Sept. 29, 1970 D. J. SCHMIDT 3,530,526

MECHANISM FOR SURFACE TREATING AN ELONGATED ARTICLE

Filed Dec. 18, 1967 2 Sheets-Sheet 1

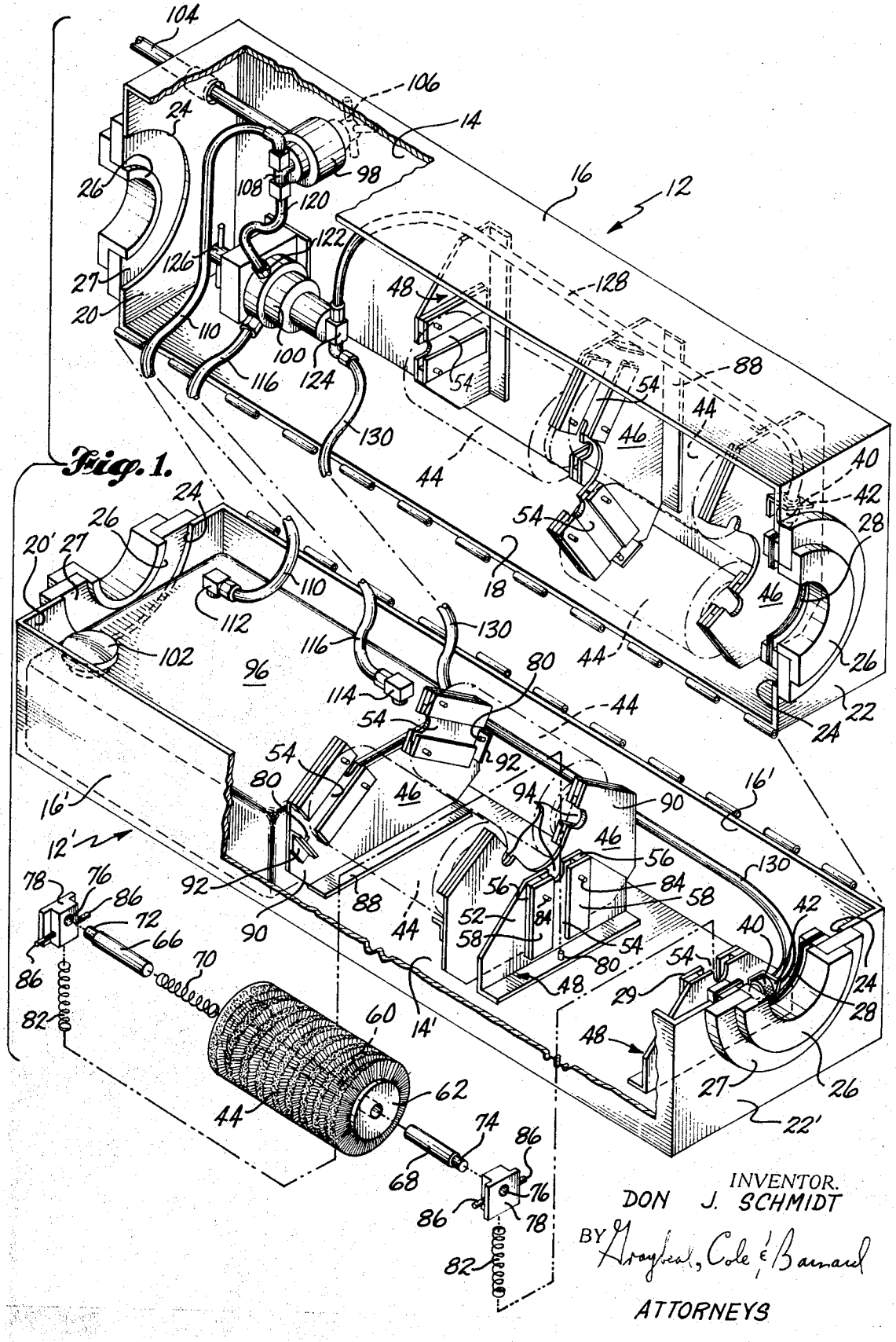


Fig. 1.

