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2,901,867

PRECISION VAPOR OR SAND BLASTING MACHINES

Filed Oct. 17, 1957

2 Sheets-Sheet 1

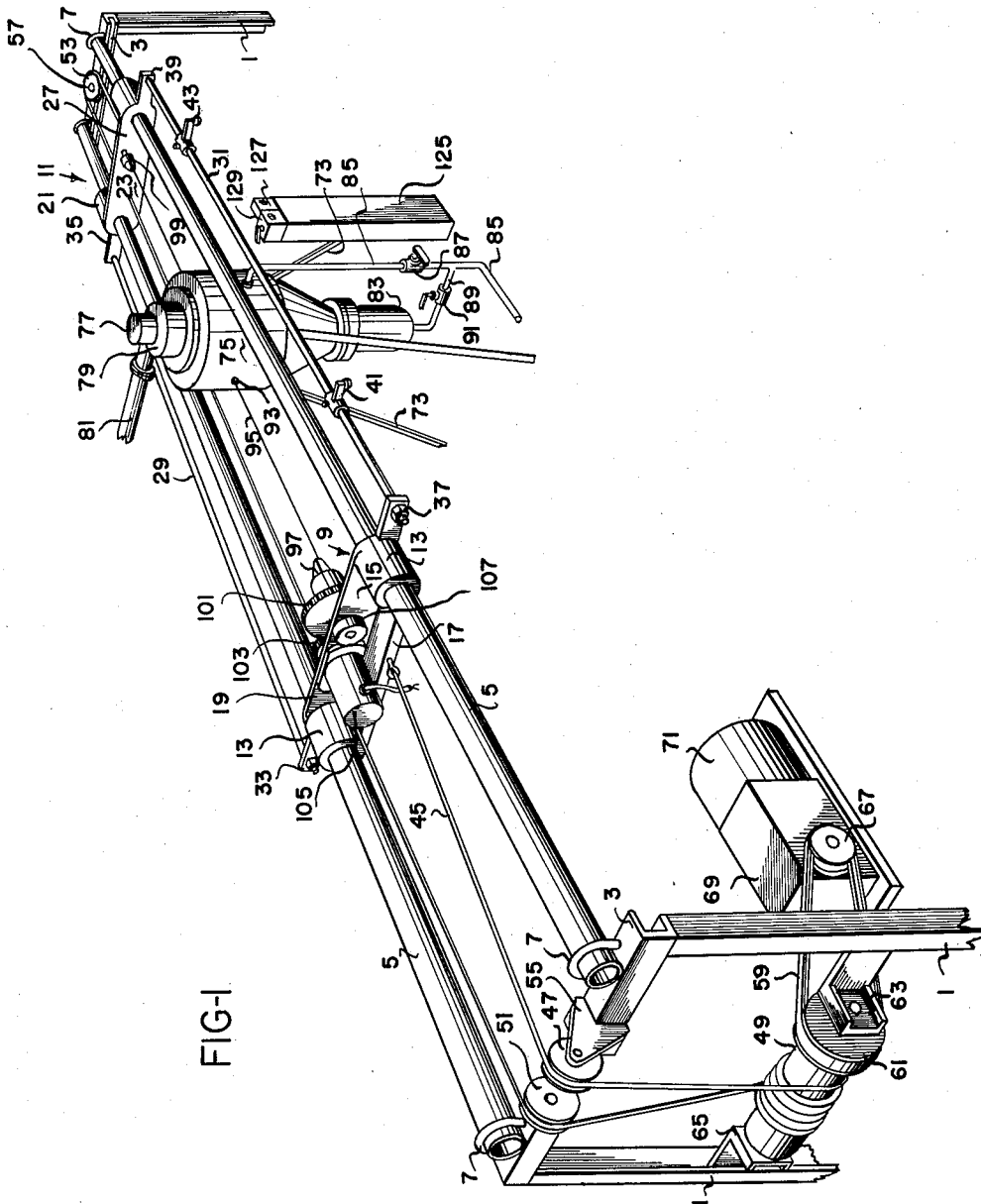


FIG-1

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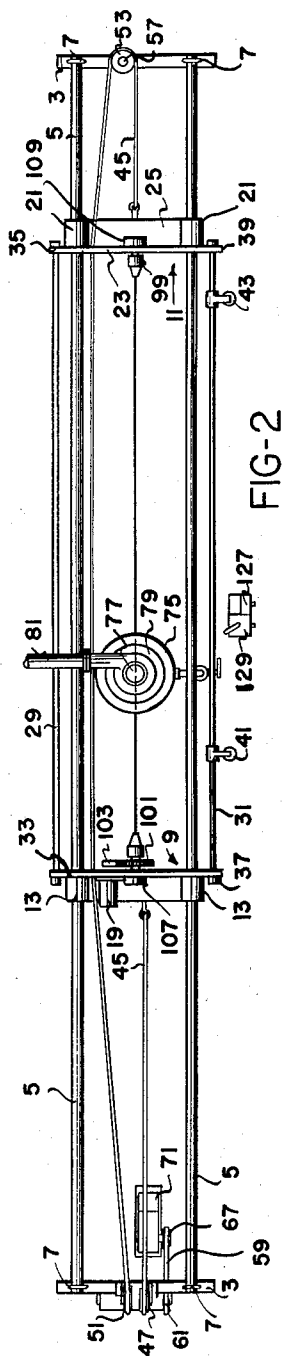


FIG-2

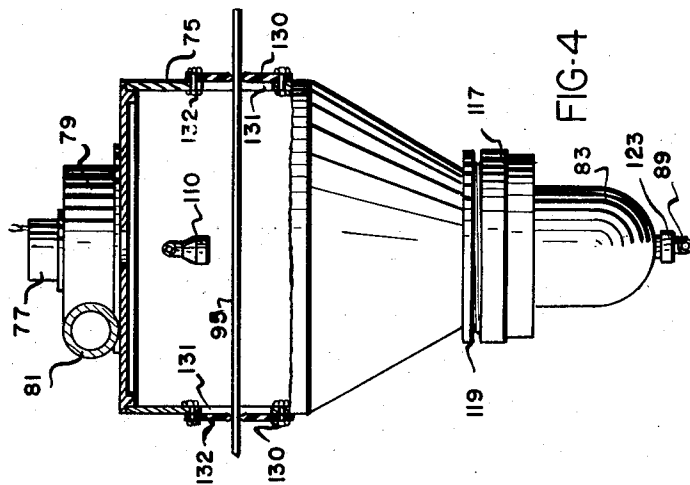


FIG-4

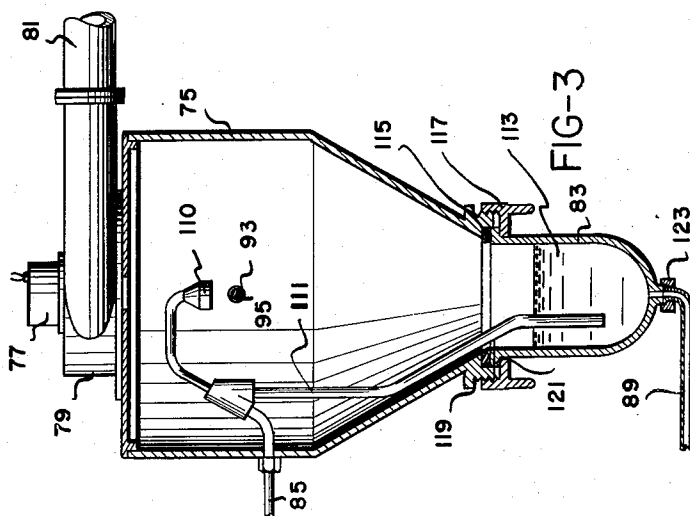


FIG-3

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PRECISION VAPOR OR SAND BLASTING MACHINES

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3 Claims. (Cl. 51—15)

This invention relates to the treatment of surfaces, particularly to surfaces of cylindrical shaped objects; more particularly the invention relates to an apparatus and method for the blasting of cylindrical surfaces to clean or roughen the same.

