A mobile paint applying unit including a truck having a flat bed which carries the paint applying means and operating mechanism, said bed being provided with four wheels, which may be power driven or, to provide for manual movement thereof along the base of a wall being painted. Means are provided to adapt the automatic house painter to the use of a paint brush having a tubular handle, a rotary type brush, a roller or a paint spray gun. In general the house painter of the present invention is either power or manually driven along the base of a wall to be painted and applies paint to said wall as the movement progresses.

11 Claims, 7 Drawing Figures
AUTOMATIC HOUSE PAINTER

This application is a division of Ser. No. 887,806, filed Dec. 24, 1969, now U.S. Pat. No. 3,611,983.

The present invention pertains to an automatic house painter and more particularly to a device which is in the form of a flat bed truck which is either power or manually driven along the base of a wall being painted, various paint applying means being adapted to be operably carried on the flat bed of the device in a manner so as to apply paint to the wall as the movement of the truck progresses.

One of the principal objects of the present invention is, therefore, to provide a mobile device which is driven along the base of a wall being painted, applying paint to said wall as the movement progresses.

Another object of the invention is to provide an intermittent drive mechanism for the truck which is synchronized to the vertical movement of a paint applying means in a manner so as to move the truck forward the correct distance between each up and down vertical stroke of the painting means to provide complete coverage of the wall with paint.

A still further object of the instant invention is to provide drive means and mechanism for the paint applying means to move said means in vertical up and down strokes to apply paint to the wall in between the intermittent forward movements of the truck.

Yet another object of this invention is to provide adjustment means to limit the upward movement of the paint applying means to a selected predetermined height.

A further object of this invention is to provide an automatic house painter in which the paint applying means may be either a brush, roller or a paint spray gun.

Another object of the present invention is to provide electric motor power for both the intermittent movement of the truck and for the up and down movement of the paint applying means with switch means to control either movement individually or simultaneously.

In the drawings:

FIG. 1 is a perspective view of a preferred form of the present invention utilizing a roller as the paint applying device;

FIG. 2 is a side plan view illustrating the vertical drive mechanism for the roller;

FIG. 3 is an enlarged detailed view of a portion of the vertical drive mechanism illustrated in FIG. 2;

FIG. 4 is an enlarged perspective view illustrating in detail the gear rack segments pivotally connected to form a gear rack segment chain which is utilized to move the paint applying roller in vertical up and down movements;

FIG. 5 illustrates a modified form of the invention incorporating a paint spray gun as the paint applying means;

FIG. 6 illustrates another modified form of the present invention utilizing a paint brush as the paint applying means; and

FIG. 7 illustrates a still further modified form of the present invention in which a cylindrical shaped rotary brush is used as the paint applying means.

With reference to the drawings in which like reference numerals are applied to like or similar parts throughout the various views, the automatic house painter, indicated by the numeral 10 in FIG. 1 is comprised generally of a flat bed 12, a pair of rear wheels 14, 14 and front wheels 16, 16 which preferably are carried by a steering member 18 which is pivoted to the flat bed 12 as at 20. A convenient handle 22 is fixed to the steering member 18 for manual movement and turning of the device. It is obvious that means, not illustrated, may be applied between the steering member 18 and the flat bed 12 which may be set to maintain any desired orientation of the steering member 18 relative to the flat bed 12.

With reference to FIGS. 1, 2 and 3, two motors 24 and 26 are mounted on the flat bed 12. Each motor is preferably controlled by individual on, off switches (not shown) and a master switch (not shown) may be provided to control both motors simultaneously.

Motor 24 drives sprocket 28 through shaft 30 and speed reducer gear box 32, sprocket 28 in turn drives shaft 34 through sprocket 36 and chain 38, and shaft 34 drives gear 40 which is fixed thereon. As best illustrated in FIG. 3, gear 40 is in driving mesh with a gear rack segment chain 42, the construction of which is best illustrated in FIG. 4. The gear rack segment chain 42 is composed of a plurality of short gear rack segments 44, each of which has a tongue 46 on one end and a yoke 48 on its opposed end. The tongue end 46 of each gear rack segment is received in the yoke of the next segment and pivotally attached as by the pins 50. In this manner a flexible gear rack segment chain is constructed which is driven upwardly or downwardly through a generally square tube 52 by the gear 40, the tube 52 extends through the flat bed 12 and is fixed thereto as at 54.