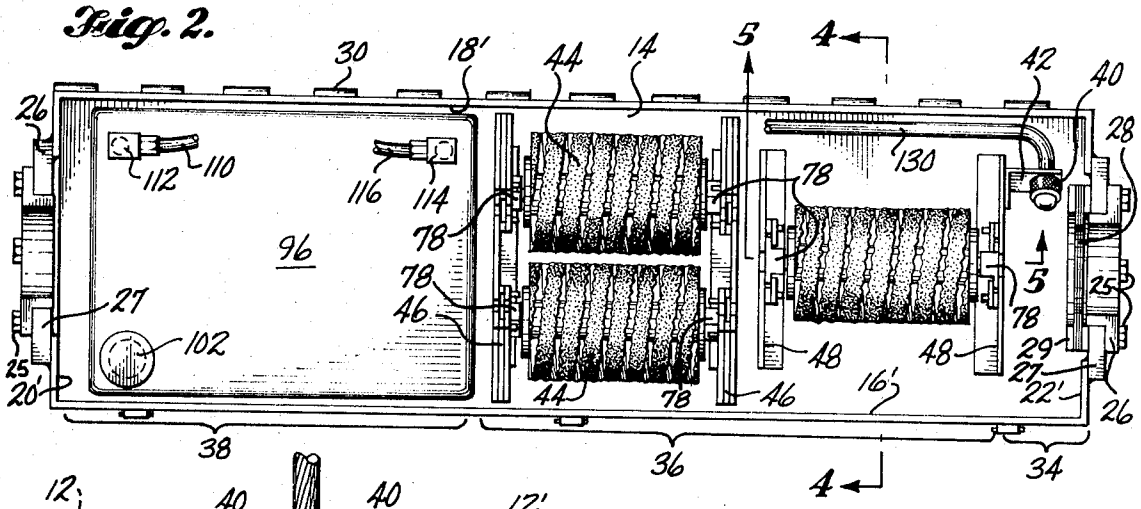
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Fig. 2.



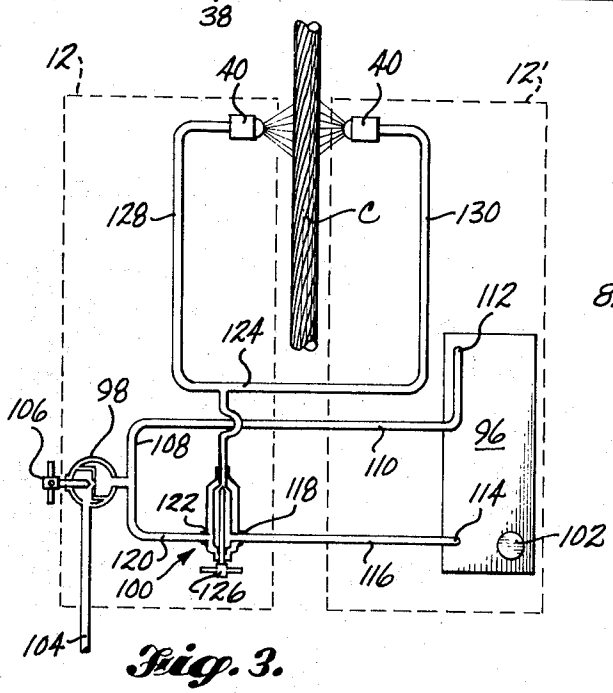
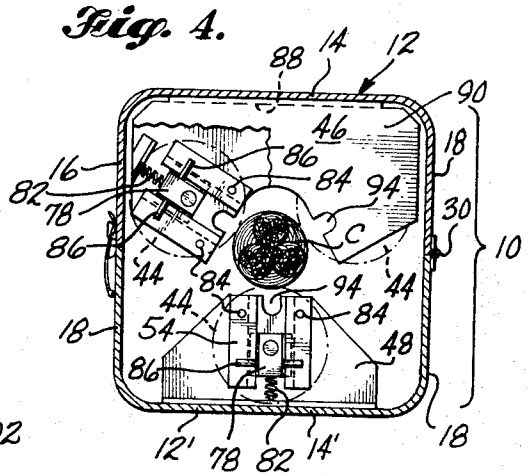


Fig. 3.

Fig. 4.



