May 29, 1951 W. MacPHERSON 2,555,237

SPRAYING MACHINE DRIVE

Filed Dec. 7, 1949 3 Sheets-Sheet 1

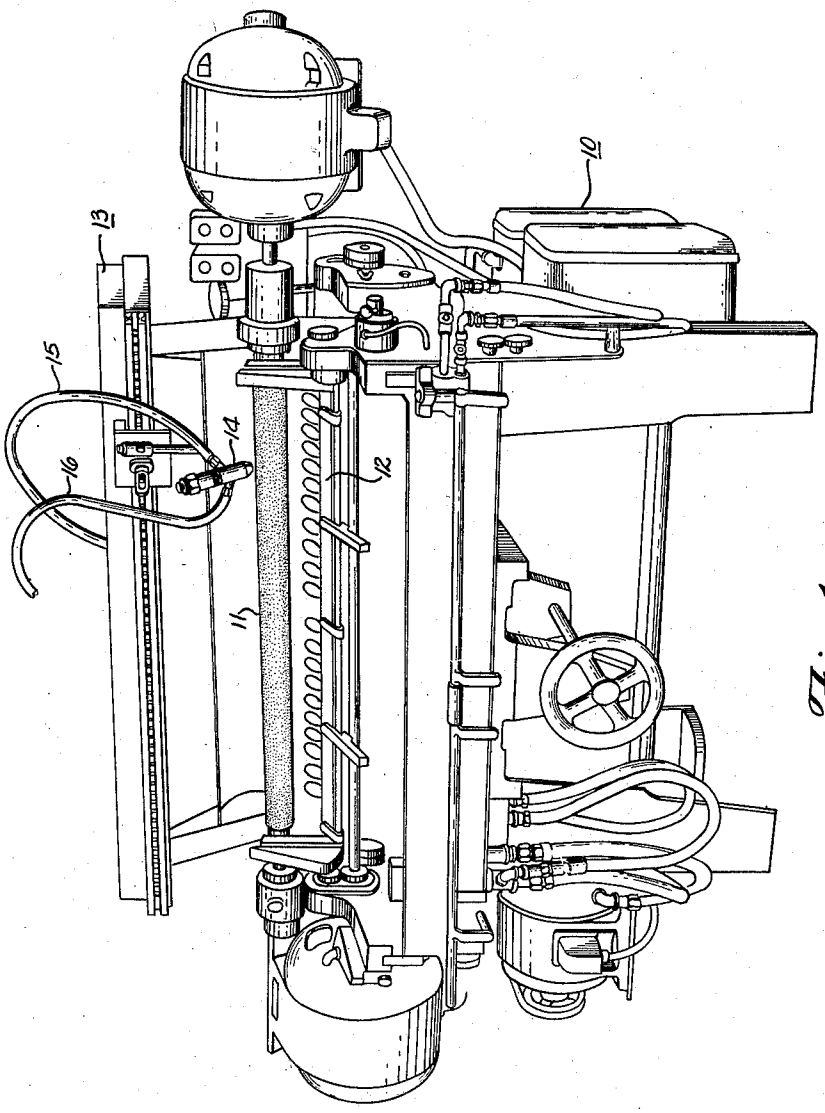


Fig. 1

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Filed Dec. 7, 1949 3 Sheets-Sheet 2

