Sept. 14, 1965 W. S. THOMPSON 3,206,126

REMOTE CONTROL FIRE NOZZLE

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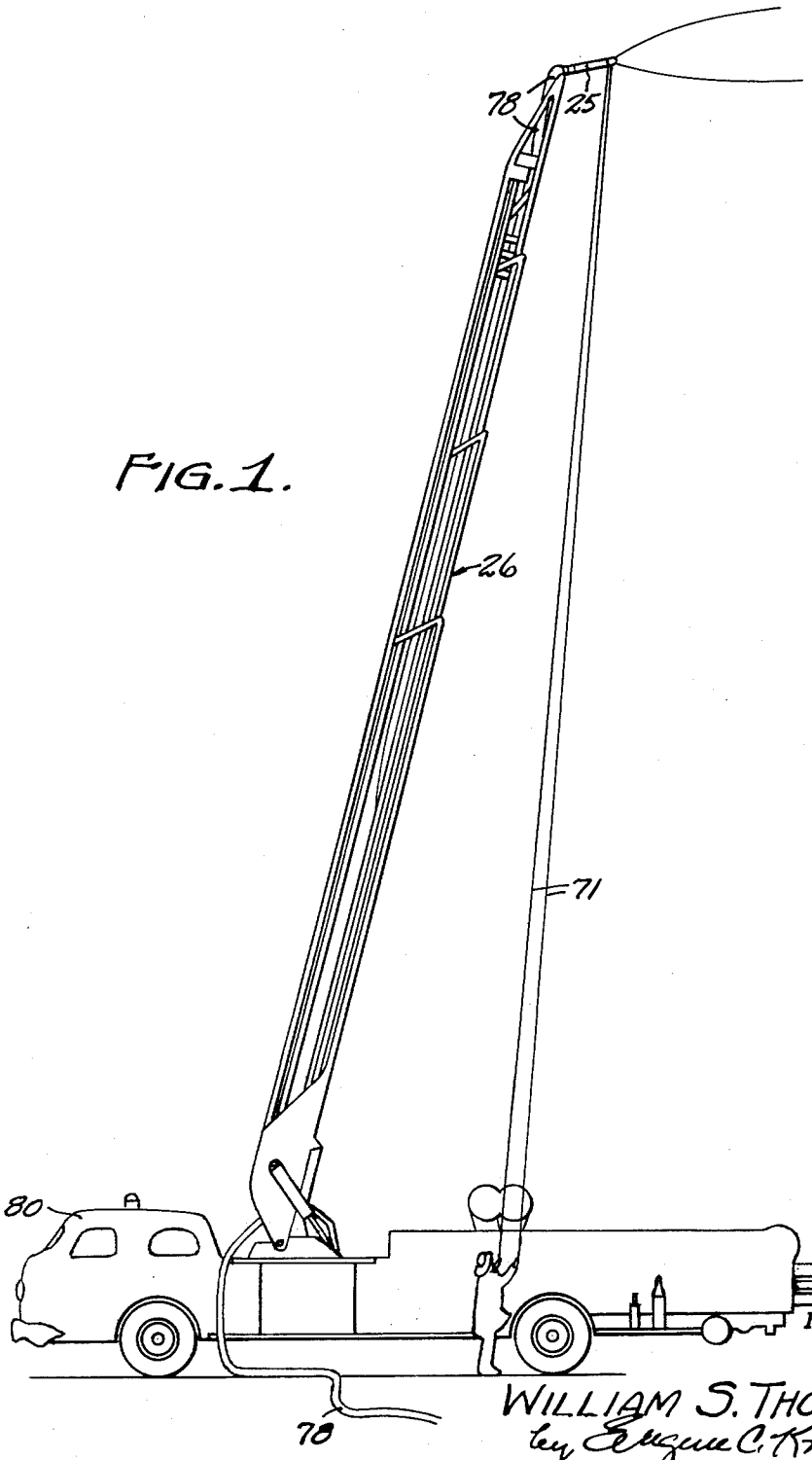
FIG. 1.



INVENTOR.
WILLIAM S. THOMPSON
by Eugene C. Knoblock
ATTORNEY.