In certain applications where wire, for example, is to be coated with metal it is frequently desirable to initially clean the wire surface prior to the deposition of the metallic coating. In some instances elongated elements, such as insulated wire, are to be plated with metal deposited, for example, from a thermal decomposable metal bearing compound, and to insure adhesion of the deposited coating it is preferable to initially roughen the insulation surrounding the elongated element.

It is an object of this invention to provide a novel method for treating surfaces, such as resin insulated wire, in order to roughen the same without penetrating the insulation to any material extent.

In the practice of this invention a very fine abrasive material, sufficiently fine to be readily suspended in a liquid, is utilized. Such abrasive may be of a 3,000 to 5,000 grit, whereas normal sand-blasting procedures utilize a grit of only about 500. The utilization of the very fine particles, in addition to providing a very uniform treatment of the surface, affects the surface very slightly.

In order to provide for uniformity the elongated elements treated in accordance with this invention are rotated while being passed longitudinally through a housing, in which the element is subjected to the action of a blast, comprising an abrasive containing spray formed from a suspension of the abrasive in liquid.

Accordingly an important object of the invention is to provide a novel apparatus for the practice of the invention.

A further object of the invention is to provide an apparatus arrangement which inhibits vibration of the elongated elements while the same are undergoing treatment with the spray of abrasive material.

The invention will be more fully understood by reference to the following detailed description and accompanying drawings wherein:

Figure 1 is a perspective view of the apparatus of invention;

Figure 2 is a plan view of the apparatus of Figure 1;

Figure 3 is a fragmentary view, enlarged and partially in section, of a housing wherein the elongated elements are subjected to the action of the blast containing the abrasive material; and

Figure 4 is an elevational view of a housing similar to the housing of Figure 3 but illustrating a further modification of the housing.

Referring now to the drawings, and particularly Figure 1, the numeral 1 designates vertically extending support members in the form of angle irons. Channel members 3 are disposed across opposed pairs of the members 1 and are welded thereto.

A pair of tubular cylindrical rods 5 extend in parallel relation between the channel members 3 and are secured

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to the latter by brackets 7. These rods 5 form ways or guides for a pair of slides designated at 9, 11. The slide 9 comprises elongated cylindrical bearing elements 13, between which there extends a transverse angle member 15 having a horizontal portion 17 and an upstanding portion 19. The slide 11 is similarly provided with elongated cylindrical bearing elements 21, a transverse angle member 23 having a horizontal portion 25, and an upstanding portion 27.

Rigid rods 29, 31 extend between the slides and secure the slides together for movement as a unit in one rectilinear direction. Rod 29 is bolted between ears 33, 35 of the slides, while rod 31 is bolted between rods 37, 39 carried by the slides.

Rod 31 itself carries limit switch actuators designated at 41, 43. The cable 45 extends continuously from the horizontal portion 17 of the slide 9, about pulley 47, drum 49, pulley 51, through the slides 9, 11, over the pulley 53, and is secured at its other end (Figure 2) to the horizontal portion 25 on slide 11.

A bracket 55 mounted on the channel member 3 supports the pulley 47 while a pin 57 in the other channel member 3 mounts the pulley 53. A belt 59 passes over a pulley 61 mounted on a bracket 63 supported from a vertical member 1. A similar bracket 65 supports the other end of the drum 49, as shown in Figure 1. Belt 59 also passes over the pulley 67 mounted on a shaft of the gear reduction unit 69 driven by the motor 71. Motor 71 is reversible and operation of the motor is effective to move the slides rectilinearly in either direction, as desired.

Supports 73 of any suitable kind brace a housing 75, which, as shown in Figure 1, is positioned between the parallel tubular members 5 and also between the slides 9, 11. Housing 75, at its upper end, is provided with a motor 77 and a blower 79 for exhausting the interior of the housing through the conduit 81.

