

April 4, 1944.

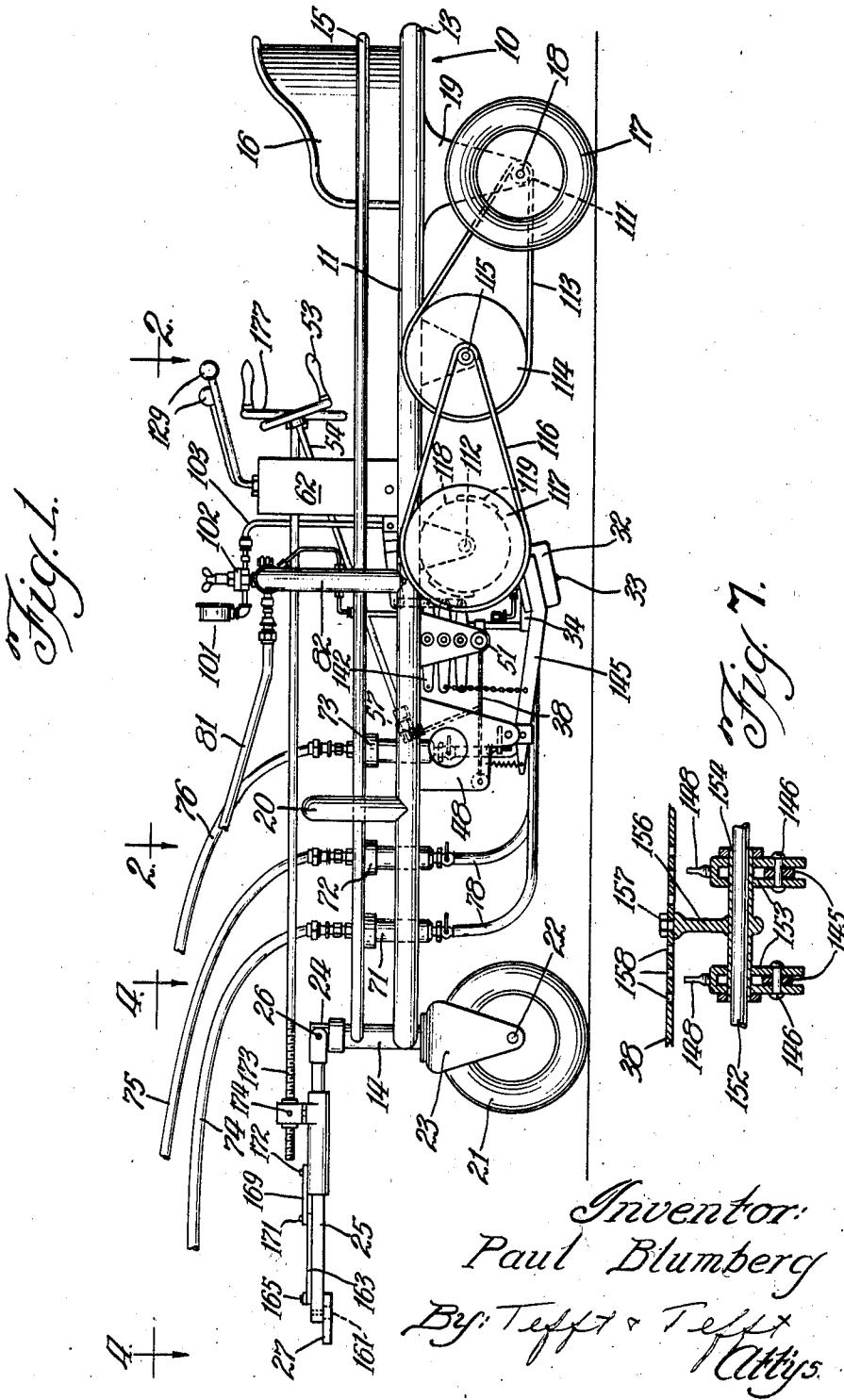
P. BLUMBERG

2,345,653

ROAD MARKING DEVICE

Filed Aug. 10, 1940

4 Sheets-Sheet 1



April 4, 1944.