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FIG. 2.

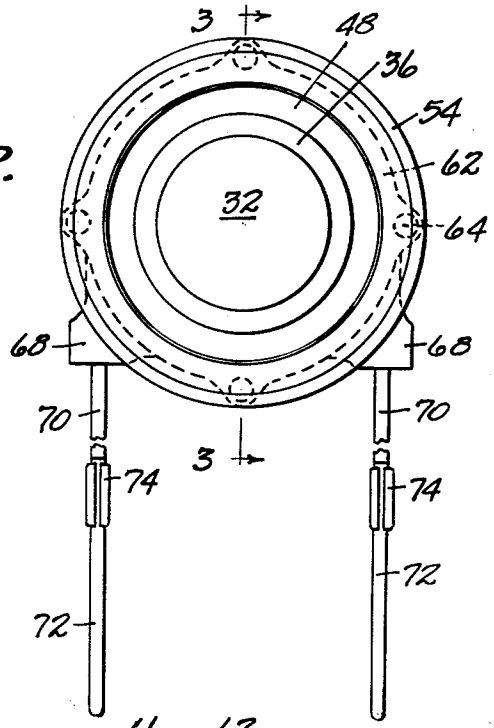
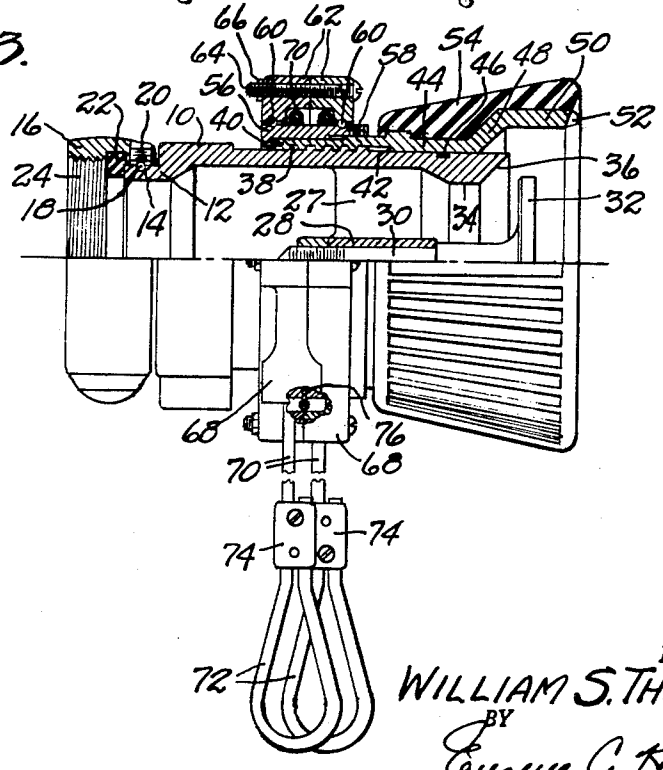


FIG. 3.



INVENTOR.
WILLIAM S. THOMPSON
BY
Eugene C. Knoblock
ATTORNEY.

United States Patent Office 3,206,126 Patented Sept. 14, 1965

3,206,126

REMOTE CONTROL FIRE NOZZLE

William S. Thompson, Elkhart, Ind., assignor to Elkhart Brass Manufacturing Company, Inc., Elkhart, Ind., a corporation of Indiana

Filed Oct. 25, 1963, Ser. No. 318,989
10 Claims. (Cl. 239—285)

This invention relates to improvements in remote control fire nozzles.

Various types of remote controlled fire hose nozzles have been available. Such nozzles include units operable hydraulically, units operable partly hydraulically and partly mechanically, and units which operate electrically. Each of these prior types has certain distinct limitations or disadvantages, such as the requirement for a source of power to operate either a hydraulic motor or an electric motor, and also requires lines extending from the power source to the remotely located nozzle. These requirements introduce elements which are expensive, bulky, heavy in weight, and are subject to difficulty of operation and expensive and time-consuming repair and replacement of parts. Such devices are also subject to limitation of location of use, and particularly must be maintained at a sufficient distance from a fire to insure that parts thereof, such as electric cables and oil conduits or tubing, which are combustible or subject to destruction by high heat, will be safeguarded against such destruction. Still another limiting characteristic of prior remotely operable nozzles has been a time lag or delay in the functioning thereof. Another characteristic peculiar to prior devices has been that the operator was required to assume a predetermined position depending upon the location of the hydraulic control valve in a control unit or the electric switch in an electrically operated unit, and this requirement for assumption of a fixed position by the operator may be detrimental for fire-fighting purposes in some instances, in that the operator cannot freely move as conditions may require, or as may be desirable for changing his view of the fire.