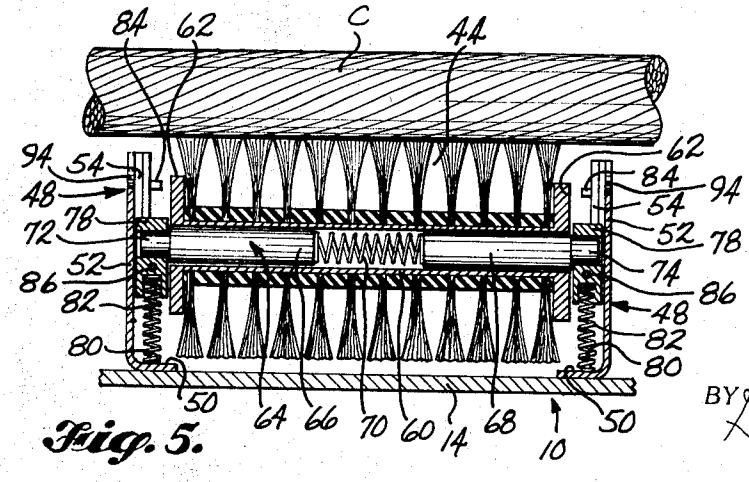


Fig. 5.

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3,530,526

MECHANISM FOR SURFACE TREATING AN ELONGATED ARTICLE

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Int. Cl. A47l 25/00; B05b 13/02
U.S. Cl. 15—302 10 Claims

ABSTRACT OF THE DISCLOSURE

A spraying compartment, a brushing zone, and a fluid system space arranged in series within a two part housing. A pair of two brush mounting brackets separately connected to the full wall of one of the housing parts opposite a pair of single brush brackets separately connected to the full wall of the second housing part. A liquid storage tank in the fluid system space of ore housing part. A fluid mixing device and an air manifold in the fluid system space of the second housing part. A hose delivering compressed air to the manfiold. A flexible tubing delivering some of the compressed air from the manifold into the liquid storage tank. A conduit delivering the remaining compressed air into the mixing device. A flexible tubing delivering pressurized liquid from the storage tank into the mixing device. Flexible tubing delivering the air-liquid mixture from the mixing device to atomizer type nozzles in the spraying compartment.

BACKGROUND OF THE INVENTION

Field of the invention

This invention primarily relates to portable machines for cleaning, lubricating, brushing and/or painting cables, pipes, poles, electrical conduits, and other types of elongated articles. It also relates to apparatus for preparing and spraying metered amounts of a fluid onto such an elongated article.

Description of the prior art

Stevenson U.S. Pat. No. 3,116,811 relates to a portable mechanism for cleaning and lubricating cables and the like. It comprises a two part housing formed by two separable housing sections, each in the nature of a segment of a cylinder. One section occupies a circumferential arc of about three hundred degrees, and the other section occupies an arc of about sixty degrees. The interior of the housing is axially divided into three compartments. Each end compartment contains a group of three brush assemblies spaced equal distances apart about the path of the cable. The center compartment of the larger housing section is in the nature of a liquid storage tank. The compressed gas from a bottle attached to the exterior of the housing is used to pressure feed the lubricant from the center tank, by way of exterior conduits, to a plurality of nozzles located adjacent the leading end of each group of brush assemblies. The nozzles are directed to deliver streams of the liquid lubricant onto one side of the table only.

The Stevenson mechanism proved to be a less than satisfactory cable lubricator. It was found to be extremely difficult to sufficiently wet the surfaces of the cable without delivering an excess of liquid into the brush assembly compartments. Integration of the mounting apparatus for the brush assemblies into the end and intermediate walls of the housing made the mechanism both expensive to manufacture and difficult to service and clean. The use of bottle gas to pressure feed the lubricant made it necessary to frequently shut down the machine for the purpose of changing bottles.

SUMMARY OF THE INVENTION

The elongated article treating machine of the present invention includes some of the features of, but at the same time constitutes a distinct improvement over, the mechanism forming the subject matter of the aforementioned Stevenson U.S. Pat. No. 3,116,811.

Basically, the machine of this invention comprises an elongated housing of split form construction characterized by two substantially identical parts which are securable together about the elongated article, which is movable relatively through the housing. Preferably, each housing part comprises one full side wall, two side wall sections which form full side walls with the side wall sections of the second part, and two end wall sections which form full end walls with the end wall sections of the second part. The side and end wall sections of each part make right angle corners with each other and with the full side wall of the part. The housing both defines an enclosed service space and functions as a frame for supporting the other major components of the machine.

