When the upper end of the nozzle tip means is in interengagement with the annular internal shoulder **58** formed in the adapter means, the nozzle tip means may be rotated so as to align the grooves **68** thereof with the lateral bores **56** formed in the adapter means. When the grooves and lateral bores are aligned, the legs **72** and **74** of the attaching means are inserted into operative position through the lateral bores **56** and within the grooves **68** so as to positively retain the nozzle tip means in operative position within the adapter means. If it is desired to remove the nozzle tip means, the attaching means is simply removed from its operative position whereupon the nozzle tip means can be simply slid out of the adapter means. It is of course a simple operation to replace the nozzle tip means when desired.

Referring now to FIG. 8, a different type of attaching means is illustrated. In this view, the same adapter means and nozzle tip means are illustrated. The attaching means in this arrangement takes the form of a cotter pin **80** which extends through an aligned lateral bore in the adapter means and a groove in the nozzle tip means. The outer ends **82** and **84** of the cotter pin are spread apart so as to positively retain the adapter means and nozzle tip means in the proper operative relationship with respect to one another.

Referring now to FIG. 7, a modification is illustrated wherein a blank plug is shown which is adapted to be substituted for the nozzle tip means previously illustrated. The blank plug is indicated generally by reference numeral **90** and includes a cylindrical body portion **92** of the same outer dimension as the outer surface of the nozzle tip means **60** previously described. An enlarged head portion **94** is formed at one end of the blank plug.

The outer surface of the portion **92** of the blank plug is provided with a pair of grooves **96** at diametrically opposite portions thereof, these grooves corrosponding to the grooves **68** formed in the nozzle tip means. A sealing gasket **98** is provided, this gasket being adapted to be compressed between the enlarged head **94** and the undersurface of the adapter means previously described.

If it should be desired to close off one or more of the outlets of liquid from the spray bar, the attaching means can be removed so as to slide the nozzle tip means out of the operative position shown in FIGS. 1 and 2, whereupon the blank plug **90** along with its gasket **98** may be mounted in place of the nozzle tip means. It will be understood that the portion **92** of the blank plug means can be slid upwardly within the lower enlarged part of the longitudinal bore through the adapter means, where-

upon the attaching means is inserted through the aligned lateral bores in grooves **96** in the blank plug to hold the plug in place.

Refering now to FIG. 6 of the drawings, a tool employed for aligning adjacent spray nozzle assemblies is illustrated. The tool is indicated generally by reference numeral **100** and comprises a substantially rectangular body portion including opposite substantially parallel flat upper and lower surfaces **102** and **104**. The body portion includes a pair of substantially straight parallel opposite edges **106** and **108** which are spaced apart a distance substantially equal to the desired spacing of the spray orifices of adjacent spray nozzle assemblies.

A lug means or key **110** is fixedly secured to the edge **106** as by welding indicated at reference numeral **112**. The upper surface **114** of the lug means may be arcuate in configuration so as to be relatively snugly received within the spray orifice of a nozzle tip means, such spray orifice having a corresponding configuration as seen in cross section.

Referring now to FIGS. 4 and 5, the method of aligning the spray nozzles with the tool previously described is illustrated. The method may be described in connection with the two nozzle assemblies as previously illustrated and described in connection with FIG. 1.

As seen in FIG. 4 which is a bottom view of the spray bar, a guard **120** is secured to the spray nozzle assembly **122** which has already been adjusted into the desired angular relationship with respect to the spray bar. It will be noted that the spray orifice **122'** of the nozzle assembly **122** is disposed obliquely to the longitudinal axis of the spray bar, and this angular relationship may be varied according to the operating conditions involved.

An adjacent nozzle assembly **124** is illustrated in its adjusted position with the spray orifice **124'** thereof disposed substantially parallel with the spray orifice **122'**. The nozzle tip means **60'** has also been pre-adjusted so that the spray orifice **66'** thereof is disposed in parallel relationship with the spray orifices of the two spray assemblies **122** and **124**.