It is the primary object of this invention to provide a device of this character which overcomes the limitations and defects of prior devices, and which is low in cost, light in weight, portable, utilizes a minimum of constituent parts, is trouble-free in operation, and is subject to repair or replacement of parts with ease and rapidity.

A further object is to provide a device of this character which is operable solely manually by manual pull upon a cable which may be grasped at any point upon its length and which is flexible to permit the user to move about without relinquishing control of the nozzle.

A further object is to provide a device of this character which is readily transferred from one type of mount to another in a short time by simply attaching it to a mount and connecting a water hose or conduit thereto, and without requiring the need to handle and manipulate and effect connection of secondary items, such as oil lines and electrical leads, and without need to arrange such secondary items in proper relation to the nozzle mount.

A further object is to provide a device of this character which avoids the use of moving or working parts which are combustible or destructible by heat, so that the nozzle may safely be used at locations in close proximity to a fire and at locations at which it would not be safe to use previous devices.

Other objects will be apparent from the following specification.

In the drawings:

FIG. 1 is a side view illustrating the nozzle mounted upon an aerial support and controlled by an operator standing on the ground;

FIG. 2 is an end view of the device as viewed from the right in FIG. 3;

FIG. 3 is a side view of the device with parts shown in section, taken on line 3—3 of FIG. 2.

Referring to the drawings which illustrate the preferred embodiment of the invention, the numeral **10** designates a tubular body. One end portion **12** of the body is of reduced dimension and preferably has a circumferential groove **14**. One end portion of a swivel ring **16** encircles the reduced body end portion **12** and has an internal circumferential groove registering with the groove **14** and cooperating therewith to receive a plurality of anti-friction elements, such as metal balls **18**. The swivel ring **16** has a threaded opening therein through which the anti-friction members may be introduced into the registering grooves and threaded plug **20** serves to retain said members and may apply pressure thereto for the purpose of limiting the freedom of rotation of the swivel ring relative to the body. The portion of the swivel ring **16** which projects from the end of the body is preferably provided with an internal groove receiving a gasket ring **22**, and the portion thereof outwardly of said gasket ring is internally screw-threaded at **14**. The swivel ring provides means by which the body may be mounted upon a ladder pipe or an extension tube connected with a source of water under pressure and mounted on a support, such as an aerial tower **26**. The arrangement is preferably such that, when the swivel ring is threaded on such ladder pipe or extension tube, the end of that pipe or tube will bear against the gasket **22** to compress the same. This will serve the dual purpose of sealing against leakage between the tube and the nozzle body and of restraining the nozzle body against rotation during usage and adjustment of the nozzle in the manner to be described. It will be understood, however, that the use of a swivel coupling ring is optional and not essential, and that any other means by which the nozzle body may be mounted upon a ladder pipe or extension tube may be utilized.

The body **10** has a spider **27** internally thereof intermediate its ends which supports a concentric tubular member **28**. The tube **28** mounts the stem **30** of a baffle which preferably projects beyond the discharge end of the body and carries a baffle head or disk **32** concentric therewith. The discharge end of the body preferably has a reduced diameter bore portion **34** and terminates at a bevelled or frusto-conical outlet end surface **36**. The disk **32** is concentric with and of a diameter greater than the reduced bore part **34** of the body and is spaced a predetermined distance from the conical outlet end surface **36**.

