

Feb. 2, 1932.

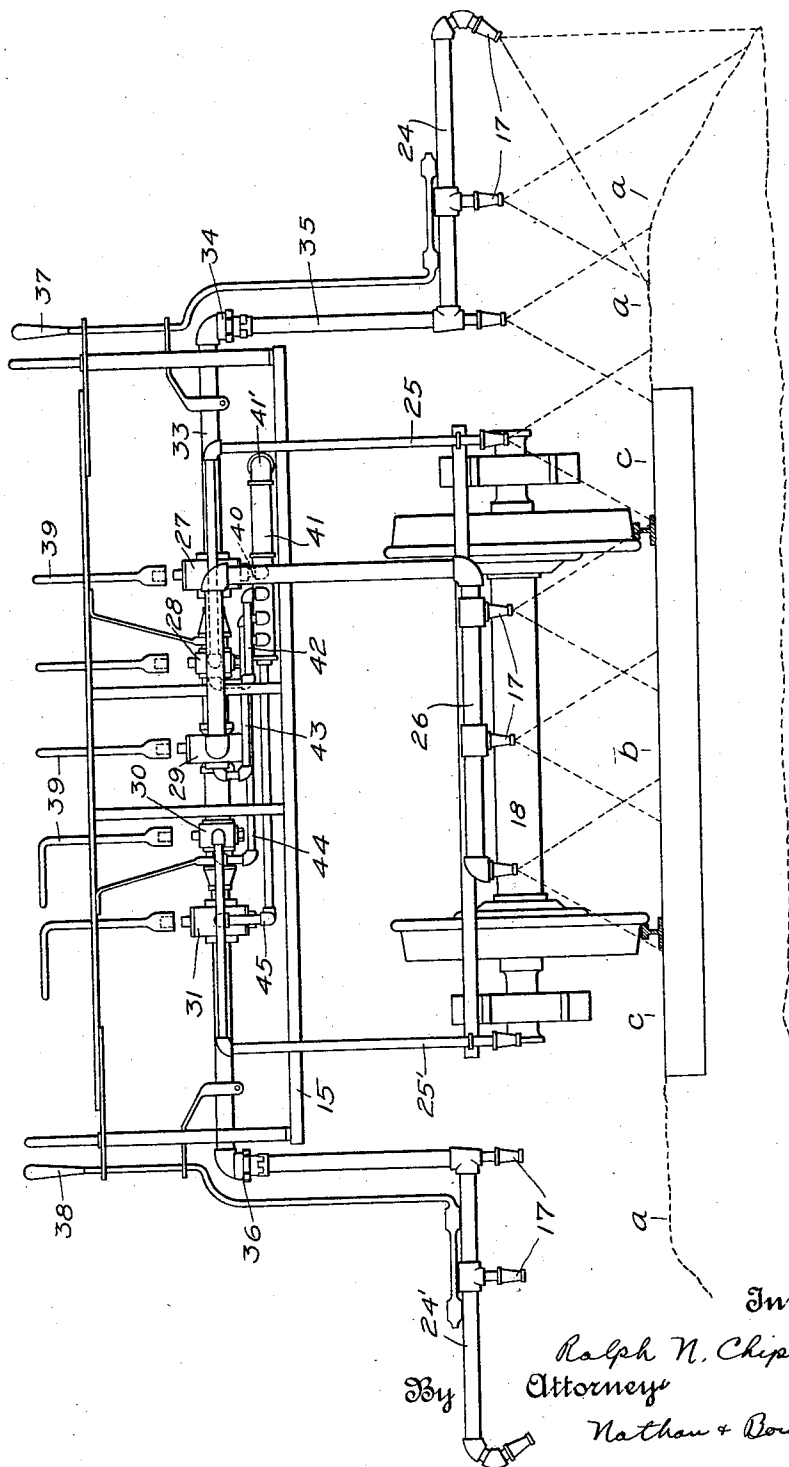
R. N. CHIPMAN
COMPENSATING SPRAYER

1,843,759

Filed May 9, 1928

3 Sheets-Sheet 1

Fig. 1.