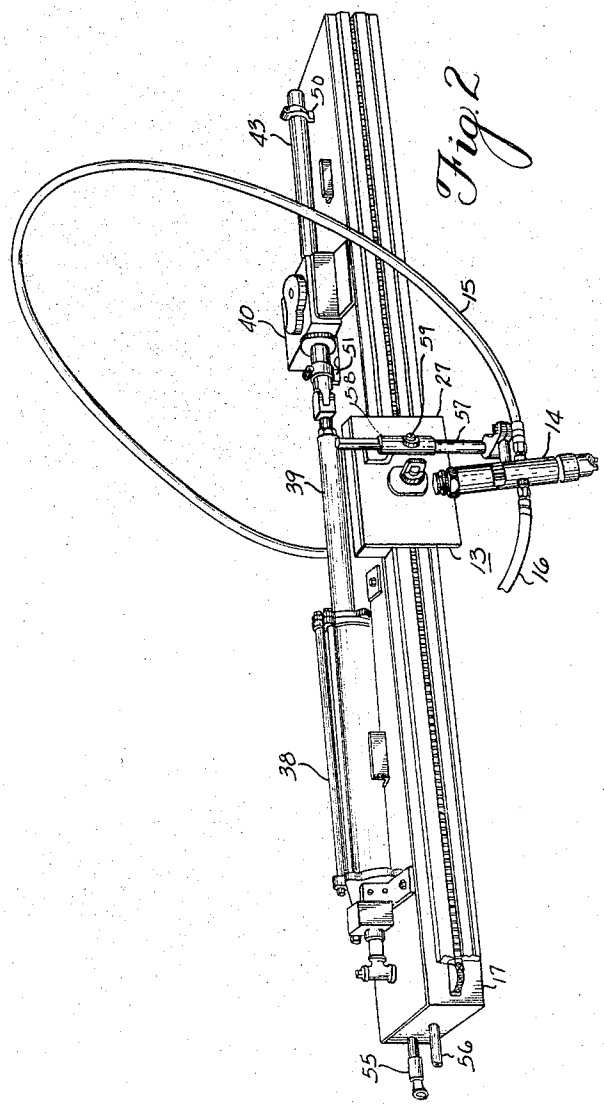


Fig. 2

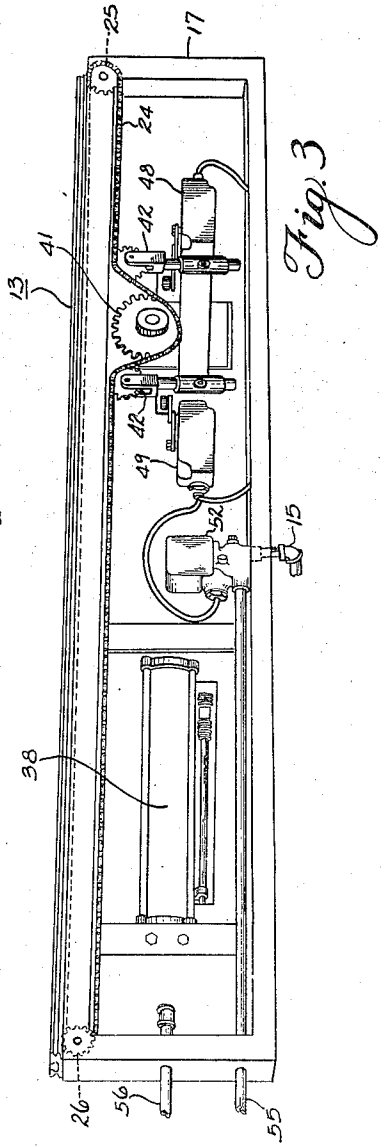


Fig. 3

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SPRAYING MACHINE DRIVE

Filed Dec. 7, 1949 3 Sheets-Sheet 3

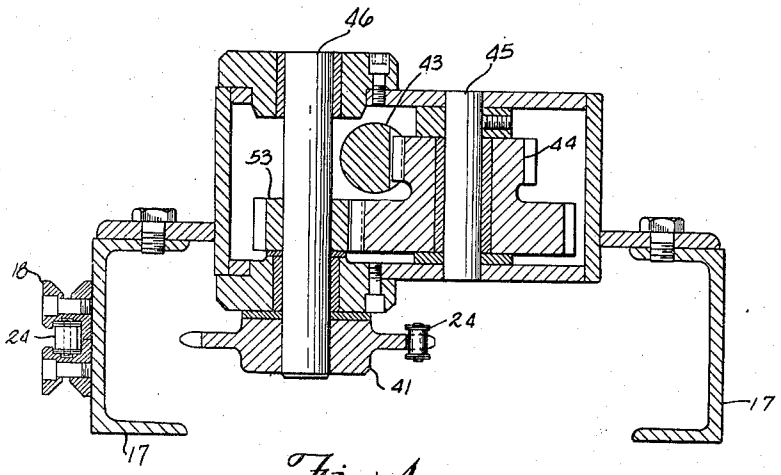


Fig. 4

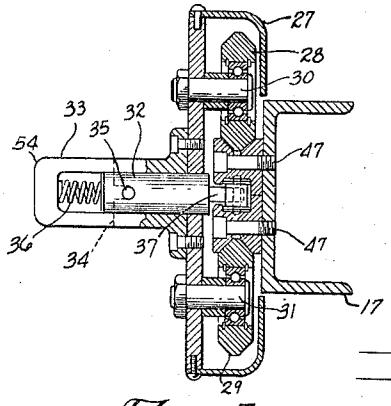


Fig. 5

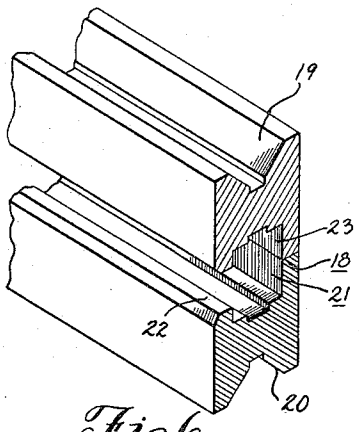


Fig. 6

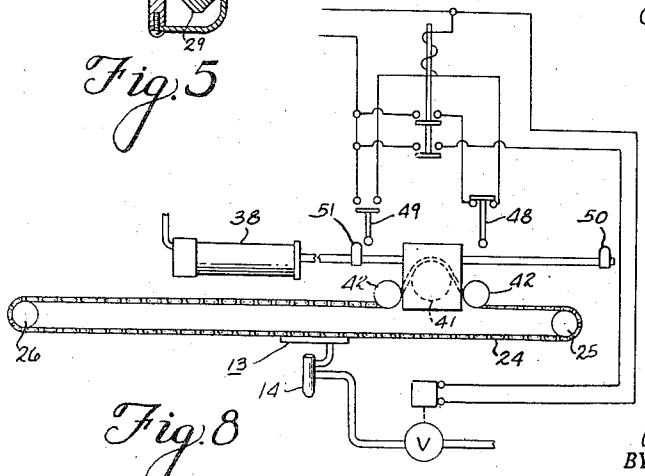


Fig. 8

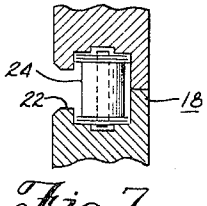


Fig. 7

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UNITED STATES PATENT OFFICE

2,555,237

SPRAYING MACHINE DRIVE

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6 Claims. (Cl. 74—110)

1

This invention relates to polishing and buffing machinery generally, and relates specifically to a reciprocable carriage for carrying a spray nozzle for spraying liquid abrasive on polishing or grinding wheels.

Prior devices for carrying spray nozzles for a buffing machine consist usually of an air cylinder, the piston rod of which is connected directly to the slide that carries the spray gun. It will readily be seen that by this method, in order to spray a 24-inch wheel it would be necessary to use a 24-inch cylinder. When the piston rod of such a cylinder is fully extended, the cylinder and piston rod would measure 48 inches. This would mean that the device would have to be built in such a manner that approximately 24 inches of it would project beyond the width of a machine in order for the spray gun to traverse the entire width of the polishing wheel. This arrangement would be objectionable in most plants.

An object of this invention is to provide an improved spraying attachment for spraying liquid abrasive compound or other similar material on the buffs or polishing wheels that are used on polishing machines and similar applications.

Another object of this invention is to provide a spray nozzle carriage device for a buffing machine with all parts thereof confined to the limits of the machine.

Another object of this invention is to provide an improved flexible drive member for a spray carriage.

Another object of this invention is to provide an improved carriage rail having a chain guide recessed therein.

Still another object of this invention is to provide a safety link means between the carriage and chain which is automatically ejected and disengaged by the chain guide sprocket teeth if the carriage should be inadvertently moved to the far extremes of the support rail.