The body **10** has external screw-threads formed thereon at **38** intermediate its length, and the rear tubular portion **40** of a tip member encircles the body and has internal screw-threads meshing with the screw-threads **38** of the body to control relative longitudinal advance and retraction of the tip with respect to the body upon relative rotation of the tip and the body. The tip includes a reduced intermediate tube part **44** defining an internal shoulder **42** adjacent to but spaced from the internal threads thereof and constituting means to limit longitudinal adjustment of the tip in a rearward direction, that is, toward the left as viewed in FIG. 3. The reduced intermediate tube part **44** has a plain cylindrical bore having a snug rotative fit upon the discharge end portion of the body **10**. The body **10** is interrupted by a circumferential groove adjacent its discharge end within which is seated an annular resilient sealing ring or member, such as an O-ring, which prevents flow of water therepast in a direction from right to left from the discharge end of the body as viewed in FIG. 3. The tip has a flared or conical portion **48**

and terminates in large dimension tubular stream-pattern-defining end portion **50** having substantial clearance with both the discharge end of the body **10** and the baffle disk **32**. The end of the enlarged stream-defining part **50** of the tip is preferably provided with a plurality of radial slots defining longitudinally projecting spaced teeth **52**, which are shown only in FIG. 3. The portions **44**, **48** and **50** of the tip are preferably encircled by a sleeve or bumper **54** in the nature of a ring of rubber or synthetic rubber, such as Neoprene, which is bonded to the tip and preferably terminates at its forward end at a frusto conical surface substantially flush with the base or inner ends of the slots which define the teeth **52**.

The tip carries a drive ring portion **56** at its rear or inner end which may be formed either integrally or separately and which, in the form shown, is a separate part which is anchored at any selected longitudinal position upon the tip by means of one or more set screws **58**, The drive ring **56** has a pair of outer circumferential grooves formed therein adjacent its opposite ends and constituting raceways for receiving a plurality of anti-friction members **60**, such as ball bearings. A pair of complementary slip rings **62** loosely encircled the drive ring **56** and are fixedly secured together by securing means, such as bolts **64**, passing through registering bores in the rings **62**, and nuts **66** threaded on said bolts. Each of the rings **62** has an internal circumferential groove cooperating with the groove of the ring **56** to receive the anti-friction members **60**. Each of the rings **62** is preferably of substantially L-shape in cross-section, as defined by longitudinally spaced portions having different inner diameters or bores. The end portions of the rings having a large diameter bore confront each other and co-operate to define an annular recess surrounding the drive ring **56**. Each of the slip rings **62** has a tubular projection **68** whose bore communicates tangentially with the annular recess within the assembled rings **62**. The projections **68** are located at opposite sides of the assembled ring unit **62** and preferably are displaced approximately forty-five degrees downwardly and outwardly therefrom, as best seen in FIG. 2.

An elongated cable **70** has its central portion entering one of the tubular projections **68** and the interior cavity of the rings **62** and is wound around the drive ring **56** one turn and the major part of a second turn and then passes out through the tubular part **68** of the other ring **62**. The cable **70** is preferably a multiple strand twisted steel flexible cable covered with a synthetic resin, such as a thermal setting resin characterized also by flexibility and having a high melting point. If desired, only the central portion of the cable may be covered with plastic. The cable **70** is of any desired length, depending upon the dimensions of the aerial tower or other support upon which the nozzle is to be mounted, and the length of the cable will preferably be at least the elevation of the nozzle mounting tower. As seen in FIGS. 2 and 3, a short length portion of the cable **70** has its ends bent to form loops **72** held in looped position by suitable clamp means **74** which limit the travel of the cable. At the center point of the cable it is fixedly secured to the drive ring by a pin or other securing means **76**. One or more exterior portions **71** extend from the loops **72** to be gripped by the user.

The nozzle is mounted upon a support which may be of any type found suitable, such as a remotely controlled truck-mounted aerial tower, a remotely controlled aerial platform, an elevated monitor, or a portable low level monitor as of the type adapted to be mounted in a doorway or window opening. In each case the support will be provided with a tube **25** to which a fire hose **78** may be connected leading to a source of water or other fire-fighting liquid under pressure. In FIG. 1 is illustrated an aerial tower **27** mounted upon a vehicle **80** and provided with means of the type well understood in the art by which the position of the tower relative to the truck and the vertical extension of the tower above the truck may be regulated. It will be understood that the tower will normally be positioned substantially horizontally for transport so that the fire hose **78** may be connected to the tube **25**, and the nozzle may be connected to the tube **25** before the tower **27** is elevated, thus requiring only coordination of the elevation of the tower and the control of the cable **70**, to prevent tangling thereof with other equipment, to condition the apparatus for use after the tower and the vehicle have been manipulated to position the nozzle at the desired fire-fighting location.