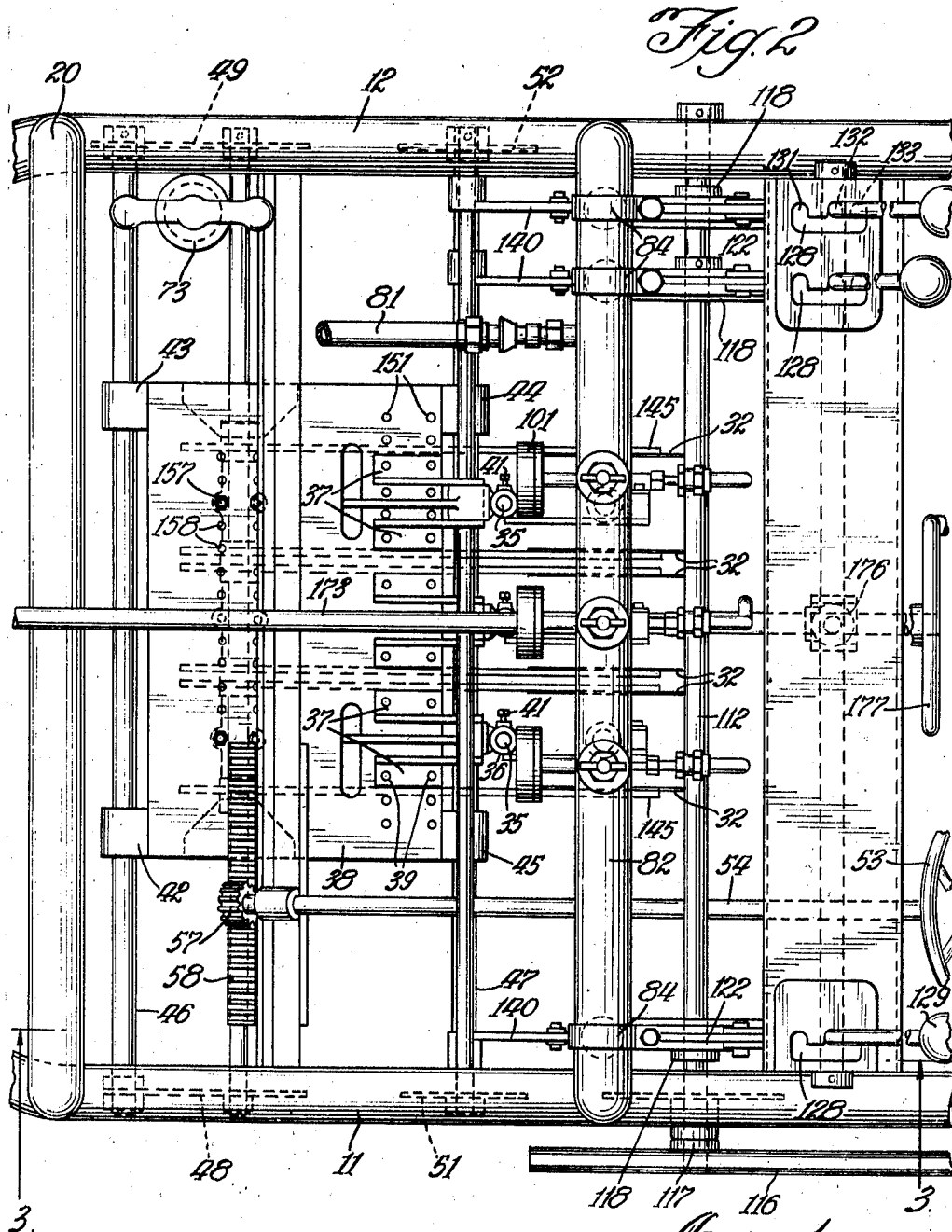
P. BLUMBERG

2,345,653

ROAD MARKING DEVICE

Filed Aug. 10, 1940

4 Sheets-Sheet 2



Inventor:
Paul Blumberg
By: Tefft & Tefft
Attys.

April 4, 1944.

P. BLUMBERG

2,345,653

ROAD MARKING DEVICE

Filed Aug. 10, 1940

4 Sheets-Sheet 3

Inventor:
Paul Blumberg
By: Jeff & Jeff City, S.

