This invention relates to a novel apparatus for painting poles, large cables and other long, slender objects, and has for its primary object to provide an apparatus of simple construction which may be readily mounted around an object to be painted and which is supported thereon by means comprising a segment of a plurality of wheels of the apparatus with the object, certain of which wheels are driven for propelling a part of the apparatus longitudinally of the slender object.

More particularly, it is an object of the present invention to provide a mechanical apparatus for use in painting long slender objects such as poles and cables, having parts which automatically adjust themselves to the cross sectional size of the object to be painted for supporting a part of the apparatus thereon and for enabling said part of the apparatus to be propelled longitudinally of the object.

A further object of the invention is to provide an apparatus which may be utilized for painting slender objects of different cross sectional shapes and of varying cross sectional sizes.

Still another object of the invention is to provide an apparatus of the aforesaid character which may be readily operated by a single workman and accurately controlled from a vantage point at a distance from a part of the apparatus from which the paint is discharged.

Various other objects and advantages of the invention will hereinafter become more fully apparent from the following description of the drawings, illustrating a presently preferred embodiment thereof, and wherein:

Figure 1 is a fragmentary side elevational view showing the apparatus in an applied position and in operation;

Figure 2 is a horizontal sectional view thereof, taken substantially along a plane as indicated by the line 2-2 of Figure 1;

Figure 3 is a vertical sectional view taken substantially along a plane as indicated by the line 3-3 of Figure 2;

Figure 4 is a horizontal sectional view, taken substantially along a plane as indicated by the line 4-4 of Figure 3;

Figure 5 is an enlarged fragmentary vertical sectional view, taken substantially along a plane as indicated by the line 5-5 of Figure 2;

Figure 6 is an enlarged fragmentary vertical sectional view, taken substantially along a plane as indicated by the line 6-6 of Figure 2, and

Figure 7 is an enlarged fragmentary vertical sectional view, taken substantially along a plane as indicated by the line 7-7 of Figure 2.

Referring more specifically to the drawings, the painting apparatus in its entirety is designated generally 10 and includes a travelling unit, designated generally 11, a unit for supplying air under pressure, designated generally 12, and a paint storage container, designated generally 13.

The mobile or travelling unit 11 includes a generally annular frame 14 having a plurality, preferably four, integral outwardly offset guide portions 15, which open inwardly of the frame 14 and each of which includes corresponding substantially parallel side walls 16 and an outer end wall 17. The inner faces of the side walls 16 are provided with opposed grooves 18, as best seen in Figure 5, to slidably receive tongues 19 which project from opposite sides of blocks 20. Such a block 20 is slidably mounted in each of the guide portions 15, which guide portions are equally spaced from one another circumferentially of the frame 14, and the blocks 20 are thus supported for radial sliding movement relative to the frame. As seen in Figure 5, each block 20 has laterally spaced depending walls which extend downwardly from the bottom thereof. The depending walls of each block 20 form a wheel fork 21. An axle 22 extends through and is journalled in the lower portion of each wheel fork 21 and a wheel 23 is fixed to each axle 22 and is disposed between the arms or walls of the wheel fork thereof. As best illustrated in Figures 1, 3 and 5 and an end of a leaf spring 24 is fastened as seen at 25 to a downwardly and inwardly inclined back edge of each wheel fork arm or wall. Said leaf springs 24 extend downwardly and inwardly at an incline from the wheel forks 21 and an axle 26 extends through and is supported in the lower ends of the two leaf springs 24 supported by each wheel fork 21, so that each wheel fork 21 supports a resilient wheel fork formed of a pair of the leaf springs 24. A wheel 27 is mounted on each axle 26 between lower ends of the fork arms 24 by which the axle 26 is supported.

A feed screw 28 is threaded inwardly through the end wall 17 of each guide 15 and has an inner end which is swivelly connected to a shallow socket member 29 which opens inwardly and which forms an adjustable spring abutment for the outer end of a compression spring 30 the inner end of which seats in an outwardly opening recess or socket 31 of the block 20 which is disposed in radial alignment with said spring. Thus, the springs 30 yieldably urge the blocks 20 radially inwardly of the frame 14 and also yieldably urge the four upper wheels 23 and the four lower wheels 27 inwardly relative to the axis of the frame.