The nozzle is of the type whose discharge is controlled or regulated by longitudinal adjustment of the tip and its stream pattern tubular end part **50** relative to the nozzle body **10**. Thus in the adjustment shown in FIG. 3 wherein the stream-pattern-defining stream portion **50** has been projected longitudinally from the body **10** and beyond the baffle disk **32**, a straight stream discharge of maximum trajectory and with hollow center part adjacent to and defined by the baffle disk **32** is produced. Retraction of the tip so that the forward end of the stream-pattern-defining part **50** thereof is adjacent to the forward or discharge end of the nozzle body and to the baffle disk **32**, provides for a fog pattern of discharge of water, sometimes referred to as a wide angle of fog discharge. In this instance it will be apparent that the direction of discharge of the water is determined by the baffle **32** and the conical outlet end surface **36** of the nozzle body. The angle of discharge may be varied by the angle of taper of the surface **36**, as will be apparent. Other patterns of discharge intermediate the wide angle discharge and the straight stream discharge may be secured by advancing the tip to an intermediate position between its maximum projected position, defining the straight stream, and its completely retracted position accommodating the wide angle fog position. It will be apparent that the fixed mounting of the baffle stem **30** and the baffle disk **32** relative to the body provides for a constant rate of flow of water through the nozzle in all adjustments as long as the clearance space between the pattern-defining tube part **50** of the tip and the periphery of the baffle disk **32** is greater than the clearance space between the marginal portion of the baffle disk **32** and the conical body outlet surface **36**.

Adjustment of the pattern of discharge of liquid from the nozzle is effected by rotating the tip relative to the body **10**. This can be accomplished by an operator at a remote location, as by a fireman standing upon the ground and controlling a tower-mounted nozzle, as illustrated in FIG. 1. This control is effected by grasping the opposite free ends of the cable **70** and pulling upon a selected end of the cable. It will be apparent that a pull in one direction will cause the drive ring **56** and the tip tube **40** and the remainder of the tip to rotate in one direction relative to the nozzle body **10** and the slip rings **62**. Such relative rotation of the parts causes the tip tube **40**, which is internally screw-threaded, to traverse the threads **38** of the nozzle body and thus longitudinally advance the stream-defining tube end **50** of the nozzle tip. It will be apparent, therefore, that an operator standing at a remote location, by a simple manipulation of the cable, can control accurately, rapidly and without time lag, the discharge pattern in which liquid is emitted from the nozzle from straight stream through all fog patterns or angles to wide angle fog discharge, as quickly as the operator can pull the remote cable. The fireman can remain a safe distance away from the nozzle and the fire, and is free to move about as required to observe the fire from different angles by reason of the flexibility of the cable.

The mechanical construction of the nozzle is simple, which makes for trouble-free usage of the nozzle, and which also makes possible rapidity of repair of the nozzle

and replacement of parts of the nozzle if that is required. The nozzle does not rely upon a power-actuated mechanism for its adjustment and, consequently, the fireman need not be concerned about protection of electric cables leading to an electric motor or of oil lines leading to a hydraulic motor, during movement of the support to an effective nozzle position or during usage of the nozzle in a zone close to a fire where it is subjected to high temperatures from the fire. Another important consideration of the device is that it is mounted solely upon a tube through which water is supplied thereto, and thus the nozzle can readily be moved from one supporting means to another without sacrifice of utility and without requiring the use of special adapters. Also, it will be apparent that, because of the provision of an elongated flexible cable as the means for adjusting the nozzle, the fireman is given a wide latitude of possible spacing of his position from the nozzle during operation inasmuch as he can grasp the cable at any selected point or points along the length thereof.

