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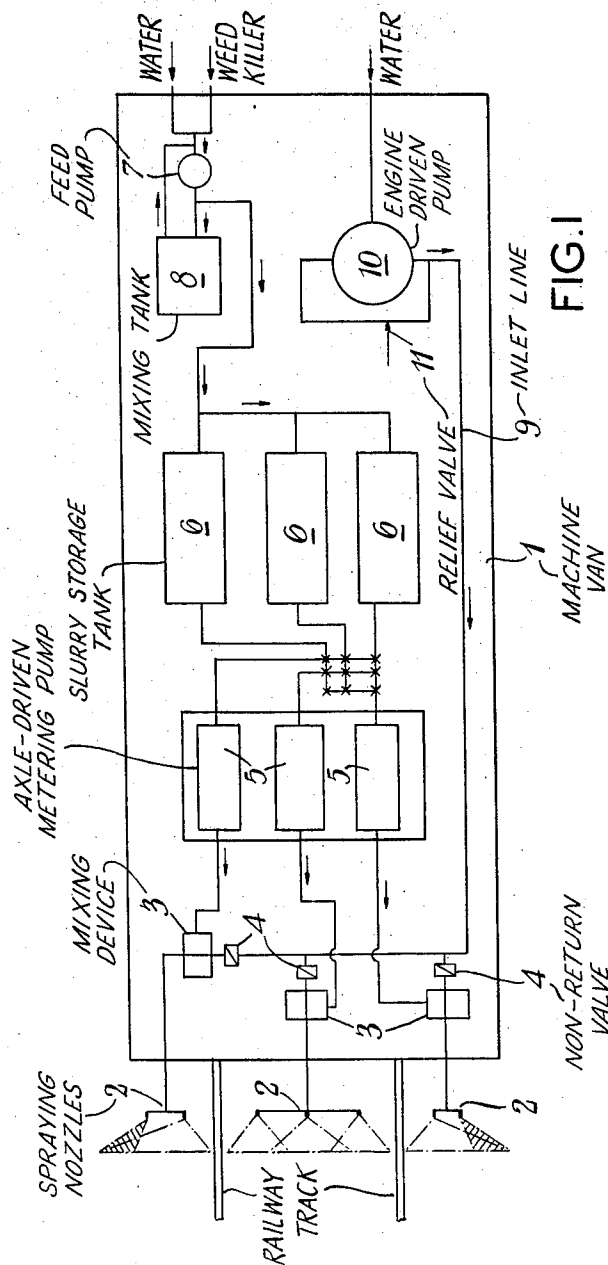
C. J. CHAMBERLAIN ETAL

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SPRAYING APPARATUS

Filed July 30, 1962

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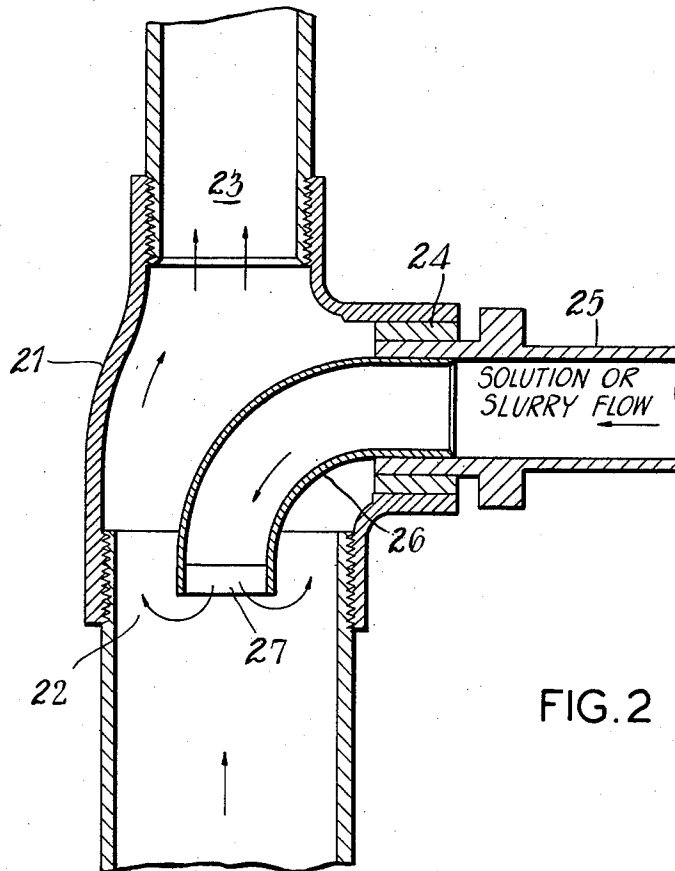


FIG. 2

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SPRAYING APPARATUS

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This invention relates to spraying apparatus and is concerned with a railway train suitable for spraying railway tracks with chemical weedkiller. The invention is also concerned with a mixing device suitable for use in said railway train.