The frame 14 is formed of two halves which are hingedly connected at 32, as seen in Figures 1 and 2. The frame halves have complementary end portions which are disposed in abutting engagement as seen at 33, substantially diometrically opposite to the hinge 32. A bolt 34 is pivotally connected as seen at 35 at one end thereof between lugs 36 which extend outwardly from one of the frame halves adjacent its unsecured end 33. The other frame half, adjacent the unsecured end 33 thereof, has outwardly projecting spaced lugs 37 between which the free end of the bolt 34 can be swung. A wing nut 38 is threadedly mounted on the free end of the bolt 34 and is adapted to be tightened against the ends of the lugs 37 which are disposed remote from the lugs 36 for securing the ends 33 of the frame halves in abutting engagement, as illustrated in Figure 2.

One of the frame halves adjacent the end 33 thereof has an electric motor 39 and a gear box 40 secured to the underside thereof by fastenings 41. The rotary driven shaft 42 of the electric motor 39 is connected by a coupling 43 to the input shaft 44 of reduction gearing, not shown, contained in the gear housing 40, and the output shaft of said reduction gearing, as seen at 45 in Figure 6, is connected by a coupling 46 to one end of the axle 22 which is located adjacent said gear housing 40. The other axles 22 are coupled by another and to said aforementioned axle by additional couplings 46 and drive shafts 47 which extend between said couplings 46 and each of which is formed of telescopic sec-
tions, to enable the shafts 47 to be extended and retracted as the axles 22 move radially inward and outward relative to one another with the wheel forks 21 in which said axles are supported. The couplings 43 and 46 comprise universal joints.

The air supply unit 12 preferably comprises a storage tank 48 for compressed air and a compressor 49 which is connected by a conduit 50 to said storage tank for supplying compressed air thereto. A conduit 51 leads from the storage tank 48 to a fitting 52 which discharges into the paint receptacle 13 through the cover 53 of said receptacle. The fitting 52 has a branch nipple 54 to which is connected one end of a flexible conduit or hose 55, and the fitting 52 is provided with a manually operable shutoff valve 56. A pipe 57 extends through and is mounted in the cover 53 and has a lower end which is disposed in the receptacle 13 and which opens adjacent the bottom thereof, and an upper end which is disposed above the cover 53 and to which is connected an end of a flexible conduit or hose 58. Said last mentioned end of the pipe or conduit 57 is provided with a manually operable shutoff valve 59. The cover 53 is secured in an applied position by clamp fastenings 60 so that when the cover applied the receptacle 13 is airtight. Said receptacle 13 has an air gauge 61 mounted in the cover 53 thereof for visually indicating the air pressure within the receptacle. As best seen in Figure 2, two T-couplings 62 and 63 are mounted on the frame 14 adjacent the hinge 32 thereof. The opposite end of the air hose 55 is connected to the lateral nipple of the coupling 62 and the opposite end of the other, paint hose 58 is similarly connected to the coupling 63.