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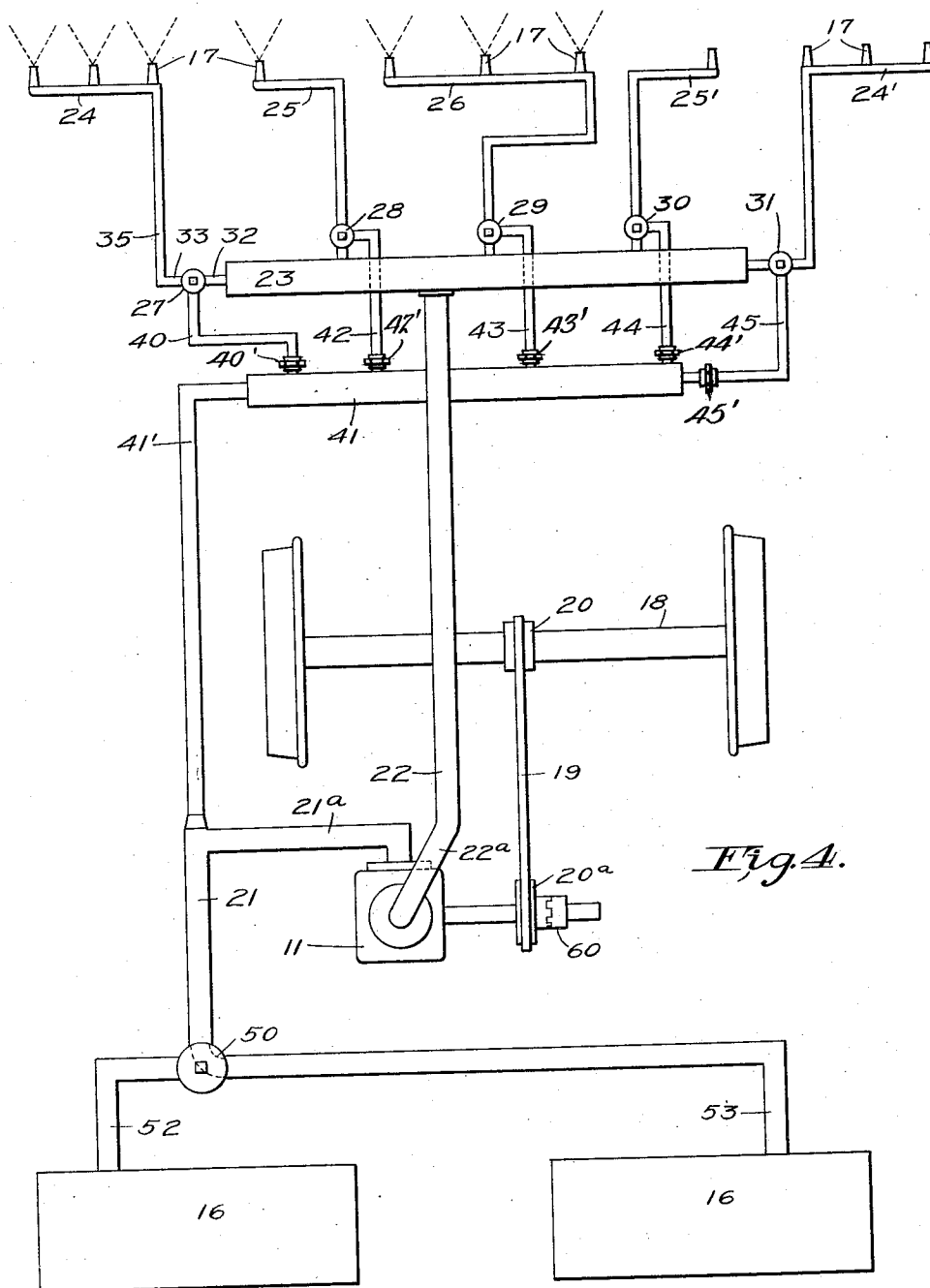
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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COMPENSATING SPRAYER

Application filed May 9, 1928. Serial No. 276,474.

This invention relates to an improvement in the apparatus for spraying a weed-killing chemical along the tracks of a railroad. Heretofore, railroad companies have encountered considered difficulty in keeping down the growth of weeds along and between the rails of their road. Due to the many miles of trackage to be kept free of weeds throughout the year, the labor and expense of so doing often presents a serious problem to the company. Resort was had to a chemical compound which effectually killed the weeds after being sprayed therewith and it is the purpose of this invention to provide a method and apparatus for spraying the chemical over the many miles of road bed in an efficient and inexpensive manner.