Other objects and a fuller understanding of this invention may be had by referring to the following description and claims, taken in conjunction with the accompanying drawings, in which:

Figure 1 is a general view of a known type of buffing and polishing machine, with a spray gun carriage device made in accordance with the principles of this invention;

Figure 2 is a perspective view of the carriage device illustrated on the buffing machine in Figure 1;

Figure 3 is a bottom view of the carriage device of Figure 2, showing some of the operating mechanism;

2

Figure 4 is a sectional view substantially along line 4—4 of Figure 2, for the purpose of showing the gearbox details, and therefore confusing associated mechanisms lying beyond the section line have been omitted;

Figure 5 is a detailed sectional view of the carriage upon which the spray gun nozzle is carried;

Figure 6 is an enlarged fragmentary perspective view of the particular carriage rail construction employed in the illustrated embodiment of the invention;

Figure 7 is an enlarged fragmentary view of the area of Figure 5 in which the linkage between the carriage and the drive chain takes place; and

Figure 8 is a wiring diagram of the spray control used with this improved carriage.

In Figure 1 of the drawings, a polishing machine of a known type for buffing and polishing silverware is illustrated and referred to by the reference character 10. The polishing machine 10 is illustrated in its entirety for the purpose of setting forth the type of machine upon which the present invention may be very advantageously applied, and is not intended to be a limitation upon the invention in any manner. The Figure 1 illustrates one serious problem which has been overcome by the present invention. Prior to development of the present invention, devices for carrying a spray nozzle relative to the buffing wheel of the machine 10 were longer than the machine, and therefore premium floor space was wasted because of the necessary spacing between machines to allow for the overhang.

In the Figure 1, the particular polishing machine 10 is provided with a suitable buff wheel 11 and work holder clamp means 12. The actual operation of the machine 10 is of little importance insofar as setting forth this invention is concerned, except that it may be pointed out that the buff wheel 11 must be wetted by a suitable buffing compound at regular intervals in order to properly finish the pieces held in the work holder 12. Accordingly, the improved spray nozzle carriage 13 made in accordance with the teaching of this invention is illustrated on the machine, and operates to move a spray gun 14 through a definite reciprocable path with respect to the buff wheel 11. An air line 15 extends to the spray gun 14 and a line 16 carries liquid buffing compound. The spray gun 14 is constructed in a suitable well-known manner,

and will eject a definite amount of buffing compound when air is supplied through the line 15, but will not eject compound when the air is not passing through line 15.

In Figure 2 of the drawings the preferred embodiment of the present invention is illustrated as it appears when removed from the machine 10. The Figure 3 is a bottom view of the device, and further sets forth the operating mechanism of the preferred embodiment. The spray nozzle carriage 13 is carried upon a channel frame 17 forming a long rectangle. One longitudinal side of the frame 17 may be cosidered to be the front of the device. To the front of the channel frame 17, a rail member 18 of greatly improved design is attached. The rail 18 is adapted to carry a carriage 27, and also provides a close fitting enclosed power track in which a flexible drive member may be guided to power the carriage 27.

Specifically, in the embodiment of the invention illustrated, the rail 18 comprises a substantially rectangular member having a groove cut in the face thereof and having two opposing track surfaces on the sides thereof. The rail member 18 is illustrated alone and in perspective in the Figure 6, and reference to the Figure 6 will better illustrate the details of construction found to be desirable for this particular embodiment.

In Figure 6, the track 18 is illustrated as being provided with a longitudinal groove 21 therethrough having a mouth portion 22 opening through one face of the rail 18. The groove 21 is also provided with an interior portion 23. The Figure 6 illustrates the enlarged nature of the interior portion 23 with respect to the mouth portion 22. In Figure 7, an enlarged fragmentary portion of Figure 5 illustrates the exact shape and purpose of the preferred embodiment of the groove 21. Figure 7 is taken from the Figure 5, wherein a sprocket chain 24 is shown passing longitudinally through the groove 21. The sprocket chain 24 is of standard construction having link members connected by pins and rollers, and need not be explained at length. However, Figure 7 clearly shows that the interior portion 23 of the groove 21 is designed to hold the chain 24 against free lateral movement, but will readily permit longitudinal movement of the chain through the groove 21. Thus, the chain 24 is closely confined and guided within the body of the rail 18, but can be readily shifted longitudinally within the interior portion 23 of the groove 21. The rail 18 is preferably made in two separate pieces as illustrated in Figures 6 and 7 for ease of manufacture, and is attached to the side of the frame 17 in any suitable manner, but the illustrated embodiment has been constructed by securing the rail 18 to the frame 17 by means of bolts 47.