UNITED STATES PATENT OFFICE

2,345,653

ROAD MARKING DEVICE

Paul Blumberg, New Holstein, Wis., assignor to
Meili-Blumberg Corporation, New Holstein,
Wis., a corporation of Wisconsin

Application August 10, 1940, Serial No. 352,084

5 Claims. (Cl. 91-12)

This invention relates to highway marking devices and more particularly to an improved highway marker comprising a vehicle in the form of a trailer having a plurality of paint applicators and control devices therefor, all arranged to be conveniently operated by an operator seated on the trailer.

It will be appreciated that in the congested traffic conditions now prevailing in most localities, it is highly important that highways be plainly and accurately marked in order to facilitate the movement of traffic and reduce the danger of accidents. It is, of course, very essential that the marking of highways shall be accomplished at low cost, and it is also highly desirable to be able to apply the markings at a relatively high rate of speed in order that a given section of highway may be marked during periods when the traffic is comparatively light so that the marking operation will not unduly interfere with the normal flow of traffic. It is also essential to provide control devices such that the markings may be rapidly applied even when it is necessary to follow and duplicate existing markings which have become partially obliterated by wear.

Further, it is desirable that a highway marking device be provided with a plurality of paint applicators arranged so that they may be individually or simultaneously controlled to apply continuous parallel lines of different colors, interrupted lines, or any combination of the above commonly used as code indications of the traffic regulations existing at a given point on the highway. For example, it is quite customary to separate individual lanes in a multiple lane highway by a single line and to separate the lanes devoted to traffic in one direction from the lanes devoted to traffic in the other direction by a double or triple line, usually in a color easily distinguishable from the color designating the boundaries of the individual lanes. In many states of the Union other code indications useful for traffic control have been adopted, as for example the provision of an interrupted center line on those portions of a highway in which it is permissible to pass another vehicle, as contrasted with a solid or double line on curves or on approaches to hills, etc. where it is illegal to pass.

It is, therefore, the principal object of this invention to provide a highway marking device consisting of a trailer having a plurality of paint applicators arranged to be simultaneously or independently operated by an operator seated on the trailer in such a position that he may easily observe the operation of the paint appli-

cators and may thus instantly note any improper functioning of the applicators or any deviation from the proper line of the markings.

A further object of the invention is to provide a highway marking device, including improved control devices whereby the operator may easily and accurately follow existing road markings even though the marking device is moving at a relatively high rate of speed.

A further object of the invention is to provide improved high speed paint applicators whereby stripes of paint may be applied to a highway at a speed considerably greater than by the use of the devices commonly utilized in the prior art.

A further important object of the invention is to provide automatic control devices for the paint applicators to permit each applicator to be individually or simultaneously controlled and to provide automatic means for interrupting the operation of the applicators to paint interrupted lines or to paint any combination of solid lines or lines of different colors.

These and other important objects, which will appear hereinafter, are accomplished in the present invention by providing a trailer adapted to be pulled or pushed by a truck or other tractor vehicle which will preferably also serve to carry paint supply tanks and an air compressor. The trailer consists in general of a framework of tubular members having a pair of rear wheels spaced apart from each other and a single front wheel or dual wheels pivoted on a kingpin to permit steering. The paint applicators themselves consist of spray guns or air brushes mounted on a carriage arranged to be shifted transversely of the trailer frame in order that new markings may be applied directly on existing markings even though the trailer is not guided with sufficient accuracy to follow the old markings exactly.

The paint applicators are each controlled by an individual air valve and a cam shaft is provided to simultaneously control all of these valves, if desired. The cam shaft is directly coupled to one of the rear wheels of the trailer by a reduction chain drive so that the valves may be automatically opened and closed in timed relationship with the forward movement of the vehicle so that the painted markings may be interrupted in uniform measured distances.