After the adapter means **50** and the nozzle tip means **60** have been assemblied with respect to one another and the adapter means threaded into operative position as shown in FIG. 5, the tool **100** is employed by placing the lug means **110** thereof within the spray orifice of nozzle tip means **60**. The adapter is then turned by means of a small pipe wrench or vice grips as for example shown in FIG. 4 from the phantom line position into the solid line position wherein the edge **108** is aligned with the center of the spray orifice **66'** of the previously adjusted spray nozzle assembly. When the tool is in the position shown in FIG. 4, it is apparent that the spray orifice of the nozzle tip means **60** will be disposed in parallel relationship with the spray orifice **66'** of the previously adjusted spray nozzle assembly. The tool is then removed from the spray orifice of the nozzle tip means **60** and may be employed with the next adjacent spray nozzle assembly **130** to adjust it in a similar manner. It is apparent that once the outer spray nozzle assembly **122** has been adjusted, the adjacent nozzle assemblies may be successively adjusted in a manner similar to that just described.

It is apparent from the foregoing that there is provided according to the present invention a new and novel spray nozzle assembly including adapter means for use with present road coating or spraying machinery or which may be equally as well employed with new equipment. Means is provided for initially accurately setting a plurality of spray nozzles in a desired orientation with respect to a supporting structure and to one another, and the spray orifices of the various spray nozzle assemblies may be set at any desired angle relative to the supporting structure. Means is provided for easily and quickly removing and replacing the nozzle tip means of the nozzle assemblies wherein the spray orifices will be in the same relative position to one another each time they are replaced. A novel tool is provided for aligning a plurality of adjacent spray nozzles, and a novel method is provided for aligning a plurality of adjacent spray nozzles.

As this invention may be embodied in several forms without departing from the spirit or essential characteristics thereof, the present embodiment is therefore illustrative and not restrictive, and since the scope of the invention is defined by the appended claims, all changes that fall within the metes and bounds of the claims or that form their functional as well as conjointly cooperative equivalents are therefore intended to be embraced by those claims.

I claim:

1. In a spray apparatus an elongated spray bar having an outer wall portion and an inner wall portion defining a manifold and a lower wall portion in spaced relation to said inner wall portion, spaced valve bodies extending downwardly from said inner wall portion and traversing said space, and having their upper and lower ends extending through and secured in said inner wall portion and said lower wall portion respectively, said valve body having an axial bore and valve member traversing said bore and including a shaft extending through the outer wall of said bar and carrying an operating arm, the lower end of said valve body having an adapter means threaded into said axial bore with a portion projecting therefrom, said adapter being cylindrical and having a longitudinal bore, a nozzle tip, and readily detachable means securing said nozzle tip within the bore of said adapter.

2. Apparatus as defined in claim **1** wherein said projecting portion of said adapter means includes lateral bore means formed therein extending in a direction perpendicular to the longitudinal bore thereof, said lateral bore means opening through the outer surface of said adapter means, said nozzle tip means including groove means formed in the outer surface thereof and adapted to be aligned with said lateral bore means in the adapter means when the inner end of said nozzle tip means is in engagement with said internal shoulder of the adapter means, said attaching means extending through the aligned lateral bore means and groove means.

3. Apparatus as defined in claim **1** wherein the lower part of the longitudinal bore in said adapter means is of enlarged cross sectional dimension so as to define an internal shoulder within said longitudinal bore of the adapter means, the inner end of said nozzle tip means resting against said internal shoulder to limit inward movement of the nozzle tip means, said projecting portion of said adapter means having lateral bore means formed therethrough and extending in a direction perpendicular to said longitudinal bore and opening through the outer surface of said adapter means, said nozzle tip means having groove means adapted to be aligned with said lateral bore means when the inner end of said nozzle tip means is in engagement with the internal shoulder of the longitudinal bore in said adapter means, said attaching means extending through the aligned lateral bore means of the adapter means and the groove means of said nozzle tip means.

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U.S. Cl. X.R.

137—608; 239—569, 600