Internally, the housing is axially divided into three distinct zones or stations. The first zone, situated immediately inwardly of the end wall of the housing through which the elongated article enters, is a spraying compartment. It contains a plurality of atomizer type spray nozzles spaced about the path of the elongated article. The spraying compartment is followed by a brushing station containing one or more end-to-end positioned groups of brushes. Preferably, each group of brushes comprises three elongated cylindrical brushes spaced equal distances apart about the path of the elongated article. The brushes are independently mounted for rotation by and between mounting brackets which are separately secured to the full wall portions of the two housing parts. The mounting brackets nearest the entrance end of the housing form the inner boundary of the spraying compartment, and shield the spray patterns from any effects the rotation of the brushes might have on them. The third zone of the housing contains most of the components of the fluid system.

According to the invention, an atomized mist of fluid is sprayed directly onto the elongated article. Preferably, the fluid is a mixture of a compressed air and a liquid. The liquid may be a cleaning solvent, a lubricant, or a paint, depending upon the particular type of treatment being given the elongated article. The apparatus for preparing the fluid comprises a storage tank for the liquid housed in the fluid system zone of one housing part, and a compressed air manifold and air-liquid mixing device housed in the fluid system zone of the other housing part. Compressed air is delivered from a source remote from the housing through a flexible hose to an off-on valve in the housing part containing the manifold and the mixing device. The outlet of the off-on valve is connected to the inlet of the manifold. A flexible hose or tube delivers a portion of the compressed air into the liquid storage tank, and a second hose or tube delivers the rest of the compressed air into the mixing device. Another hose delivers liquid from the storage tank into the mixing device. The effluent of the mixing device is divided into as many paths as there are atomizer nozzles, and flexible hoses or tubes deliver the air-liquid mixture to the nozzles.

The use of flexible hoses or tubing for all interhousing movement of the air, liquid and/or air-liquid mixture permits the two housing parts to be moved together and apart without any interference from the fluid conduits.

Preferably, each group or set of three brushes includes one pair of two-brush brackets and one pair of single-brush brackets. Each bracket comprises a mounting base and a slideway carrying wall. The two-brush brackets carry two radial slideways spaced one hundred and twenty

degrees apart across the bracket, and the single brush brackets carry a single radial slideway. The slideways mount end blocks and each pair of end blocks mount between them a spindle which extends axially through a center passageway in one of the brushes and supports it for free rotation. The end blocks are spring biased inwardly, and in this manner the brushes are resiliently urged against the elongated article.

These and other inherent objects, features, advantages and characteristics of the present invention will be apparent from the following description of typical and therefore nonlimitative embodiments of the invention, as described below in conjunction with the accompany illustrations.

BRIEF DESCRIPTION OF THE DRAWING

In the drawing like element designations refer to like parts, and:

FIG. 1 is an exploded pictorial view of a preferred form of the invention, showing one of the brush assemblies in solid line and itself exploded, in a foreground position, and showing the remaining brush assemblies in phantom, with selected side wall portions of the housing parts cut away for clarity of illustration of certain internal components;

FIG. 2 is a view looking down into the housing part which contains the liquid storage tank;

FIG. 3 is a schematic view showing the fluid distribution system, with the two housing parts being diagrammatically indicated by broken line boundaries;

FIG. 4 is a cross-sectional view taken across the assembled machine, substantially along line **4—4** of FIG. 2; and

FIG. 5 is an axial sectional view of one of the brush assemblies, taken substantially along line **5—5** of FIG. 2.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The illustrated embodiment of the invention comprises a housing or casing **10** which both provides an enclosed work space and serves as a main frame on which the other major components of the machine are mounted. Housing **10** is shown to be longitudinally divided into two parts **12, 12'**, shown to be identical in size and basic form. Each is shown to comprise a full side wall, **14, 14'** onto which the internal parts it contains are mounted, a pair of side wall half sections **16, 18** and **16', 18'**, and a pair of end wall half sections **20, 22** and **20', 22'**.