As best illustrated in FIG. 3, the gear rack segment chain 42 is guided and held in mesh with the gear 40 by means of a roller bearing assembly 56 in the lower end of the square tube 52. The assembly 56 is composed of a pair of guide rollers 58 and 60 on the tooth side of the gear rack segment chain and by a plurality of rollers 62 on the opposed side thereof which hold the chain in mesh with the gear 40.

The upper end of the gear rack chain 42 is fixed to a vertically extending square rod 52 which is in turn fixed in the upper end of the upper square tube 64, FIG. 3. One or more square tubes such as 66 may be interposed between the upper and lower square tubes 64 and 52 and as illustrated, the upper tubes 64 and 66 are sized to be telescopically received in the lower tube 52. Appropriate upper and lower flanges 68 and 70 are provided on the square tubes to maintain said tubes in the proper confined sliding relationship. The upper end 72 of the square rod is fixed to a paint applying means 73 such as a roller, brush or spray gun which will be subsequently described in detail.

The gear rack segment chain must be of a substantial length to permit the square telescopic tube assembly just described to be extended to its full height which may be for example 8 to 10 feet or more. Also, take up means must be provided for the gear rack segment chain when the square telescopic tube assembly is in its retracted position. To provide for the required length and take up, the gear rack segment chain passes from the gear 40 forwardly through an upturned channel member 74, a second gear 76 is in mesh with the chain 42 adjacent the rear end 78 of the channel 74 and a second roller bearing assembly 80 is utilized to maintain meshing engagement between the gear 76 and
chain 42 in much the same manner as the roller bearing assembly 56 relative to the gear 40. Gear 76 is driven by and in the same direction as gear 40 through idler gear 82. The shafts 34, 84 and 86 of the gears 40, 82 and 76 are journaled in downwardly extending bracket members such as illustrated at 88 in FIG. 2, which are fixed to the underside of the flat bed 12.

From the front end 90 of the channel member 74, the gear rack segment chain doubles backwardly around a pulley 92 carried on a shaft 94, then passes rearwardly through a channel member 96 and has a cable 98 fixed to its rearward end, said cable 98 passes rearwardly from the channel 96, around a pulley wheel 100, doubles forwardly and upwardly around a spring loaded tension pulley 102, forwardly and downwardly around the bottom portion of a reel 104, forwardly and upwardly around a second spring loaded tension pulley 106, then doubles rearwardly to the reel 104 which carries the supply of cable wound thereon. Reel 104 is fixed to the drive shaft 34 which carries the gear 40 which drives the chain 42 to extend and retract the telescoping square tube assembly and thus the reel 104 unwinds and winds the cable in unison with the telescopic movement of the square tube assembly, and the spring loaded pulleys 102 and 106, which are carried on the flat bed 12 of the truck 10, maintain a constant tension on the gear rack segment chain and cable.

The motor 24 is a reversible motor and is provided with a forward and reverse switch 110 which is operated by a gear rack and lever assembly 112 and 114. The gear rack 112 is slidably journaled in a channel member 116 suspended from the flat bed 12 on bracket means 118. A small pinion gear 120 is fixed to the drive shaft 34 and is in mesh with the gear rack 112 which carries a forwardly extending rod extension 122 which carries two spaced apart collars 124 and 126 each having set screw means 128 whereby one or both may be adjusted along the length of the rod extension 122. The lever arm 114 has a suitable aperture 130 adjacent its lower end which is traversed by the rod extension 122 between the adjustable collars 124 and 126. As illustrated in FIG. 2, the lever 114 is adapted to be moved by either of the adjustable collars 124 or 126 depending upon the direction of travel of the gear rack 112 as driven by the small pinion gear 120. Contact by either collar moves a switch arm 132 of switch 110 a distance sufficient to stop the motor 24, the lever 114 being pivotally attached to the edge of the flat bed 12 at 134 and at its upper end to the switch arm 132 of the forward and reverse switch 110 as at 136.

Referring to FIG. 1, the motor 26 runs constantly during the painting operation and drives gear 140 through shaft 142 and speed reduces gear box 144. A gear 146 having two cut out segments 148 and 150 is fixed to a shaft 152 transversely spanning the top of the flat bed 12 and carries a disc 154 on its end opposite to the gear 146. Another shaft 156, in parallel relation to shaft 152, carries a gear 158 fixed thereto and provides a drive connection to the rear wheels 14, 14 through sprocket 160, fixed to shaft 156, and a sprocket 162 fixed to the rear wheel axle 164. A chain 166 provides the driving connection between the sprockets 160 and 162. Pillow blocks 168 and 170 fixed to the top surface of the flat bed 12 journal the respective shafts 152 and 156.