In the past, weed-killing apparatus consisted of a given number of nozzles carried by a flat car and arranged transversely across the track, and through which a certain amount of weed-killing solution was forced by means of air pressure or independent pump pressure. With this device it was necessary to regulate the speed of the train to the exact point whereby the discharge from the nozzles would result in a proper dosage for a given area. The equipment heretofore employed provided no flexibility for the different speeds of the moving train and the operator was obliged to rely on his own judgment as to what speed the train was moving and to regulate the valves accordingly. This resulted, oftentimes, in a waste of weed-killing chemicals on certain parts of the road bed and inefficient spraying on other parts.

Since weed-killing dosage is based on the exact tolerance point of vegetation for the chemical it becomes important therefor that the spraying apparatus should function properly at all times so that no more or less chemical will be discharged than is actually necessary for a given area, or that previous determinations have indicated as best suited for the conditions.

This invention contemplates a means for driving a positive, self-measuring or constant displacement pump directly from the axle of the car in such a manner whereby the discharge and pressure of the pump is automa-

tically regulated by the speed of the axle of the car so that within certain limits the discharge from the pump is increased or decreased according to the acceleration or deceleration of the train.

Another disadvantage found in prior devices was that in the absence of weeds across the entire road bed the operator was unable to properly control or direct the fluid through those nozzles under which the weeds appeared, as e. g., when the operator desired to shut off one or more of the nozzles the entire amount was thereby caused to flow through the remaining nozzles.

This condition resulted in a very wasteful and costly weed spraying outfit, therefore an object of this invention is to provide a means whereby one or more of the spray heads may be turned off without affecting the rate of discharge from the others. This is accomplished by locating within convenient reach of the operator and between the spray heads or nozzles and the pump, a three-way valve, such that when a particular nozzle or section of nozzles are turned off, that amount of fluid which would normally be discharged therethrough is directed back to the intake or suction side of the pump. Thus it will be seen that the amount of discharge through the nozzles remaining open is not increased or decreased on the manipulation of any of the other valves. The result is an efficient spraying apparatus without any waste or over dosage and by the aid of a positive self-measuring pump a uniform film of chemical is sprayed over the weeds wherever they appear on the road bed and regardless of the rate of movement of the train.

Another important feature of this invention lies in the design of this apparatus including a selection of valves and related fluid conduits such that pressure losses due to the various lengths of piping, bends and orifices have been compensated for so that each nozzle discharges the proper amount of weed-killing chemical to effectually kill the plant growth along the road bed.

Other objects and advantages will be in part indicated in the following description

and in part rendered apparent therefrom in connection with the annexed drawings.

To enable others skilled in the art so fully to apprehend the underlying features hereof that they may embody the same in the various ways contemplated by this invention, drawings depicting a preferred typical construction have been annexed as a part of this disclosure and, in such drawings, like characters of reference denote corresponding parts throughout all the views, of which:—

Figure 1 is a front assembly view of the weed spraying apparatus incorporating this invention. Fig. 2 is a plan view showing the pipe connections to the pump and the driving means therefore, (the platform of the flat car being removed to better show the mechanism therebeneath). Fig. 3 is an elevational view showing more clearly the support for the pump and the manner of connecting the same to the standard form of wheel truck of a car. Fig. 4 is a diagrammatic figure showing the pressure lines from the pump to the nozzles and the by-pass lines back to the intake or suction side of the pump. Fig. 5 is an enlarged detail of a portion of a return pipe section illustrating readily accessible means for maintaining the pressures in the spray sections unaffected upon the closing off of one or more thereof.

Referring more particularly to Figs. 1, 2 and 3, the apparatus is shown as mounted preferably on the usual standard type of a flat car but not necessarily so, as with a few minor changes it may be readily adapted to other types of cars, such as, for example, the standard push car type for use in freight yards and railroad terminals where it would be impractical to spray short lengths of track with an engine drawn outfit. The apparatus may also be mounted on what is known as a motor power car which is driven from an ordinary gas engine.

For the purpose of illustration the outfit is shown as adapted to be mounted on a flat car shown in part on the drawings. In Figs. 2 and 3 cross rails 10 supporting the pump unit 11 are provided at each end with a forwardly extending arm 12 which may be suitably secured to the arch bar 13 of the car truck by means of the strap 14 and bolts (not shown).