A known method of applying a solution or suspension of chemical weedkiller to a railway track is to spray the solution or suspension evenly across the track or to apply a differential dosage rate of the weedkiller on the cess or other portions of the track on which weed infestation is more prolific. Hitherto, the method used for differential spraying has been to apply an increased quantity of the weedkiller solution or suspension to the required area, the solution or suspension either having been bulk mixed or formed by adding a slurry to a water stream. In either case these systems involve the wasteful use of heavy quantities of spray solution or water. This is a considerable disadvantage, since with the advent of the electrification and dieselization of the railways, large supplies of water are more difficult to obtain.

According to one aspect of the invention, there is provided a railway train adapted for spraying railway tracks with chemical weedkiller comprising at least one spraying member having a plurality of outlet elements arranged in groups each adapted to spray weedkiller over respective portions of the track, each group of outlet elements of the spraying member being connectable through a regulatable pumping unit to a tank capable of containing a solution or slurry of chemical weedkiller, there being a separate pumping unit and tank for each group of outlet elements, and regulatable pumping means for supplying water carried by the train to each group of outlet elements, the arrangement being such that chemical weedkiller drawn from each of said tanks by each of said pumping units is fed respectively into the water supply to each group of outlet elements on the pressure side of said pumping means, whereby the quantity and/or kind of weedkiller sprayed from each group of outlet elements can be varied.

Each group of outlet elements may consist of one or more outlet elements. Advantageously, the or each spraying member has three groups of outlet elements, one group arranged to spray weedkiller over the width of the track and the remaining groups each being arranged to spray weedkiller respectively over one of the strips on either side of the track.

According to another aspect of the invention, there is provided a mixing device suitable for use in the railway train hereinbefore described, said device comprising a mixing vessel having substantially opposed inlet and outlet openings whereby a first liquid can be caused to flow through the mixing vessel, and entering said vessel an inlet line through which a second liquid can be caused to flow, the inlet line having an outlet end positioned within the mixing vessel in a direction substantially opposite to the direction of flow of the first liquid through the mixing vessel.

By employing the railway train of the invention, it is possible to apply differential dosage rates of weedkiller to different portions of the track, without increasing the volume of water or spray solution or suspension used, but merely by regulating the amount of weedkiller fed to

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each group of outlet elements of the spraying member. Furthermore, it is possible by employing two or more groups of outlet elements simultaneously to apply to different portions of the track two or more different chemical weedkillers, or two or more mixtures of chemical weedkillers, at the same or different dosage rates. By employing the mixing device hereinbefore described in the railway train of the invention it is possible successfully to inject a solution or slurry of weedkiller into a flow of water on the pressure side of a pump feeding the water to the mixing device.

Preferably each of the regulatable pumping units is adapted to be driven from an axle of a train vehicle carrying said unit, so that each pump unit can be regulated to meter a predetermined amount of the weedkiller slurry or solution proportional to the speed of the train, whilst the regulatable pumping means for supplying water to each group of outlet elements is preferably an engine driven pump so that a substantially even output from the outlet elements may be maintained over the speed range of the train. Advantageously the engine driven pump is provided with a long stroke relief valve, whereby the pressure of the water flow can be kept substantially constant as the amount of weedkiller fed to the spraying member is increased by increased train speed. Thus the water flow to the spraying member will be varied so that at terminal speed neat weedkiller may, if desired, be sprayed from the spraying member.

To reduce wastage of water when the train is travelling at slow speeds, more than one spraying member, e.g. two spraying members, may be used so that at low speeds water and weedkiller will be supplied to only one of the spraying members but at increased speeds the further spraying members will be brought into use so that the necessary heavier dosage of weedkiller may be applied.

For a better understanding of the invention and to show how the same may be carried into effect, reference will now be made, by way of example, to the accompanying drawings in which:

FIGURE 1 is a diagrammatic plan view of a machine van forming part of a railway train adapted for spraying railway tracks with chemical weedkiller; and

FIGURE 2 is a longitudinal section on an enlarged scale through a mixing device used in the machine van shown in FIGURE 1.

Referring to FIGURE 1 of the accompanying drawings, a machine van 1 is provided with a spraying boom having three groups 2 of outlet nozzles, each group 2 of nozzles being positioned so that weedkiller can be sprayed on to the central portion of the track as well as on each side of the track. Each of the three groups 2 of spray nozzles is connectable via a mixing device 3 to a separate regulatable pumping unit 5 of a triple axle-driven pumping unit, each unit 5 of which can draw from any one of three storage tanks 6 a slurry or solution of weedkiller contained therein. When a solution of weedkiller is to be sprayed, this can be fed into the tanks 6 by a pump 7 which is connectable to one or more separate tank wagons containing the weedkiller solution. When a slurry of weedkiller is to be sprayed, water or weedkiller (depending on whether the slurry is to contain one or a mixture of weedkillers) is drawn by the pump 7 into a mixing tank 8 where powdered weedkiller can be added to make a slurry of the desired consistency. The slurry is then fed into the tanks 6 which can be mechanically agitated, as can the mixing tank 8. The triple pumping unit is driven from the machine van axle and will thus meter a predetermined amount of weedkiller solution or slurry which will be proportional to the speed of the train. The spraying boom is connected via non-return valves 4 by an inlet line 9 provided with an engine driven water feed