Referring now more particularly to the drawings in which a preferred embodiment of the invention has been illustrated,

Fig. 1 is a side elevation of a highway mark-

ing trailer constructed in accordance with the teachings of this invention;

Fig. 2 is an enlarged plan view of the central portion of the mechanisms illustrated in Fig. 1 and is taken substantially on the plane of the line 2—2 in Fig. 1;

Fig. 3 is a detail sectional view of the paint applicator and control mechanisms and is taken substantially on the plane of the line 3—3 in Fig. 2;

Fig. 4 is a detail plan view of the preferred drawbar construction and is taken substantially on the plane of the line 4—4 in Fig. 1;

Fig. 5 is a diagrammatic representation of the device illustrating in Figs. 1 to 4, inclusive, illustrating the manner in which this trailer is coupled to a truck or other tractor vehicle;

Fig. 6 is a detail sectional view of one of the paint applicator air control valves; and

Fig. 7 is a detail sectional view of the shield plate mounting and is taken substantially on the plane of the line 7—7 of Fig. 3.

The frame

In general, the trailer comprises a tubular frame 10 consisting of the longitudinal frame members 11 and 12, which are interconnected at their rear extremities by a transverse member 13 and which extend inwardly at their forward ends to join with and be supported by a vertical tube or kingpin bearing 14. This lower frame is reinforced by a somewhat similar upper frame or hand rail 15 which also extends from the kingpin bearing 14 down one side of the trailer, across the back of the seat 16, and forwardly on the other side to the bearing 14. A pair of rear wheels 17 are mounted on an axle 18 carried between a pair of brackets 19 welded or otherwise secured to the tubular frame 10, and a cross frame member 20 is welded between the side members 11 and 12 near the forward end of the vehicle. A front wheel 21 is mounted on an axle 22 carried between the opposite sides of a fork 23 secured at the lower end of a kingpin 24 journaled in the kingpin bearing 14. A drawbar 25 is pivoted to the kingpin 24 by means of the pivot 26 and extends forward to a plate 27 which is provided with a plurality of mounting holes 28 in order that it may be readily bolted to a truck or other tractor vehicle 29. (See Fig. 5.)

The marker carriage

The device chosen for illustration in the drawings includes three paint applicators, each of which is identical in construction and consists in general of a spray gun or air brush 31 having a shield plate 32 arranged on each side of the nozzle 33 so that the spray from the nozzle will be confined between the shield plates and will paint a line having sharp, regular side edges. It will be understood, of course, that as the vehicle moves forward, these shields contact the paving lightly and prevent any of the paint discharged from the nozzle 33 from striking the surface of the paving at any point except within the limits defined by the shields.

Each of the spray guns 31 is mounted on a bracket 34 carried by a vertical rod 35 having its upper end bolted in a sleeve 36 of one of the brackets 37 secured to the marker carriage 38 by the machine screws 39. It will be appreciated that each of the rods 35 is vertically adjustable in the sleeve 36 and may be locked in any position in the sleeve by means of the set screw 41 in order that the spray gun 31 may be mounted at any

desired height above the surface of the paving.

It has been pointed out hereinbefore that it is one of the objects of the invention to provide a transversely shiftable carriage to support the paint applicators so that all of the applicators may be simultaneously shifted to one side or the other to follow markings in existence on the road surface. To accomplish this result the marker carriage 38 is provided with sleeve portions 42, 43, 44, and 45 at each of its corners so that it may be readily shifted transversely of the frame on the slide rods 46 and 47. The slide rod 46 extends through the sleeve members 42 and 43 at the front of the carriage and is supported between a pair of brackets 48 and 49 welded to the frame members 11 and 12 respectively, while the slide rod 47 extends between the brackets 51 and 52 also welded to the frame members 11 and 12. The arrangement is such that the entire carriage 38 and the three paint applicators 31 may be simultaneously shifted in either direction simply by sliding the carriage 38 along the slide rods 46 and 47.

To accomplish this shifting instantly and easily, a hand wheel 53 is mounted on a shaft 54 extending between an upper bearing 55 and a lower bearing 56. The lower bearing 56 is mounted on an angle iron 61 which extends between the opposite longitudinal frame members 11 and 12, and the upper bearing 55 is supported on a channel shaped cross frame member 62 which extends upwardly from the frame member 11, transversely across the machine, and downwardly to the frame member 12. By manipulating the hand wheel 53 the shaft 54 may be rotated so that a spur pinion 57 at the lower end of the shaft will impart transverse movement to a rack 58 which is supported on the carriage 38 by the bracket 59.