The pump 11 is of a standard make and description thereof is thought unnecessary. Suffice it to say that it is of the positive self-measuring or constant displacement type in which the quantity of fluid delivered thereby is directly proportional to the speed at which it is operated. The pump is mounted on the rails 10 between the arms 12 and is driven directly from an axle 18 of the car truck by means of the chain 19 and gears 20 and 20^a. In order that the action of the pump may be discontinued at the will of the operator a suitable clutch mechanism indicated gener-

ally at 60 may be employed and which is actuated by the lever 61. Thus, when the train is moving along a stretch of track barren of weeds, or when shifting the train about the railroad yards the pump may be disconnected from the axle of the car and thereby needless wear and tear on the unit is dispensed with. The size of the sprocket 20 and 20^a may be varied to regulate the pump output accordingly. This enables e. g., a wider or narrower strip to be covered without changing the amount of fluid per unit of area.

Fluid from the tanks 16 is drawn into the pump 11 thru pipe line 21 and flexible connection 21^a and is forced out of the pump through the flexible pipe 22^a thru line 22 to the distributing chamber or manifold 23. At this point the line is divided into numerous outlets, five of such outlets being illustrated in the drawings.

Each outlet conducts fluid to one or more of the nozzles 17. For economical operation the nozzles are arranged in groups or sections (Figs. 1 and 4) depending upon the character of the road bed which determines the number of nozzles that may be controlled by a single valve. It has been found that the ballast shoulder *a* of the road bed normally requires more weed-killing solution than the section *b* located between the rails of the tracks and the section *c* located just outside of the rails and therefore it has been found desirable to group the individual nozzles into sections 24, 25, 26, 25' and 24'. Sections 24 and 24' being used, when necessary, for the extreme edges of the road bed, sections 25 and 25' for that locality just outside of the rails and section 26 for that locality between the rails.

The various pipes leading from the manifold 23 are usually of different sizes in order to maintain an equivalent pressure on the respective nozzles. However, as the pipe friction in the several sections varies according to the number of right angles, bends and lengths, an ordinary washer or metal orifice 60 is placed at some point in the return fluid conduits and bored to the proper size so that the discharge is equalized in accordance with the requirements of each section. Since it is practically impossible to accurately compute friction in short units the required opening is usually determined by tests.

The fluid forced into the distributing chamber 23 is conducted thru three-way valves 27, 28, 29, 30 and 31, one valve being located in each of the sections of the spray heads and inasmuch as all function similarly only one of which will be described. The valve per se is of a standard make and readily obtainable on the market and is what is known as a three-way valve, i. e., three ports to which pipe connections may be made. For instance, valve 27 shown in the drawings re-

ceives fluid from the distributing chamber 23 thru the pipe line 32 and if the valve is "open" the fluid passes thru pipe 33, angle joint 34, pipe 35 and thence to section 24 and out of the nozzles 17 of that section.

The angle joint 34 (Fig. 1) is for the purpose of folding the section 24 backward or forward at right angles to its normal working position to allow room for another train on an adjacent track to pass the outfit and also to conserve space in the railroad yards when the apparatus is temporarily in storage. A similar angle joint 36 is used to permit the swinging of the section 24'. Any suitable means may be employed for swinging the sections to the desired position such as, for example, levers 37 and 38 located within reach of the operator positioned on the platform 15 of the car.

Should the operator desire to stop the flow thru any one of the sections of nozzles a quarter turn of the valve is all that is necessary. For instance, the outer edge of the track under spray head section 24 may be barren of weeds, the operator turns the valve 27 by means of the handle 39 thereby stopping the flow of chemical thru those particular nozzles. The valve 27 is so constructed and arranged that when the line 33 is closed the fluid is by-passed thru the pipe line 40 to the auxiliary reservoir 41. For a very accurate control or compensation the effective openings thru the valve 27 may be such as to compensate for the variation in resistance offered by the respective outlets thru the pipes 35 and 40. To permit ready accessibility, this restricted passage may be placed in the unions 40', 42', 43', 44', and 45' of the return lines 40, etc., and may assume the form of a bored washer 60 or any other suitable device which offers a restriction to flow equivalent to the restriction at the nozzles of the particular spray section. Valves 28, 29, 30 and 31 are similarly connected to the reservoir 41 by means of pipe 42, 43, 44 and 45 respectively.

Thus it will be seen that upon the closing off of one or more of the sections of spray heads the pressure in those sections remaining open and the rate of flow therethrough is unaffected since the unused fluid which would ordinarily build up the pressure is directed back to the intake side of the pump.