As best illustrated in Figure 5, an arch shaped member 64 is secured to the top surface of each block 20 by fastenings 65 and is provided in its upper portion with an arch opening 66. A ball 67 is turnably confined frictionally held in each arch member 64 in frictional contact therewith and with the upper surface of the block 20 on which said arch 64 is secured. The extent that the balls 67 are held against movement can be varied by tightening and loosening the fastenings 65, and said fastenings may be tightened sufficiently to clamp the balls immovably in the arches 64. A standard 68 is fixed to and extends upwardly from each ball 67 and a nozzle 69 is detachably mounted on the upper end of each standard 68. The openings 66 are sufficiently large so that the lower portions of the standards 68 can swing to a limited extent in any direction therein for swinging the standards either inwardly or outwardly relative to the frame 14 or sidewise at various angles. The balls 67 can also be turned in the arches 64 for turning the standards 68 about their longitudinal axes for swinging the nozzles 69 so that the axes thereof will be disposed at angles to radii of the frame 14. Each nozzle 69 has a spray head 70 at the inner end thereof, an air hose receiving nipple 71 at its outer end and a paint hose receiving nipple 72 disposed near the outer end thereof. Two T-couplings 73 and 74 may be mounted on the upper side of the frame 14 adjacent the other two blocks 20 and between said last mentioned blocks and the blocks 20 on which the T-couplings are mounted. The coupleings 73 and 74 may be suitably secured to the blocks 20 and the coupleings 75 and 76 are suitably secured to the frame 14. Lengths of hose 77 lead from the inner T-coupling 63 in both directions to the coupleings 73 and from said coupleings 73 to the coupleings 75, and similar lengths of hose or flexible conduits 78 extend in both directions from the coupling 62 to the outer coupleings 74 and from said coupleings 74 to the outer coupleings 76. Lengths of hose or flexible conduits 79 are connected to and extend upwardly from the coupleings 73 and 75 and are connected to the nipples 72 of the nozzles 69, located adjacent said coupleings, and lengths of hose 80 are connected to and extend upwardly from the coupleings 74 and 76 and connect with the nipples 71 of the nozzles 69 located adjacent the coupleings from which said hoses 80 extend. Electrical conductors 81 lead downwardly from the electric motor 39 to any suitable source of electric current, not shown. The electric motor 39 is of the reversible type and an electric switch 82 is interposed in the electric circuit of the conductors 81 and is preferably provided with three switch actuators 83, 84 and 85. The upper switch actuator 83 closes the circuit to cause the motor to be driven in a direction for driving the wheels 23 in a direction so that they are moving downwardly and away from the frame 14, the intermediate switch actuator 84 interrupts the circuit to the motor 39, and the lower switch actuator 85 closes the circuit to cause the motor to drive in the opposite direction.

It will be readily apparent that by loosening the nut 38 the bolt 34 can be swung out of engagement with the lugs 37 so that the two halves of the frame 14 can be swung away from one another about the hinge 32 to permit the frame 14 to be positioned around a pole 86, as illustrated in Figures 1 and 3. When the frame is closed and locked in a closed position by returning the bolt 34 and nut 38 to the positions of said parts as seen in Figure 2. The springs 30 will yieldably urge the inner portions of the wheels 23 into frictional contact with the pole 86, and the feed screws 28 can be turned for adjusting the spring stops 29 to vary the pressure of the springs 30 to thus vary the traction engagement of the wheels 23 with the pole 86. The springs 30 will also frictionally retain the lower wheels 27 in contact with the pole 86, beneath the wheels 23. Said lower wheels 27 are additionally turnably confined inwardly by the resiliency of the spring forks 24 which are placed under tension by the wheels 27 contacting the pole 86, as seen in Figures 1 and 3. The wheels 27 function to maintain the frame 14 at all times in a plane normal to the axis of the pole 86, as illustrated in Figures 1 and 3. The electric circuit to the motor 39 is then closed by the switch actuator 83 so that the wheels 23 will be driven in a direction to travel up the pole 36 for propelling the travelling unit 11 of the painting apparatus upwardly on the pole 86. When said mobile unit 11 has reached an elevation so that the nozzles 69 are approximately at the level of the upper end of the pole 86, the motor 39 is stopped by actuating the switch element 84.