In Figure 2, the left ends of the rail 18 and the frame 17 have been broken away to illustrate the location of a sprocket 26. A slot is cut through the side of the frame 17 and into the rail 18 to permit the sprocket 26 to extend out into the groove 21. A similar sprocket 25 is mounted at the opposite end of the rail 18. The sprocket chain 24 is then threaded through the interior portion 23 of the groove 21 and engaged with the teeth of the sprockets 25 and 26. It will readily be seen that the chain 24 can therefore be looped around behind the rail 18 and driven in any suitable manner to cause continuous movement of the chain 24 through the groove 21, or preferably the chain 24 may be driven in a reciprocating manner.

For the purpose of carrying the spray gun 14, it is desired to drive the chain 24 in a reciprocating manner through a predeterminable period of oscillation. In Figure 3 a drive sprocket 41 is illustrated on the bottom of the frame 17, and reference to the Figure 4 will show that the drive sprocket 41 is provided with a shaft 46 which extends upwardly into a gearbox 40. The chain 24 is passed around the drive sprocket 41 and the slack of the chain 24 is taken up by two idle sprockets 42. The idle sprockets 42 may be manually adjustable or spring actuated as desired, but in any event the chain 24 is suitably attached to the drive sprocket 41 to drive the chain 24 around the sprockets 25 and 26 and through the groove 21 in the rail 18.

Although it is quite possible to provide other methods of causing reciprocating movement of the sprocket chain 24, the illustrated embodiment is equipped with an air cylinder 38 having a piston rod 39. Of course, there would be no advantage in providing a cylinder 38 with a rod 39 long enough to produce a 1–1 drive ratio with respect to the movement of the chain 24, because in order to make one particular link of chain 24 move the entire length of the rail 18, if a 1–1 drive ratio were employed, the total length of cylinder 38 and piston rod 39 would have to be more than double the length of the rail 18. Accordingly, the gearbox 40 is employed to multiply the movement of the piston rod 39. The gearbox 40 includes a rack 43 having suitable teeth adapted to rotatably drive a pinion 44 mounted upon shaft 45. The pinion 44 is suitably intermeshed with a drive pinion 53 on the shaft 46 employed to drive the previously explained drive sprocket 41. The particular embodiment illustrated has a gear ratio adapted to give four feet of chain travel for one foot of piston rod travel. However, the air cylinder 38 is of standard construction and is suitably adjustable in its stroke whereby a movement may be obtained, which when multiplied through gear box 40, will provide chain travel from four inches to 48 inches.

The rail 18 is provided with two opposing track surfaces in the form of V tracks 19 and 20 on the edges of the rail. The carriage 27 is then provided with a top roller 28 and a bottom roller 29, as best illustrated in Figure 5, which are formed to fit closely into the V slots of tracks 19 and 20. The rollers 28 and 29 are mounted on the carriage 27 by means of suitable stud shafts 30 and 31, and reference to the Figure 5 will immediately illustrate the fact that the carriage 27 will grip the rail 18, but is free to move longitudinally therealong. The carriage can be inserted upon the rail 18 and removed therefrom by pushing the carriage 27 beyond the end of the rail 18, but it cannot be removed by lateral pull. Of course, it is understood that other methods of mounting the carriage 27 could be resorted to without departing from the spirit and scope of this invention.

The carriage 27 is provided with a plunger 32 longitudinaly reciprocable within a slotted sleeve 33. The sleeve 33 is actually a tubular member which has been milled away to produce a shoulder 34 and a yoke 54. A suitable notch is provided in the shoulder 34, and a pin 35 passes through the plunger 32 and is adapted to engage in the notched shoulder 34. A spring 36 operates between the yoke 54 and the plunger 32 to keep the plunger 32 normally advanced to the position illustrated in Figure 5 with the pin 35 engaged in the notched shoulder 34. The plunger

32 has a reduced finger end 37 adapted to extend through the mouth portion 22 of the groove 21 and into an opening between two of the link members of the chain 24. The length of the plunger 32 and the finger portion 37 thereof is such that the finger end will not strike the back wall of the groove 21 and drag therealong, but is of sufficient length to fully engage into the chain 24 within the groove 21.