Secured to the lower end of the housing is a bowl 83. Air pressure is supplied through line 85 from valve 87 to the interior of the housing 75; air pressure is also supplied through line 85, line 89 and valve 91 to the bottom of the bowl 83.

The housing 75 has apertures 93 therethrough, one of which is shown in Figure 1, and through which there passes an insulated wire 95. In the present instance the wire 95 may be considered as copper wire coated with a thin film of resin, such as Formvar, for example. One end of this wire 95 is secured in a Jacobs chuck 97, while the opposite end of the wire is secured in another chuck 99 carried by the slide 11. The chuck 97 is itself mounted on a shaft with a relatively large gear 101, which is driven from a gear 103 mounted on the drive shaft of an electric motor 105. Operation of motor 105 is effective to rotate the wire 95 even while the wire is being transferred through the housing 75 by operation of the motor 71.

A pin 107 on the upstanding portion 19 of the slide 9 provides for support of the gear 101, while a tensioning nut 109 mounted on the upstanding portion 27 of the slide 11 provides for the maintaining of tension on the wire 95.

Referring now to Figure 3, the conduit 85 extends inwardly of the housing and terminates in a nozzle 110, which is itself mounted above the aperture 93 to provide for the passage of the wire 95 through the housing. Communicating with the conduit 85 internally of the housing is a conduit 111 which extends downwardly into a pool 113, comprising a suspension of abrasive material in water.

As may be most clearly seen from Figure 3 the bowl 83, which retains the pool 113, is provided with a peripheral lip 115 against which a clamping ring 117 is provided for support of the bowl. The clamping ring 117

threadedly engages a lower portion 119 of the housing and compresses a gasket 121 between the housing and bowl. Thus the bowl is resiliently mounted against shock and is provided for easy removal from the housing. To further facilitate removal of the bowl from the housing a coupling 123 is provided to secure the conduit 89 to the bowl 83.

Referring now again to Figure 1, the numeral 125 designates a support for switches 127, 129; switch 129 being engageable by the limit switch actuators 41, 43 when the device is in operation. In this connection it is to be noted that only one limit switch actuator is necessary for the operation of the device since the wire may be transferred from one end to the other. However, both the limit switch actuators will be employed if the machine were operated in such manner that the initial blasting operation were commenced with the housing 75 intermediate the distance between the two sides. Similarly both switches may be employed if it is desired to reverse the wire direction automatically and to pass it through the housing a number of times, that is to oscillate the wire through the housing past the nozzle.

Referring now to the mode of operation of the device, it is preferable to initially charge the bowl 83 with approximately one quart of water and an initial volume of abrasive material of about 5000 grit. The abrasive material may be, for example, a Pangbornite abrasive, which is a very fine powder. This powder is mixed with the water by any suitable mechanical means, such as a manually operated or a motor operated stirrer.

If desired, to aid suspension, a small amount of a suspension agent, such as Pangborn "Sure-Flo" may be provided, one thimble full per quart of water is sufficient. Such is generally employed only if the abrasive containing suspension is to stand for any length of time.

After placing the suspension in the bowl the clamping ring 117 is mounted onto the threads at 115, as already described, and conduit 89 is connected to the bowl. Valves 87, 91 are at this time closed; however, conduit 81 is open to exhaust. Valve 91 is then open to admit of a slow release of air into the mixing bowl 83. This occasions a constant bubbling which is desirable to keep the suspension uniform. In this connection it is to be noted that where the device is used on intermittent operation, it is generally desirable to maintain the valve 91 slightly open to provide a continuous agitation of the suspension.

The elongated element, such as the resin coated wire, is then passed through the apertures of the housing and is retained in place at each end by the Jacobs chucks 97, 99, the wire being tightened by tensioning nut 109 (Figure 2). Switch 129 is then employed to position the slides such that one slide approaches the housing 75 to within a distance of about 8-10 inches, as indicated in Figure 2.