Assuming that the compressor 49 is in operation or that adequate air pressure exists in the storage tank 48, the valve 56 is then opened to admit compressed air to the upper portion of the receptacle 13, at least the lower portion of which is filled with paint. When a proper pressure has been obtained in the receptacle 13, as indicated by the gauge 61, the valve 59 is opened so that paint will be supplied to the nozzles 69 through the hoses 58, 77 and 79 and the coupleings 63, 75 and 76. Compressed air will have already been supplied to the nozzles 69 by the opening of the valve 56, through the hoses 55, 78 and 80 and the coupleings 62, 74 and 76. The nozzles 69 will have been previously adjusted toward or away from the pole 86, as previously described, so that the diameters of the sprays 87 emitted from the spray heads 70 and which are received in the coupleings 73 and 74 may be suitably secured to the blocks 20 and the coupleings 75 and 76 are suitably secured to the frame 14. Lengths of hose 77 lead from the inner T-coupling 63 in both directions to the coupleings 73 and from said coupleings 73 to the coupleings 75, and similar lengths of hose or flexible conduits 78 extend in both directions from the coupling 62 to the outer coupleings 74 and from said coupleings 74 to the outer coupleings 76. Lengths of hose or flexible conduits 79 are connected to and extend upwardly from the coupleings 73 and 75 and are connected...
means, not shown, so that when the circuit to the motor is closed by the actuator element 85 the motor will be driven more slowly, than when driven in the opposite direction, to cause the travelling unit 11 to descend at a sufficiently slow speed so that the pole 86 can be painted from top to bottom thereof as the travelling unit 11 travels from top to bottom of the pole.

While the painting apparatus 10 has been described in conjunction with its most common use for painting an upright pole, it will be understood that it is likewise well adapted for painting other objects such as cables and is capable of being connected to and travelling along long slender objects which are mounted either vertically, horizontally or at an incline, with said unit 11 always travelling toward the stationary paint source and air pressure source while the painting operation is being performed. The travelling unit 11 can effectively function on a tapered object such as a tapered pole since the springs 39 will displace the wheels 23 radially inward and allow said wheels to yield radially outward to compensate for changes in the diameter of different portions of the pole. The travelling unit 11 will also fit objects of other than circular cross sectional shapes, such as objects which are oval shaped, square or rectangular in cross section. Various modifications and changes are contemplated and may obviously be resorted to, without departing from the function or scope of the invention as hereinafter defined by the appended claims.

I claim as my invention:

1. A painting apparatus of the character described comprising a substantially annular frame adapted to be disposed around a part of a long slender object, said frame having circumferentially spaced radially disposed inwardly opening guide portions, blocks mounted in said guide portions for reciprocating movement radially of the frame, forks projecting from said blocks, drive wheels journaled in said forks and supported thereby on one side of the frame, spring means supported in the frame and bearing against said blocks for urging the blocks and drive wheels radially inward relative to the frame, a reversible prime mover supported by said frame, means forming a driving connection between said prime mover and each of said drive wheels whereby said wheels are driven by the prime mover simultaneously and in the same direction for propelling the frame in either direction along said object with which the wheels are held in traction engagement by said spring means, means for controlling operation of said prime mover at a point remote from the frame for starting and stopping the prime mover and for causing the prime mover to drive the wheels in either direction, a plurality of spray nozzles on the opposite side of said frame in circumferentially spaced relation to one another around said object, means for supplying paint and air under pressure simultaneously to each of the nozzles whereby the paint will be sprayed under pressure simultaneously from the nozzles, said nozzle-supporting means including said blocks whereby said nozzles are radially movable relative to the frame, and said nozzle supporting means including standards mounted for universal rocking movement relative to said blocks for swinging the nozzles in all directions relative to the frame.

2. A painting apparatus of the character described comprising a substantially annular frame adapted to be disposed around a part of a long slender object, said frame having circumferentially spaced radially disposed inwardly opening guide portions, blocks mounted in said guide portions for reciprocating movement radially of the frame, forks projecting from said blocks, drive wheels journaled in said forks and supported thereby on one side of the frame, spring means supported in the frame and bearing against said blocks for urging the blocks and drive wheels radially inward relative to the frame, a reversible prime mover supported by said frame, means forming a driving connection between said prime mover and each of said drive wheels whereby said wheels are driven by the prime mover simultaneously and in the same direction for propelling the frame in either direction along said object, a plurality of spray nozzles, means for supporting said nozzles on said frame in circumferentially spaced relation to one another around said object, means for supplying paint and air under pressure simultaneously to each of the nozzles whereby the paint will be sprayed simultaneously from the nozzles for simultaneously painting the entire circumference of a part of the object.

References Cited in the file of this patent

UNITED STATES PATENTS

1,250,705 Van Amburgh Dec. 18, 1917
2,357,144 Stair Aug. 29, 1944