Each end wall half section **20, 20', 22, 22'** is formed to include a semicircular cutout or recess. A semiannular half collar **24** is affixed to each end wall section **20, 20', 22, 22'** to serve as a mount for a semiannular half section **26** of an annular collet or guide, removably secured in place, such as by bolts **25**. A semiannular seal element **28** of neoprene, rubber, or the like, may be associated with each collet half **26** at the end of the housing **10** through which the elongated article to be treated enters for its passageway relatively through the housing **10**. Semiannular retainer plates **27** may be positioned inwardly of the seal elements **28**, with bolts (not shown) being used to secure both the plates **27** and the seal elements **28** to the mounts **24**.

As shown by FIGS. 1 and 4, the housing parts **12, 12'** may be hinged together along one side by a hinge **30**, and be provided with snap type fasteners **32**, or the like, where they come together at the opposite side. As will hereinafter be described in greater detail, a longitudinal central passageway for a cable or other elongated article is formed within the housing between the two end guides or collets.

Referring now to FIG. 2, the interior of the housing **10** is divided into three zones or stations arranged in series. The first zone is a spraying compartment **34** located immediately inwardly of the inlet collet; the next succeeding station is a brushing station **36**; and the third station **38** houses the major components of the fluid system.

The spraying compartment **34** is bounded on its sides by the four walls of the housing **10**, at its entrance end by the entrance wall **20, 20'** of the housing **10**, and at its opposite end by wall-like portions of the first two brush assembly mounting brackets, which brackets will hereinafter be described in greater detail.

At least one, but preferably two or more, atomizer type spray nozzles are located in the spraying compartment **34**, and are directed to each deliver a divergent spray of fluid radially inwardly towards the path the elongated article takes through the housing **10**. Preferably, enough spray nozzles **40** are provided, and are suitably spaced about the path of the elongated article, so that substantially all surface portions of the elongated article are wetted by the fluid. In FIGS. 1 and 2 the nozzles **40** are shown supported by a simple little bracket **42** secured to the brush assembly mounting brackets bounding the compartment **34**.

By way of typical and therefore nonlimitative example, the brushing station **36** is shown to comprise two groups of brushes in series within the housing **10**. Each group of brushes includes a set of three cylindrical brushes **44**, and means for mounting them equal distances apart about the path of the elongated article.

According to the invention, each group of brushes **44** includes a first pair of mounting brackets **44** secured to the full side wall **14** of one of the housing parts, and adapted to mount two of the brushes **44**, and a second pair of mounting brackets **48** secured to the side wall **14** of the other housing part, directly opposite the brackets **46**, and adapted to mount only a single brush **44**.

Each mounting bracket **48** includes a base flange **50** and an upstanding carrier wall **52** directed substantially ninety degrees apart. A single slideway **54** is provided on the mounting flange side of the wall **52**. The slideway **54** may be formed by a pair of spacer blocks **56** spaced apart in parallelism and are secured to the mounting flange side of the wall **52**. Wider retaining plates **58** are in turn secured to the spacer blocks **56**, with the width differential thereof projecting inwardly of the inner boundaries of the blocks **56**, to provide a pair of retaining lips separated by an access throat which is narrower than the distance between the spacer blocks **56**.

As best shown by FIGS. 1 and 5, each brush **44** includes a hub having a tubular central portion **60** and flanged ends **62**, giving it the general form of a spool. The bristles of the brush project radially outwardly from a tubular base surrounding the central portion **60**. The brush **44** is supported for free rotation by a nonrotating sectional spindle **64**. Spindle **64** may comprise two end sections **66, 68** insertable into the central passageway of the hub **60** spring loaded axially outwardly by a compression spring **70**. Spindle parts **66, 68** have reduced diameter outer end portions **72, 74** which are fittable into openings **76** formed in mounting blocks **78**. The mounting blocks **78** are generally T-shaped in cross section and are sized to be snugly but slidably receivable in the slideways **54**. As perhaps best shown by FIG. 1, a pin **80** is secured to the mounting flange **48** at the outer end of the slideway **54**, and serves to anchor the outer end of a compression spring **82**. The inner end of spring **82** is received in a socket formed in the outer end portion of the end block **78** (FIG. 5).