Switch 129 is then de-energized and the rotation motor switch 127 is then energized to cause rotation of the elongated element 95. Switch 129 is then again energized to occasion longitudinal movement of the slides in the rightwardly direction shown in Figure 2. At this time valve 87 is opened and the flow of air through the line 85 towards the nozzle 110 causes the liquid suspension to be drawn through the conduit 111 to the nozzle.

Thus the combination of conduits 85, 111 functions as an aspirator to provide the spray of suspension material at the nozzle. The flow of compressed air blasts the spray of suspension material against the wire 95, traversing the housing 75, and since the wire is being rotated as well as moving longitudinally, the resin coat of the wire is uniformly roughened.

Normally the slides are moved such that the slide 11 approaches the housing 75 (Figure 2) to within about 8-10 inches. At this time the limit switch actuator 43 engages the switch 109 and cuts off the motor 71. The rotation motor switch 127 is then cut off manually.

Thereafter the longitudinal motor switch 129 is again actuated, preferably manually, to run the slides sufficiently far from the housing to permit the operator to manipulate the Jacobs chuck 99; releasing the tension nut 109 and the chuck 99 frees the elongated element 95 at one end and the opposite end of the element may be withdrawn from the chuck 97.

Referring now to Figure 4, there is illustrated an arrangement of hand holes in the housing 75 and through which the wire 95 passes in sealed relation. Sealing is effected by flexible components of rubber, rubberized fabric or similar materials 130 which cover the ports 131. Bolt and nut combinations or rivets as at 132 retain the flexible components positioned while the components seal against the wire 95. Also the materials 130 serve as dampening media for they tend to dampen vibration in the elongated element undergoing the treatment.

The structure and mode of operation described are particularly applicable to the blasting with very fine powders capable of suspension in a liquid which is itself subject to formation into a spray.

It will be understood that this invention is susceptible to modification in order to adapt it to different usages and conditions and accordingly, it is desired to comprehend such modifications within this invention as may fall within the scope of the appended claims.

What is claimed is:

1. In combination in abrading apparatus; a housing; a bowl on the lower end of the housing for retaining a liquid suspension containing an abrasive, the housing having apertures above the bowl for the passage transversely of the housing of an elongated element; retaining means on either side of said housing for retaining an elongated element passed through the apertures of the housing; a slide for each of said retaining means, the slides being mounted for movement in one rectilinear direction together whereby said wire may be moved through the housing in one direction, means carried by one of the slides operably connected for driving the element in rotation; other means operably connected with one of the slides for driving the slides in rectilinear movement, and a nozzle communicable with the bowl and positioned to direct a spray of the suspension to an element passing through the apertures of the housing.
2. In a vapor blasting device, in combination, longitudinally extending ways in spaced parallel relation; a pair of slides in longitudinally spaced relation extending transversely between and supported by the ways; rigid means connecting the slides for movement together along the ways; retaining means provided on each slide whereby an elongated element may be retained between the slides; means for driving the retaining means of one of the slides in rotation relative to the slide; a housing between the ways and between the slides, said housing having apertures therethrough aligned for passage of an elongated element retained by the said retaining means of the slides; means engaging one of the slides for effecting slide movement; means to limit the slide movement in one rectilinear direction, and a nozzle positioned to direct a spray of an abrasive material to an element passing through the apertures of the housing.
3. In a vapor blasting device, in combination; longitudinally extending ways supported in spaced parallel relation; a pair of slides in opposed longitudinally spaced relation extending transversely between and supported by the ways; tie rod means connecting the slides together for movement along the ways; a chuck on each slide for retaining and rotatably supporting an elongated element; a motor operably connected with one of the chucks for driving the chuck and an elongated element supported by the chuck in rotation relative to the slide; a housing mounted between the ways transversely and between the slides longitudinally, said housing having aligned apertures for the passage through the housing of an elongated

element supported between the chucks; means for driving the slides on the ways in rectilinear movement; means for limiting the rectilinear movement of the slides in one direction, and a nozzle positioned to direct a spray of an abrasive material to an element passing through the apertures of the housing. 5

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