While the preferred embodiment of the invention has been illustrated and described, it will be understood that changes in the construction may be made within the scope of the appended claims without departing from the spirit of the invention.

I claim:

1. A remote control fire nozzle comprising
a tubular body having a passage therethrough from inlet to outlet end thereof,
means at the inlet end of the body for removably mounting said body on a water supplying tube,
a baffle mounted at the outlet end of said body and including a concentric disk spaced from the outlet end of said body for laterally deflecting liquid emitted from said outlet,
a tubular member encircling said body and having means connected therewith to translate rotation of said member into longitudinal movement thereof,
a tubular stream-pattern-defining part of said member adapted in projected position thereof to encircle said baffle disk and direct longitudinally the lateral liquid discharge from said body into a straight stream and adapted in a retracted position to be substantially free of the liquid discharge from said body outlet,
an elongated flexible cable having part thereof intermediate its ends wound around said member,
means anchoring said wound cable portion to said member at one part thereof, and
means guiding and retaining said wound cable part.

2. A remote control fire nozzle comprising
a tubular body having a passage therethrough from inlet to outlet ends thereof,
means at the inlet end of the body for removably mounting said body on a water supplying tube,
a baffle mounted at the outlet end of said body and including a concentric disk spaced from the outlet end of said body for laterally deflecting liquid emitted from said outlet,
a tubular member encircling said body and having means connected therewith to translate rotation of said member into longitudinal movement thereof,
a tubular stream-pattern-defining part of said member adapted in projected position thereof to encircle said baffle disk and direct longitudinally the lateral liquid discharge from said body into a straight stream and adapted in a retracted position to be substantially free of the lateral liquid discharge from said body outlet,
an elongated flexible cable having part thereof intermediate its ends wound around said member,
means anchoring said wound cable portion to said member at one point thereof, and
ring means encircling said member and said wound cable portion and rotatable relative to said member, said cable being movable endwise relative to said ring means.

3. A remote control fire nozzle comprising
a tubular body having a passage therethrough from inlet to outlet ends thereof,
means at the inlet end of the body for removably mounting said body on a water supplying tube,
a baffle mounted at the outlet end of said body and including a concentric disk spaced from the outlet end of said body for laterally deflecting liquid emitted from said outlet,
a tubular member encircling said body and having means connected therewith to translate rotation of said member into longitudinal movement thereof,
a tubular stream-pattern-defining part of said member adapted in projected position thereof to encircle said baffle disk and direct longitudinally the lateral liquid discharge from said body into a straight stream and adapted in a retracted position to be substantially free of the lateral liquid discharge from said body outlet,
an elongated flexible cable having part thereof intermediate its ends wound around said member,
means anchoring said wound cable portion to said member at one part thereof,
ring means encircling said member and wound cable portion with clearance, and
anti-friction means journaling said ring means on said member.

4. A remote control fire nozzle comprising
a tubular body having a passage therethrough from inlet to outlet ends thereof,
means at the inlet end of the body for removably mounting said body on a water supplying tube,
a baffle mounted at the outlet end of said body and including a concentric disk spaced from the outlet end of said body for laterally deflecting liquid emitted from said outlet,
a tubular member encircling said body and having means connected therewith to translate rotation of said member into longitudinal movement thereof,
a tubular stream-pattern-defining part of said member adapted in projected position thereof to encircle said baffle disk and direct longitudinally the lateral liquid discharge from said body into a straight stream and adapted in a retracted position to be substantially free of the lateral liquid discharge from said body outlet,
an elongated flexible cable having part thereof intermediate its ends wound around said member,
means anchoring said wound cable portion to said member at one point thereof, and
ring means encircling said member and defining an annular chamber therearound receiving said wound cable portion,
said ring means having spaced tubular portions substantially tangential of said annular chamber for passage of said cable,
said ring means and said member being relatively rotatable.