The paint and air supply ducts

The paint supply and air compressor for the spray guns 31 may be carried on the trailer, if desired, but it is at present considered preferable that they should be carried in a truck which may also be utilized as a tractor vehicle to draw the trailer illustrated herein along the highway. In this event it is contemplated to provide three paint containers in the truck and to connect each of these paint containers with one of the tubular headers 71, 72, or 73 by one of the flexible hose lines 74, 75, and 76, respectively. The headers may be arranged in any desired fashion, but it has been found convenient to form them of tubular material similar to that used in the frame elements and to position them at one side of the frame on the longitudinal member 12 in order to give clear vision across the entire forward end of the trailer frame. It should be understood, however, that each end of each of these headers is closed to prevent paint flowing from one header to the other. Each of the spray guns 31 is connected to one of the headers by a flexible hose connection 78 so that each of the spray guns may be supplied with a different colored paint, if desired. It is, of course, contemplated that it may be frequently desirable to supply two or more of the spray guns with paint of the same color and this may be easily accomplished by providing valves in the headers or by providing additional fittings so that more than one spray gun may be connected to each individual header.

The compressed air supplied to operate the spray guns is supplied through an air hose 81 extending from the compressor located in the

truck to a transverse tubular header 82 extending between the frame members 11 and 12. The spray guns 31 are of such construction that the flow of paint is controlled by the air supply, and it is, therefore, only necessary to provide mechanism to control the air to each spray gun in order to positively control the flow of paint. To accomplish this each of the spray guns 31 is provided with an individual control valve 83 clamped to the header 82 by a split clamp 84. The valve 83 comprises a cylinder 85 adjustably mounted on a threaded shank 86 of the clamp 84 and locked in predetermined position thereon by a lock nut 87. An air passage 88 is drilled in either side of the cylinder, and the flow of air through this passage 88 is controlled by the sliding plunger 89 which extends downwardly out of the lower end of the cylinder and is provided with a compression spring 91 telescoped on the plunger 89 to act downwardly against the collar 92 and move the plunger 89 downwardly. A transverse port 93 is drilled through the plunger 89 and is adapted to register with the port 88 and permit the flow of air through the valve whenever the plunger 89 is raised against the force of the compression spring 91. A vent 94 is provided at the upper extremity of the cylinder 85 and a by-pass port 95 is cut in the plunger 89 to interconnect the port 88 with a port 96 when the air supplied to the spray guns is shut off.

Each of the individual air control valves 83 is supplied with compressed air through a tube 97 leading from the header 82 to the port 88 of the valve, and each valve delivers air to one of the spray guns 31 through one of the tubes 98. A pressure gauge 101 is provided for each of the spray guns 31. These pressure gauges 101 are preferably mounted on brackets 102 secured to the header 82 and connected directly to the spray guns by an air tube 103.

The automatic valve control

It is frequently desirable to apply highway markings consisting of an interrupted or broken line and in order to insure uniformity of marking it is desirable that the paint lines and spaces between them be accurately measured and uniform on all portions of the highway. This is done in the present invention by providing a sprocket 111 on the rear axle 13 and arranging this sprocket 111 to drive a cam shaft 112 through a reduction chain drive consisting of the chain 113, sprocket 114, sprocket 115, chain 116, and driven sprocket 117. The cam shaft 112 is positioned somewhat below the valves 83 and is provided with three cam disks 118, each of which includes segmental cam portions 119. It is contemplated that these cam portions 119 may be formed integral with the cam disk 118 or may be separate segments bolted to the disk in such a manner as to be shiftable or removable according to the desires of the operator. The cam segments 119 are arranged to contact a roller or cam follower 121 to pivot the arm 122 upwardly around its mounting pivot 123 and thus lift the plunger 89 of the valve 83 by means of the connecting links 124 which interconnect the arm 122 and the lower extremity of the plunger 89. It will be apparent that as the entire vehicle is drawn forward, the cam shaft 112 will be driven by the reduction chain drive extending to the rear wheels so that all of the three control valves 83 will be synchronously operated by the three identical cam structures 118. By this means all of the spray guns 31 may be simul-

taneously controlled and by altering the size and number of the cam segments 119 it is possible to provide any type of interrupted line suitable to the desired code marking in use.