In the illustrated embodiment of the invention, the chain 24 is reciprocably driven through a predetermined cycle within the interior of guide rail 18. The carriage 27 is adapted to freely reciprocate upon the exterior surface of the rail 18 throughout any portion of the length of the rail 18. Therefore, the cycle and length of movement of the chain 24 within the guide rail 18 may be set according to the length of the buff wheel 11 which is to be serviced by a spray of compound. Thereafter, the plunger 32 of the carriage 27 may be withdrawn by pulling the pin 35 against the urge of spring 36 and removing the engagement of the carriage 27 from the chain 24. Thereafter, the cylinder 38 may be set into operation and the carriage 27 manually moved along the rail 18 to a position which appears to be closest to the center of the area which is to be served, and then the plunger 32 is released in order that the finger end 37 may again engage the chain 24, whereupon the carriage 27 will begin to reciprocate with the chain 24. However, if the exact position has been misjudged, the position of the carriage 27 may be readily shifted by pulling the plunger 32 and allowing several chain links to pass before rengagement is again effected.

One particular advantage of the illustrated embodiment of the invention is that two or more carriages 27 may readily be employed at one time upon the rail 18. Therefore, if a series of different articles are to be buffed at one time, for example, it is possible to set the oscillating cycle of the chain 24 rather short and employ one carriage 27 for each of the buffing groups.

Another particular advantage which has been discovered is that if the carriage 27 is moved too close to one end of the rail 18, and the natural movement of the chain carries the carriage 27 completely to the end of the rail 18, there will be no stalling of the drive mechanism, nor will there be any damage to the end sprockets 25 and 26 or to the carriage 27. The teeth of the sprockets 25 and 26 extend through the chain 24 in one direction, and the finger end 37 of the carriage 27 extends through the chain in the opposite direction. Therefore, if the chain 24 attempts to carry a carriage 27 past the position of the sprockets 25 or 26, the sprocket teeth will push the plunger 32 against the urge of the spring 36 and release the carriage 27. Therefore, if the carriage 27 is moved to the end of the rail 18, it will simply disengage from the chain and stop, with no harm done to any portion of the device.

To complete the invention and provide a fully operative and useful device for use upon buffing machines, there has been illustrated an air pipe 55 supplying a solenoid valve 52. The valve 52 is adapted to supply the air line 15 which extends to the spray gun 14. An air pipe 56 which is illustrated, serves the air cylinder 38.

As best illustrated in the Figures 3 and 8, limit switches 48 and 49 are suitably mounted longitudinally with respect to the rack 43. Movable dogs 50 and 51 are mounted upon the rack 43, and will therefore engage the limit switches 48 and 49. It is usually desirable in applying buffing compound to a buff wheel 11, to apply the buffing compound only in one direction of movement of the spray gun 14, and allow the spray gun 14 to return inoperative. Therefore, the solenoid valve 52 will be operated by the limit switches 48 and 49 to supply air through the line 15 only during one direction of travel, and will be inoperative in the opposite direction of travel. It is of course understood that the spray gun 14 is of a standard type to which liquid material can be supplied but will eject the liquid material only when an active air supply is provided. Therefore, control of the air supply will control the application of the liquid.

The spray gun 14 may be mounted upon the carriage 27 in any suitable manner, and is illustrated as being provided with a shaft 57 which may be inserted into a sleeve 58 on the carriage 27 and held in an operative position by means of a set screw 59.

Although the invention has been described in its preferred form with a certain degree of particularity, it is understood that the present disclosure of the preferred form has been made only by way of example and that numerous changes in the details of construction and the combination and arrangement of parts may be resorted to without departing from the spirit and the scope of the invention as hereinafter claimed.