The springs **82** bias the support shafts **64**, and the cylindrical brushes **44** carried thereby, radially inwardly of the housing towards the path of the elongated article. Stop means are provided for limiting travel of the end blocks **78**, so that they are not urged completely out from the slideways **54**. The stop means may simply comprise pins **84** secured to the retainer plates **58** at inner end locations closely bordering the access throat defined between the plates **58**, to be contacted by cross pins **86** carried by the end blocks **78**.

Mounting brackets **46** are each provided with two slideways **54** oriented one hundred and twenty degrees, and each directed radially inwardly towards the path of the elongated article. Each slideway **54** is also angularly spaced one hundred and twenty degrees about the elongated article path from the slideway **54** of the corresponding single brush bracket **48**. Each bracket **46** also includes a mounting flange **88** and a carrier wall **90** to which the various components which make up the slideways **54** are secured. The carrier walls **90** also carry a small bracket **92** at the outer end of each slideway **54**, serving as a support for both the spring retaining pin **80** and the spring **82** itself.

As best shown by FIG. 4, each wall **90** is cut away between the inner ends of the slideways **54** to provide clearance for the elongated article. Also, generally semicircular recesses **94** are formed in the support walls **52**, **90** right at the inner end of each slideway **54**. The recesses **94** provide clearance for a tool insertable through the openings **76** in the end blocks **78**, for the purpose of pushing the reduced diameter end portions **74** of the support shaft part **66** or **68** out of the opening **76**, permitting removal of the brush **44**.

In an embodiment of the illustrated type, comprising a plurality of end-to-end related groups of brushes **44**, the relative placement of the single and two brush brackets **46**, **48** is reversed from one group to the next. In other words, the two-brush brackets **46** for the first group of brushes **44** and the single brush brackets **48** for the second group of brushes **44** are located in end-to-end relationship on the full wall **14** of housing parts (e.g. part **12**), and the single brush brackets for the first group of brushes **44** and the two brush brackets for the second group of brushes **44** are end-to-end related on the full side wall **14** of the second housing part (**12'**). As best shown by FIG. 1, this arrangement results in a circumferential spacing of the recesses **94** and facilitates removal of the brushes **44**.

The fluid system compartment houses a liquid storage tank or reservoir **96**, for a liquid lubricant, cleaner or paint, for example, a variable orifice valve **98**; an air manifold; a mixing device **100**; and most of the fluid supply and distribution conduits.

The reservoir or storage tank **96** is shown to be completely contained within the fluid system storage space of housing part **12'**. It includes a fill opening provided with a suitable cap or closure **102**. The variable orifice valve **98** and the mixing device **100** are located within the fluid system storage space of the other housing part **12**.

Referring to FIG. 3, in which the housing parts **12**, **12'** are indicated by broken boundary lines, a compressed air supply conduit or hose **104** is shown leading into housing part **12** to the inlet of the valve **98**. Preferably the control handle **106** of the valve **98** is located to be accessible from the outside of the housing part **12**, possibly within a well formed in the side wall **14** of the housing part **12**. The outlet of valve **98** is connected to a manifold or flow divider **108** which may be no more than a T fitting. A first portion of the compressed air flows from the manifold **108** through a flexible hose **110**, over into housing part **12'** and is connected to an inlet fitting **112** leading into the storage tank **96**. The storage tank **96** is also provided with an outlet fitting **114**. A liquid delivery hose **116** extends from the outlet fitting **114** back over into housing part **12** to a liquid inlet **118** of the mixing device **100**. A branch conduit **120** delivers the remaining compressed air from the second side of the manifold **108** to a compressed air inlet **122** of the mixing device **100**.

As schematically shown by FIG. 3, the mixing device **100** may comprise a central tubular passageway or chamber into which the compressed air inlet **122** extends. The outlets of these passageways are concentrically related and both discharge into a manifold or flow divider **124** which also may be nothing more than a T fitting. Preferably, the liquid passageway of the mixing device **100** is provided with a needle valve **126** for controlling the flow of liquid at that point independently of the flow of air. The system that is diagrammatically illustrated by FIG. 3 includes only two atomizer type of spray nozzles **40** positioned on opposite sides of the elongated article, shown in the diagram to be in the form of a cable or wire rope C. A first conduit **128** leads from one side of the manifold **124** to the atomizer nozzle **40** located within housing part **12**. A second conduit, in the form of a flexible tube or hose **130**, extends from the second side of the manifold **124** over the second housing part **12'** and then to the atomizer nozzle **40** located in it. The use of flexible hoses or tubing for the branch conduit **110**, **116** and **130** which extend from one of the housing parts **12**, **12'** over to the other permits the manipulation of the housing part **12**, **12'** that is necessary during installation and removal of the machine onto and off from the elongated article, without interference from the conduits from the conduits which extend from within one part to within the second part.