During the up and down strokes of the paint applying means, the gears 140 and 158 which both lie in a common vertical plane with the gear 146, are positioned within peripheral cutouts 148 and 150 with their teeth in position for engagement by the teeth of gear 146 when said gear is rotated in either direction.

Referring to FIG. 2, a crank arm 172 is pivotally connected in common with the lever 114 to the switch arm 132 at 136 and to the disc 154 adjacent its outer periphery as at 174 to impart rotary movement thereto each time either of the adjustable collars 124 or 126 contacts the lever 114 to shut off motor 24 as previously described. The rotary movement thus imparted to the disc 154 is transmitted to the gear 146 through shaft 152 which meshes the teeth of gear 146 with the constantly driven gear 140. Gear 158 simultaneously meshes with the teeth of gear 146 and is driven by gear 140 through gear 146 until the cutouts 148 and 150 become realigned with gears 140 and 158. The rear wheels 14, 14 are therefore driven through sprockets 160, 162 and chain 166 during one-half of a revolution of gear 146.

During the forward travel of the truck 10 in the manner just described, the disc 154 continues to rotate after the motor 24 is shut off and it is during this period of rest of motor 24, when the paint applying means is either at its upper or lower extremity of movement as determined by which of the collars 124 or 126 contacted lever 114, that forward movement is imparted to the truck 10, when the cutouts 148 and 150 are realigned with the gears 140 and 158, forward movement of the truck 10 stops, the motor 24 is restarted in reverse by the final movement of the switch arm 132 and the paint applying means begins another stroke, either up or down as determined by which collar 124 or 126 was contacted by lever 114.

In operation, the motors 24 and 26 are switched on and motor 24 drives the paint applying means upwardly, extending the square telescopic tubes, by means of the shaft 30, speed reducer 32, sprockets 28 and 36, chain 38, and gear 40 in driving mesh with the gear rack segment chain 42 in the manner previously described. Simultaneously, the small pinion gear 120 drives the gear rack 112 forwardly until collar 126 contacts the lever 114 to move the forward and reverse switch arm forwardly sufficiently to shut off motor 24 and mesh gears 140, 146 and 158 for one-half revolution of gear 146 to move the truck 10 forwardly a distance sufficient to begin the down stroke of the paint applying means, which down stroke commences with the final movement of switch arm 132 which reverses the motor 24 as the forward movement of the truck 10 is stopped. Reversing the motor 24, reverses the direction of rotation of the gear 40 which then drives the gear rack segment chain 42 in the opposite direction retracting the square telescopic tubes and lowering the paint applying means to its lowermost position at which time the collar 124 contacts the switch operating lever 114 to again stop motor 24, move the truck 10 forwardly, reverse motor 24 as the truck again stops to begin the next cycle.

The paint applying means fixed to the upper end of 72 of the square rod 62 carried atop the upper square tube 64 in FIGS. 1, 2 and 3 comprises a paint applying roller 176, a bracket 178 rotatably connecting the roller to the end of 72, a paint supply container 180 disposed longitudinally across the top of the roller 176.
and a supply tube 182 connecting the supply container 180 to the interior of a paint roller cylinder 184 which is perforated as at 186. A suitable fabric cover 188 is provided over the perforated cylinder 184 which becomes saturated with paint flowing through the perforations 186. A suitable valve means 190 is provided in the tube 182 to control the volume of paint flowing into the cylinder 184.

FIG. 5 illustrates a modified form of the invention which comprises a paint spray gun 192 which is controlled by a trigger 194 having a flexible control cable 196 fixed thereto. Fixed to the outer end of the cable is a spring loaded squeeze handle 198 which is adapted to actuate the trigger 194 through the cable to control the paint spray from the gun 192.

The paint spray gun assembly just described may be mounted atop the end 72 of the square rod 62 of the automatic house painter in place of the roller assembly illustrated in FIGS. 1, 2 and 3. However, in FIG. 5 the spray gun assembly is illustrated mounted on a frame 200 carried on a truck 10a for manual movement along a wall being painted.

The frame 200 is comprised of a pair of sectional upright tubular members 202 and 204 fixed at their lower ends to the top of the flat bed 12a as at 206 and 208. A cross member 210 connects the upper ends of the uprights 202 and 204 and a U shaped trolley assembly 212 is adapted to be moved vertically up and down along the uprights 202 and 204 by pairs of roller means 214 and 216 in rolling engagement with said uprights.