pump 10 to a supply of water carried by the train in separate tank wagons. The separate engine driven pump 10 enables a substantially even output and spray pattern through the outlet nozzles to be obtained at different speeds of the train. The water feed pump 10 is provided with a long stroke relief valve 11 which enables the pressure of the water flow to be maintained substantially constant by releasing the excess water displaced by the weedkiller as the amount of weedkiller fed to the spraying boom by the triple pumping unit is increased by an increase in the speed of the train. The relief valve 11 serves to unload the excess water to the suction side of the water feed pump 10, so that at the terminal speed of the train neat weedkiller may, if desired, be applied to the spraying boom.

The mixing device 3 (shown more clearly in FIGURE 2 of the accompanying drawings) comprises a vessel in the form of a reducing T-pipe fitting 21, the arms of the fitting 21 having substantially opposed inlet and outlet ports 22 and 23 by means of which water can flow into and out of the mixing device. The stem of the fitting 21 has a port 24 through which passes an inlet pipe 25, the end portion 26 of which is bent into an arcuate shape, so that the outlet end 27 of the pipe 25 is adjacent the center of the inlet port 22 of the fitting 21.

When in use, water is caused to flow through the arms of the T-fitting. The solution or slurry of weedkiller to be sprayed from the spraying boom of the train is caused to enter the mixing device through the inlet pipe 25. The bend in the pipe 25 causes the solution or slurry of weedkiller to enter the mixing device against the line of flow of the water through the device. The action of the weedkiller solution or slurry meeting the oncoming flow of water causes the weedkiller to disperse radially and the mixing of the water and weedkiller is continued by the vortices and turbulence about the inlet pipe 25. The resulting mixture of weedkiller and water then leaves the mixing device by passing through the outlet port 23 and is then conveyed by means of a suitable pipeline to the spraying boom of the train.

Each group of outlet nozzles covering the outer portions of the track can be designed to apply an even dosage across the full swath or, if a differential application of weedkiller over a small portion of the track is required, one of the nozzles can be designed to provide an obtuse triangle of spray so as to give a superimposed spray pattern resulting in the application of a heavier dosage over a small portion of the track.

In operation the railway train can be used to apply differential dosage rates of weedkiller to one or more desired portions of the track by suitable adjustment of one or more of the pumping units which feed weedkiller to the group of outlet nozzles covering the desired portion of the track. Furthermore, one or more of the pumping units may be used to feed a different weedkiller to the respective group of nozzles on the spraying boom so that, if desired, up to three different chemical weedkillers, or three different mixtures of weedkillers, can be applied to the track at the same time.

What is claimed is:

1. A railway vehicle adapted for spraying railway tracks with chemical weedkiller, said vehicle essentially comprising in combination:

- (a) three groups of outlet elements, one group being arranged to spray chemical weedkiller over the width of the track and the other two groups each being arranged to spray chemical weedkiller respectively over the strip on one side of the track;
- (b) each group of outlet elements being connected through a mixing device to an axle-driven metering pump and
- (c) each of said metering pumps connected to a mechanically agitated storage tank;
- (d) means for producing a chemical weedkiller composition in fluid form;
- (e) said means having a supply line to at least one tank wagon carrying water and
- (f) a supply line to at least one tank wagon carrying chemical weedkiller concentrate;
- (g) means for feeding said fluid weedkiller composition to each of said storage tanks;
- (h) an engine-driven centrifugal pump having a sensitive long stroke relief valve;
- (i) a supply line from said engine-driven pump to at least one tank wagon carrying water; and
- (j) a supply line from said engine-driven pump to each of said mixing devices, the arrangement being such that said fluid chemical weedkiller composition drawn from each of said storage tanks by each of said metering pumps is fed respectively into the water supply to each group of outlet elements on the pressure side of said engine-driven pump, hence enabling the quantity and kind of chemical weedkiller dispensed from each group of outlet elements to be varied.

2. A railway vehicle as claimed in claim 1, wherein said mixing device comprises a mixing vessel having substantially opposed inlet and outlet openings whereby water can be caused to flow through the mixing vessel, and entering said vessel an inlet line through which a fluid chemical weedkiller composition can be caused to flow, the inlet line having an outlet end positioned within the mixing vessel in a manner such that the fluid weedkiller composition enters the mixing vessel in a direction substantially opposite to the direction of flow of water through the mixing vessel.

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