At least one hauling eye (not shown) may be secured to an end of the housing **10**, to which can be tied a hauling lanyard by means of which the machine can be moved along the elongated article being treated. Alternatively, the machine may be stand mounted, in a horizontal position, for example, and advantageously used in that manner, with the elongated article to be treated being moved relatively through it. This type of operation is particularly suitable for use by salvage companies which collect used cables, for example, and bring them to their yards for reconditioning prior to resale.

The term "brush" is used herein to describe wire brushes, all types of bristle brushes, synthetic or natural material type rollers, and any other type of rotating members adapted to hold and spread or apply a liquid. The term "liquid" is meant to include slurries and thixotropic materials. The term "paint" is used in a general sense to describe all types of film leaving coatings used for decorative and/or protective purposes.

What is claimed is:

1. Mechanism for surface treating an elongated article, comprising:

a two part housing assemblable about the elongated article, said housing including spaced apart end walls having aligned openings therein for passing the elongated article, as it is moved relatively through said housing for treatment, and side wall means interconnecting said end walls;

a brushing station in said housing comprising rotary brush means resiliently urged into contact with the elongated article and transverse mounting wall means for said rotary brush means spaced axially inwardly from the end wall through which the elongated article enters into the housing;

a spraying compartment in said housing defined by and axially between the mounting wall means and the end wall through which the elongated article enters;

spray nozzle means in said spraying compartment for spraying a metered mist of fluid onto the elongated article before it is contacted by said brush means; and

means for delivering a metered amount of fluid to said nozzle means.

2. Mechanism according to claim **1**, wherein said means for delivering a metered amount of fluid to the nozzle means includes means for independently metering a liquid and air and means for mixing the metered liquid and air.

3. Mechanism according to claim **1**, comprising a liquid storage tank in said housing, means for delivering compressed air into said liquid storage tank to pressurize the liquid therein, a mixing device, conduit means for delivering the pressurized liquid from said storage tank into said mixing device, conduit means for delivering additional

air into said mixing device, for admixture with said liquid, and conduit means for delivering the effluent of said mixing device to said spray nozzle means.

4. Mechanism according to claim 1, comprising a mist forming zone in said housing between said brushing station and the end wall through which the elongated article leaves the housing, said mist forming zone including a liquid storage tank, manifold means for receiving compressed air from a source outside of, and remote from, said housing, a branch conduit for delivering some of said compressed air from said manifold into said liquid storage tank to pressurize the liquid therein, a mixing device, branch conduit means for delivering the remainder of said compressed air from said manifold into said mixing device, conduit means for delivering the pressurized liquid from said storage tank into said mixing device, and conduit means for delivering the effluent of said mixing device from the mist forming zone and through the brushing station to said spray nozzle means.

5. Mechanism according to claim 4, comprising a metering valve in the conduit means for delivering the pressurized liquid from the storage chamber into the mixing device.

6. Mechanism according to claim 1, wherein said spray nozzle means comprises plural atomizer type spray nozzles spaced about the path of the elongated article, and each adapted to deliver a divergent spray of the mist onto the elongated article, and together substantially wetting all surface portions of the elongated article.