What is claimed is:

1. A reciprocable carriage device comprising, a rail member, a carriage mounted to ride said rail member, said rail member having a longitudinal chain groove therein, a link chain within said groove, reciprocable power means driving said chain with a longitudinal reciprocable movement of preselected longitudinal period, guide surfaces to hold said chain within said groove for free longitudinal movement and against lateral displacement, and manually releasable selective engagement means carried by said carriage to selectively link said carriage to said chain, whereby said carriage may be linked to said chain at any selected position along said rail member and will thereafter move through a reciprocable path corresponding to the movement of said chain.

2. A reciprocable carriage device for carrying a spray nozzle in a buffing machine comprising, a carriage rail, carriage track surfaces on said rail, flexible drive member guide surfaces recessed within said rail, said rail having a slot opening longitudinally therealong, a flexible drive member passing through said rail in said guide surfaces and looped behind said rail, drive means adapted to reciprocably drive said flexible drive member in said rail guide surfaces, said flexible drive member being exposed through said slot in the rail, carriage means mounted to ride on said track surfaces, and selective engagement means to extend through said slot and selectively link said carriage to said flexible drive member, whereby said carriage may be linked to said flexible drive member at any selected position along said rail member and will thereafter move through a reciprocable path corresponding to the movement of said flexible drive member and carry a spray nozzle therealong.

3. A reciprocable carriage device comprising, a rail member having longitudinal track surfaces, said rail member having a longitudinal groove, chain guide surfaces in said groove, a link sprocket chain having open spaces therethrough, said chain guide surfaces being posi-

tioned to confine said sprocket chain to a longitudinal path through said groove within the body of the rail member, sprocket members mounted at each end of the rail member, said chain passing through said groove and around both said sprocket members and looping behind said rail member, said sprocket members having chain driving teeth extending into said open spaces of said chain, drive means to move said chain in said groove, carriage means mounted to ride said track surfaces, a longitudinally reciprocable pin member carried by said carriage in position to extend into said groove and into a selected one of said open spaces of said chain, whereby said carriage means is moved along said rail member by said chain, and whereby the sprocket teeth push the pin member out of the chain upon movement of the carriage to the position of one of said sprocket members.

4. A reciprocable carriage device for directing a spray nozzle along a longitudinal buffling member comprising, a carriage rail of generally rectangular cross section having front and rear faces and side edges, said carriage rail having a longitudinal groove opening through said front face, said groove having an interior portion and a mouth portion, said interior portion being enlarged with respect to said mouth portion, a link sprocket chain having sprocket tooth openings, said interior portion of the groove being dimensioned to guide said chain longitudinally therethrough and prevent the chain from moving laterally through said mouth portion, said chain passing through said groove and being looped behind said rail sprocket members at the ends of said rail member to engage said sprocket openings and guide said chain in said loop, a carriage member having truck means to engage said side edges of the rail and guide said carriage for longitudinal reciprocable movement on the rail, a longitudinally reciprocable pin member carried by said carriage in position to extend into said groove and into the sprocket openings in said link chain, said pin member being rejectable from said sprocket openings by engagement with teeth of the guide sprocket members, and chain drive means of selectable reciprocable period.

5. A reciprocable carriage comprising, a rail member having longitudinal track surfaces, said rail member having a longitudinal groove, said groove having a mouth portion and a body portion, a link chain, said main portion of the groove being dimensioned to closely confine and longitudinally guide the link chain through the groove, said chain extending through the groove and being looped behind the rail member, power means to move the chain through said groove, carriage means mounted to ride said track surfaces, and releasable interlocking means to extend through said mouth portion of the groove and said carriage means to said link chain for movement of the carriage with the chain.

6. A reciprocable carriage device comprising, a rail member having a plurality of external longitudinal track surfaces, a longitudinal groove opening along said rail member, a longitudinally reciprocable power means fitted in said groove, lock surface means within said groove adapted to hold said power means against lateral movement out of said groove, a carriage to ride said rail member, said carriage having truck means to ride said track surfaces and carry said carriage along said rail in a position over the opening of said groove, and selective engagement means to releasably engage said carriage to said power means.

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