The paint spray gun 192 is fixed to the trolley assembly 212 as at 218 for vertical up and down movement by pulley means 220 comprised of a pair of pulleys 222 and 224 fixed to the flat bed 12a and cross member 210 respectively. A continuous cable 226 is fixed to the trolley 212 and passes around the pulleys 222 and 224 in a manner so as to move the paint spray gun 192 vertically up and down with the trolley assembly by the application of appropriate pull forces to the cable 226.

A pair of outwardly extending arms 228 and 230 carrying wall engaging casters 232 and 234 are carried by the upper ends of the vertical tubular members 202 and 204 to maintain the proper spacing between the wall being painted and the paint spray gun.

The vertical tubular members 202 and 204 are preferably composed of sections screw threaded together as at 236 whereby sections may be added thereto or subtracted therefrom to adjust the overall height thereof.

FIG. 6 illustrates a further modified form of the invention incorporating a paint brush assembly 240 which may also be fixed to the top 72 of the square rod 62 for use with the invention as disclosed in FIGS. 1, 2 and 3.

However, as illustrated in FIG. 6 the paint brush assembly is illustrated mounted on a frame assembly 200a similar to the paint spray gun assembly and will need no further detailed description.

The assembly 240 includes a U shaped mounting bracket 242 fixed to and extending forwardly from the trolley assembly 212a and includes top, bottom and outer end plates 244, 246 and 248. A drive motor 250 is fixed to the top plate 244 as at 252 and drives a worm gear 254 which is in driving engagement with a worm wheel 256 journaled in the top and bottom plates 244 and 246. A piston 258 eccentrically pivoted to and driven by the worm wheel 256 as at 260 is slidable received within the rear end of the tubular handle 262 of paint brush 264 and imparts a back and forth painting motion to the paint brush 264 as well as a pumping means for supplying paint to the brush 264 in the following manner.

The tubular paint brush handle 262 is pivoted as at 266 forwardly of its rear end in the top plate 274, the pivot means comprises a tube 268 extending vertically downwardly through said top plate 244 into a paint supply container 270. The upper end of the tube 268 above the plate 244 includes a one way ball check valve 272 in an increased diameter portion of the tube 268 which communicates with the hollow interior of the tubular paint brush handle 262. Forwardly of the pivot 266, the tubular paint brush handle contains a normally closed spring loaded ball check valve assembly 274 and forwardly of the valve 274 open communication between the tubular handle 262 and the paint brush bristles 264 is indicated by the plurality of arrows 276.

As viewed in FIG. 6, during the rearward 180° degrees of revolution of the eccentric pivot 260 of the piston 258, the piston will be retracted within the tubular handle 262, providing a suction which keeps check valve 274 closed and opens check valve 266, withdrawing paint from the container 270. During the forward 180° revolution of the piston, theadvance is advanced within the tubular handle, applying pressure forces therein which close the check valve 266 and open the spring loaded check valve 274 forcing the paint trapped in the tubular handle there through into the paint brush bristles 264 for application to the wall being painted. Therefore, it is readily apparent that each complete revolution of the worm wheel 256 will provide one complete back and forth movement of the paint brush 264 as well as providing one shot of paint thereto.

With reference now to FIG. 7 a still further modification of the present invention is illustrated which incorporates a vertically disposed rotary brush 280. The brush 280 is mounted atop an open sided rectangular housing 282 fixed to the upper ends of a pair of spaced, parallel vertical uprights 284 and 286 carried on the top surface of the flat bed 12b of a truck 10b. A motor 288 is mounted within the housing 282, and drives the paint brush through a speed reducer 290, shaft 292 and a clutch 294.

A drive pulley and belt assembly 296 provides a drive connection between the shaft 292 and a shaft 296a which drives a paint pump 298. A tube 300 extends from the pump 298 into a paint container 302 and draws paint from the container when the pump is in operation, said paint then being pumped through a tube 304 into the interior of the cylindrical core 306 of the brush 280. The paint passes from the tube 304 into a part 308 of a fitting 310 surrounding the lower portion 312 of the cylindrical core 306 of the brush 280. The part 308 is in constant communication with one or more of a plurality of holes 314 spaced about the lower portion 312 of the core 306 and feeds the paint there through for distribution to the bristles of the rotary brush 280 through a plurality of holes 316 spaced about the entire bristle portion 318 of the core.

A paint control valve 320 is included in the tube 300 and the uprights 284 and 286 are composed of short sections 322 which are removable in the same manner as illustrated in FIG. 5.

The rotary brush painting unit is pushed either manually or by power means along the side of a wall being
painter, starting at the top of the wall and lowering the brush by removing sections 322 as the painting operation progresses downward.