At one end of the reservoir 41 is connected pipe line 41' which conducts the fluid to the line 21 from whence it is drawn into the pump 11 thru the flexible pipe 21^a.

The valves 28 and 30, also the pipe connections to spray head sections 25 and 25' as shown in Fig. 1 are proportionately smaller in diameter and cross-sectional area to compensate for the fewer number of nozzles to be supplied with the chemical. This reduction in the sizes of the piping and valves is important in order to discharge an even spray of

chemical transversely across the entire road bed and in the event of the closing of the valves to return to the pump suction lines 41' and 21 the equivalent of the sectional quantity and thereby neither diminishing nor increasing the discharge thru the other spray head sections when valves 28 and 30 are operated.

Valve 50, actuated by levers 51, is inserted in the pipe line 21 in order that the operator may selectively spray the road bed with one of two kinds of solutions. Branch lines 52 and 53 conduct the fluid from the tanks 16 which, may contain solutions of different killing properties or both tanks may contain the same solution but of different dilutions, one being used for a heavy growth of weeds and the other diluted for a light growth. Either solution being used according to the character or geographical location of the country thru which the tracks run.

The cycle of operation is as follows:

The fluid is drawn from one of the reservoirs 16 by the pump 11 and forced to the distributing chamber 23 and thence to the various spray sections as desired. Figs. 1 and 4 illustrate diagrammatically the spray emitted from sections 24, 25 and 26, while sections 25' and 24 are closed off. The fluid which would normally be discharged thru these sections is by-passed to the reservoir 41 and thence back to the pump, the by-pass pipes and reservoir 42 forming a pressure relief system which prevents an over-loading of the pump or a greater discharge from the open nozzles than is necessary. And since the pump is of the positive self-measuring type and geared directly to the axle, a very even, properly proportioned spray in accordance with the area covered is produced regardless of the rate of movement of the train.

Without further analysis, the foregoing will so fully reveal the gist of this invention that others can, by applying current knowledge, readily adapt it for various utilizations by retaining one or more of the features that, from the standpoint of the prior art, fairly constitute essential characteristics of either the generic or specific aspects of this invention and, therefore, such adaptations should be, and are intended to be, comprehended within the meaning and range of equivalency of the following claims.

Having thus revealed this invention, I claim as new and desire to secure the following combinations and elements, or equivalents thereof, by Letters Patent of the United States:—

1. A compensating fluid distributing system combining a car platform and car trucks therefor; a reservoir; means for supplying fluid in accordance with the speed of travel of said flat car, said means comprising a positive pressure pump mounted directly on said

car truck and driven from the car wheel axle;
a plurality of distributing devices for said
fluid, means for rendering one or more of
said devices inoperative; and means including
5 a by-pass line for each distributing device,
each by-pass having therein a resistance ele-
ment affording a resistance equal to that af-
forded by the distributing device for main-
taining a supply of fluid to the remaining
10 devices substantially constant for a given
speed independent of the number operative.

2. A compensating spraying apparatus
combining a vehicle; wheel trucks therefor; a
pump adapted to supply fluid in substantial-
15 ly direct proportion to its speed; a driving
connection for operating said pump at a
speed proportional to the rate of travel of the
vehicle; a plurality of spraying elements con-
nected to said pump, and means for by-pass-
20 ing the fluid normally supplied to one of
said elements whereby said element is ren-
dered inactive without effecting the opera-
tion of the remaining elements, said means
including a two-part conduit, a coupling ele-
25 ment connecting said two parts, and a plate
removably mounted in said coupling and pro-
vided with an aperture adapted to afford a
resistance equal to the resistance afforded by
the spraying element by-passed by said con-
30 duit.

3. A compensating fluid distributing sys-
tem combining a car platform and car trucks
therefor; a reservoir; means for supplying
fluid in accordance with the speed of travel
35 of said car, said means comprising a positive
pressure pump mounted directly on said car
truck and driven from the car wheel axle;
a plurality of sets of distributing devices for
said fluid; means for rendering one or more of
40 said sets inoperative; means including a by-
pass line for each distributing device, each by-
pass line having therein a resistance element
affording a resistance equal to that afforded
by the distributing device for maintaining the
45 supply of fluid to the remaining devices sub-
stantially constant for a given speed, inde-
pendent of the number operative; and means
to swing one of said sets of distributing de-
vices out of its normal operative position.

50 In witness whereof I hereunto subscribe
my name.

RALPH N. CHIPMAN.

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