5. A remote control nozzle comprising
a tubular body having a passage therethrough from inlet to outlet ends thereof,
means at the inlet end of the body for removably mounting said body on a water supplying tube,
a baffle mounted at the outlet end of said body and including a concentric disk spaced from the outlet end of said body for laterally deflecting liquid emitted from said outlet,
a tubular member encircling said body and having means connected therewith to translate rotation of said member into longitudinal movement thereof,
a tubular stream-pattern-defining part of said member adapted in projected position thereof to encircle said baffle disk and direct longitudinally the lateral

liquid discharge from said body into a straight stream and adapted in a retracted position to be substantially free of the lateral liquid discharge from said body outlet,

an elongated flexible cable having part thereof intermediate its ends wound around said member,

means anchoring said wound cable portion to said member at one point thereof,

said member having a circumferentially grooved drive ring portion spaced from said stream-pattern-defining part,

a ring member encircling said drive ring part and having an internal circumferential groove registering with said first groove, and

anti-friction members seating in said grooves,

said ring member confining said wound cable portion with clearance.

6. In a fire hose nozzle having a tubular body,

means detachably and fixedly mounting said body on a support,

a baffle disk mounted concentrically to said body adjacent the discharge end of said body and a stream-pattern-defining member rotatable on said body and having an end portion cooperating with said baffle disk and body discharge end to regulate the stream pattern discharged from said nozzle, the improvement comprising

an elongated flexible cable wound around said pattern-defining member,

means anchoring a part of said cable to said member, and means for confining the wound portion of said cable in operative relation to said member.

7. In a fire hose nozzle having a tubular body, means detachably and fixedly mounting said body on a support, a baffle disk mounted concentrically to said body adjacent the discharge end of said body and a stream-pattern-defining member rotatable on said body and having an end portion cooperating with said baffle disk and body discharge end to regulate the stream-pattern discharged from said nozzle, the improvement comprising

a pair of elongated cable parts,

means securing said cable parts to said member, said cable parts being wound on said member in opposite direction from said cable securing means, whereby a pull on either cable part to unwind the same will rotate said member and wind the other cable part, and

means for confining said wound cable parts.

8. In a fire hose nozzle having a tubular body, means detachably and fixedly mounting said body on a support, a baffle disk mounted concentrically to said body adjacent the discharge end of said body and a stream-pattern-defining member rotatable on said body and having an end portion cooperating with said baffle disk and body discharge end to regulate the stream-pattern discharged from said nozzle, the improvement comprising

a pair of elongated cable parts,

means securing said cable parts to said member, said cable parts being wound on said member in opposite direction from said cable securing means, whereby a pull on either cable part to unwind the same will rotate said member and wind the other cable part, and

a cable-confining ring rotatable on said member and having spaced cable passages therein.

9. In a fire hose nozzle having a tubular body, means detachably and fixedly mounting said body on a support, a baffle disk mounted concentrically to said body adjacent the discharge end of said body and a stream-pattern-defining member rotatable on said body and having an end portion cooperating with said baffle disk and body discharge end to regulate the stream pattern discharged from said nozzle, the improvement comprising

a pair of elongated cable parts,

means securing said cable parts to said member, said cable parts being wound on said member in opposite direction from said cable securing means, whereby a pull on either cable part to unwind the same will rotate said member and wind the other cable part, and

a cable-confining ring rotatable on said member and having spaced cable passages therein,

said ring being formed of two complementary ring parts of L-shape in cross-section secured together to define a ring having a central annular cable-receiving chamber, each ring part having a substantially tangential cable passage therein.

10. In a fire hose nozzle having a tubular body, means detachably and fixedly mounting said body on a support, a baffle disk mounted concentrically to said body adjacent the discharge end of said body and a stream-pattern-defining member rotatable on said body and having an end portion cooperating with said baffle disk and body discharge end to regulate the stream pattern discharged from said nozzle, the improvement comprising

a pair of elongated cable parts,

means securing said cable parts to said member, said cable parts being wound on said member in opposite direction from said cable securing means, whereby a pull on either cable part to unwind the same will rotate said member and wind the other cable part, and

a two-part cable confining ring having a parting plane transverse of its axis, said ring defining an annular chamber, and each ring part having a cable passage communicating with and substantially tangential of said chamber, and bearing interposed between said ring and member to restrain said ring from movement longitudinally of said member.

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EVERETT W. KIRBY, *Primary Examiner.*