1. An automatic house painter comprising, a mobile truck including a flat bed and wheel means to provide for movement of the truck along the base of a wall being painted;

paint applying means, means for mounting said paint applying means atop said flat bed, paint container means and adjustable controlled automatic paint feed means for supplying the paint to said paint applying means from said paint container means;

means for providing a predetermined set pattern of movement of said paint applying means in the vertical direction whereby paint is applied to the entire area of a surface within the range of operation of said paint applying means, said area being defined by the linear distance traveled by the truck along the base of the wall being painted and a height defined by said predetermined set pattern of movement of said paint applying means in a vertical direction;

said paint applying means comprising a paint brush assembly and said means for mounting said paint applying means comprising a U-shaped bracket fixed to the upper end of said means for providing a predetermined set pattern of movement of said paint applying means in the vertical direction;

said paint brush assembly comprising a brush drive and paint feed motor fixed to said U-shaped bracket, said motor driving a horizontally disposed worm wheel through a worm gear fixed to said motor shaft, a paint brush having an elongated tubular handle having paint brush bristles extending outwardly from the inner end thereof and a piston extending partially into the inner end thereof, said piston having an outwardly extending portion pivotally and eccentrically connected to said worm wheel in a manner so as to be reciprocally moved, in and out, in the inner end of said elongated tubular handle when said worm wheel is rotated by said drive and feed motor, vertical tubular pivot means mounted in said U-shaped bracket outwardly of said piston, said tubular pivot means interconnecting with and communicating with said tubular handle, a paint supply container receiving the lower end of said vertical tubular means and a first one way check valve in said vertical tubular pivot means whereby paint is drawn upwardly from said paint container through said first one way check valve into said tubular handle during each first 180° of rotation of said worm wheel, a second spring loaded check valve forwardly of said pivot tube which is normally closed during each of said first 180° of rotation, said piston being driven inwardly in the outwardly extending portion of said handle during each second 180° of rotation of said worm wheel closing said first check valve and opening said second check valve to feed the paint drawn into said tubular handle therethrough into said paint brush bristles for application to the surface being painted, each 360° of rotation of said worm wheel imparting one back and forth paint applying movement in a horizontal plane to said paint brush.
8. An automatic house painter as defined in claim 7 in which said adjustable means for actuating said reversing switch means includes a sliding gear rack, a gear rack drive pinion gear fixed to said main drive shaft and a lever means having its upper end pivotally attached to said reversing switch means, said sliding gear rack including a rearwardly extending rod portion carrying a pair of spaced apart collars including adjustment means for providing a predetermined fixed position of said collars along said rod portion, said lever means being slidably traversed adjacent its lower end by said rod portion between said collars and including a pivotal attachment means intermediate its length to said truck whereby continued movement of said sliding gear rack and rod portion in either direction as provided by said drive pinion gear causes contact of one of said collars with said lever means to pivot said lever means in a manner so as to actuate said reversing switch means.

9. An automatic house painter as defined in claim 8 in which said intermittent drive means comprises a drive pinion gear driven constantly by said second motor through a speed reducer means when said second motor is energized, a driven pinion gear spaced from said drive pinion in a common vertical plane therewith and fixed to a second main drive shaft having a sprocket and chain drive means connection to said truck wheels, a gear intermediate said drive pinion and driven pinion in said common vertical plane, a crank arm drive means between said intermediate gear and said pivotal attachment of said lever means and reversing switch means to rotate said intermediate gear each time said reversing switch means is actuated by either said collar means, said intermediate gear including a pair of peripheral cut out portions which normally are disposed relative to the said drive and driven pinions respectively to provide no drive connection therebetween except when said crank arm is actuated by movement of said lever means and reversing switch means to rotate said intermediate gear sufficiently to move said cut out portions relative to said drive and driven pinion gears to mesh the teeth thereof with said intermediate gear to provide a drive connection to said truck wheels through said sprocket and chain drive means which drives said truck wheels until said pair of peripheral cut out portions become realigned with said drive and driven pinion gears to break said drive connection.

10. An automatic house painter as defined in claim 9 in which said pair of peripheral cut out portions are spaced approximately 180° apart to provide an equal amount of drive connection to said truck wheels each time said reversing switch is actuated by either of said adjustable collar means.

11. An automatic house painter as defined in claim 1 wherein said means for providing a predetermined movement in a vertical direction includes vertical sectional upright means fixed to said flat bed, trolley means to vertically traverse said vertical sectional upright means, pulley means for actuation of said trolley means selectively in an up or down direction.

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