7. Mechanism for surface treating an elongated article, comprising:

a two part housing assemblable about the elongated article, said housing including spaced apart end walls having aligned openings therein for receiving the elongated article as it is moved relatively through said housing for treatment, and side wall means interconnecting said end walls;

plural spray nozzles in said housing spaced about the path of the elongated article and directed to discharge radially inwardly towards such article, said spray nozzles being atomizers spaced about the path of the elongated article, and each being adapted to deliver a spray of a liquid-air mixture, in the form of a mist, onto the elongated article;

a liquid storage tank in said housing, said tank being connected to a first one of said housing parts, and said tank having an inlet and an outlet;

a source of compressed air remote from the housing;

manifold means inside said housing connected to the second housing part;

conduit means for delivering compressed air from said source to said manifold means, including a flexible hose leading from the compressed air source to the housing;

a flexible branch conduit in said housing connected between the manifold and the liquid storage tank, for delivering some of the compressed air from the manifold into the liquid storage tank;

a mixing device in said housing connected to the second housing part, said mixing device having a liquid path and an air path discharging together and valve means in said liquid path permitting adjustment of the liquid flow;

a branch conduit connected between the manifold and the air path of the mixing device, for delivering the remainder of the compressed air from said manifold into said mixing device;

flexible conduit means inside said housing connected between the outlet of the liquid storage tank and the liquid path of the mixing device, with the compressed air that is introduced into the storage tank force feeding the liquid through such conduit means to the mixing device;

conduit means interconnected between the mixing device and the spray nozzles, for delivering a portion of an air-liquid mixture from the mixing device to each of the spray nozzles; and

with all flexible conduits spanning between the two housing parts being long enough to permit opening of the housing without having to disconnect said flexible conduits.

8. Mechanism for surface treating an elnogated article, comprising:

a two part housing assemblable about the elongated article, with each housing part including a full side wall that is parallel to both a path for the elongated article through the housing and the full side wall of the other housing part, two side sections which form full side walls with the side wall sections of the other housing part, and two end wall sections which form full end wall sections of the other housing part; and

at least one group of brushes in said housing spaced axially inwardly of the end walls of the housing and each comprising a pair of two-brush mounting brackets in one of said housing parts, each including a mounting base independently secured to the full side wall of the housing part and a perpendicular carrier wall in opposed parallelism with the carrier wall of the other two-brush mounting bracket, and a pair of single brush mounting brackets in the second housin part, each comprising a mounting base independently secured to the full side wall of such part and a perpendicular carrier wall in opposed parallelism with the carrier wall of the other single brush mounting bracket, and in coplanar parallelism with the carrier wall of one of the two-brush mounting brackets, and two elongated rotary brushes mounted by and between the pair of two-brush brackets, and a single elongated rotary brush mounted by and between the pair of single brush brackets.

9. Mechanism according to claim 8, wherein a pair of radial slideways are formed on the inner side wall of each two-brush mounting bracket, substantially one hundred and twenty degrees apart, a single radial slideway is formed on the inner wall of each single brush mounting bracket, a slide block is positioned in each slideway, a spindle is connected between the slide blocks of opposed slideways, a related one of said brushes is supported for rotation by the spindle, and each slide block is backed by a compression spring, with the springs serving to bias the end blocks, the spindles and the brushes towards the path of the elongated article.

10. Mechanism for surface treating an elongated article, comprising:

a two part housing assemblable about the elongated article, said housing including spaced apart end walls having aligned openings therein for passing the elongated article, as it is moved relatively through said housing for treatment, and side wall means interconnecting said end walls;

a spraying compartment in said housing immediately inwardly of the end wall through which the elongated article enters into the housing;

a brushing station in said housing immediately inwardly of said spraying compartment, comprising rotary brush means resiliently urged into contact with the elongated article;

spray nozzle means in said spraying compartment for spraying a metered mist of fluid onto the elongated article before it is contacted by said brush means; and

a mist forming zone in said housing between said brushing station and the end wall through which the elongated article leaves the housing, said mist forming zone including a liquid storage tank located in one of said parts, manifold means for receiving compressed air from a source outside of, and remote from, said housing, a branch conduit for delivering

some of said compressed air from said manifold into said liquid storage tank to pressurize the liquid therein, a mixing device, said manifold means and said mixing device being located in the other housing part, branch conduit means for delivering the remainder of said compressed air from said manifold into said mixing device, conduit means for delivering the pressurized liquid from said storage tank into said mixing device, and conduit means for delivering the effluent of said mixing device to said spray nozzle means, with at least the branch conduit means for delivering compressed air from manifold means into the liquid storage tank, and the conduit means

for delivering pressurized liquid from said tank to said mixing device, being flexible hoses.

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U.S. Cl. X.R.

15—88; 118—325