It is also desirable, however, to be able to control the valve 83 by manual controls which can be operated irrespective of the operation of the cam shaft. To accomplish this each of the cam arms 122 has been mounted on the pivot 123 carried on a shiftable crank 125 on the transverse shaft 126. It will be understood that there are three of these cranks 125, each of which is pivotally mounted on a shaft 126 and each of which is provided with a manual control handle 127 extending upwardly through an indexing slot 128 on the upper surface of the transverse channel member 62 and terminating in a shifting knob 129 positioned at a convenient point for manipulation by the operator. By reference to Fig. 2 it will be seen that each of the indexing slots 128 includes three locking notches 131, 132, and 133. The notch 131 provides for automatic cam control of the nozzles, but the operation of any nozzle may be controlled by moving the rod 127 into the notch 132 to shut off the air supply or may by moving the rod 127 into the notch 133 open the valve 83 and turn on the air.

The operation of this mechanism will be clarified by an examination of Fig. 3 in which the control handle 127 has been illustrated in its off position with the valve 83 closed. It will be seen that with the parts in this position the pivot 123 is located at such a point that the cam roller 121 will not be contacted by the cam segments 119 as they revolve below it. Thus the compression spring 91 of valve 83 will urge the plunger 89 downwardly into closed position against the limit stop 134. To open the valve, however, the operator may move the control handle 127 rearwardly into the notch 133 to rock the arm 125 in a clockwise direction around the shaft 126. At this time an adjustable screw 135 secured to the arm 125 will contact the extension 136 of the arm 122 to limit the pivotal movement around the notch 133 and lift the arm 122 to open the valve 83. These operations, it will be noted, are positive and may be accomplished irrespective of the position of the cam segments 119, but to provide automatic control it is only necessary to shift the lever 127 forwardly into the notch 131. When this is done the arm 126 will pivot in a counter-clockwise direction and lower the pivot 123 to such a point that the cam roller 121 is in the path of rotation of the cam segments 119. Thus when the segments 119 contact the roller 121 the arm 122 will be lifted to open the valve 83 and supply air to the spray guns, but as the cam segments 119 move beyond the roller 121 the coil spring 91 of the valve will move the plunger downwardly into closed position.

The shield control

It is considered desirable that paint lines used in highway marking have smooth, sharp, and definite edges and since this cannot ordinarily be accomplished by the use of a spray, it is desirable to provide the side shields 32 on either side of each of the spray gun nozzles 33 to prevent undue spreading of the paint spray and provide smooth clean edges for the lines. The shields 32 may be adjusted to assume a position closely adjacent the surface of the highway, but it is the more common practice to permit the shields to actually contact the highway sur-

face under light pressure to secure the greatest sharpness of the line edges. It will be appreciated, however, that a certain amount of paint collects on the shield plates and that if they are allowed to remain in contact with the road surface after the spray guns have been shut off, they may leave a slight mark or individual narrow stripe beyond the end of the main body of the marking line. This effect is undesirable and is eliminated in the present invention by providing means responsive to the opening and closing of the valve 33 to control the shield plates 32 and lift these plates from the highway whenever the spray gun 31 is closed.

To accomplish this result each of the arms 122 is provided with a link 141 connected to one of the rocker arms 140 supported on one of the pivot shafts 143 extending between the brackets 52 hereinbefore described. Rocker arms 142 are provided on each shaft with chains 144 leading to a pair of the shield arms 145. It will be understood that each of these shield arms 145 is mounted on a pivot 146 and extends rearwardly to support one of the shield plates 32. Springs 147 are provided to urge the shields 32 downwardly into firm contact with the highway surface and adjusting screws 148 are provided to limit the downward movement.

From the foregoing it will be seen that whenever the arm 122 is raised, either by the operation of the cams 119 or by manual operation of one of the control handles 127, the valve 33 will be opened and one of the rocker arms 140—142 will be operated to lower the shields 32 simultaneously with the opening of the valve 33. When the arm 122 is lowered to close the valve 33 the rocker arms 140—142 will operate to lift the shield plates out of contact with the highway surface to leave a clean and neat end on the painted marking line.

Line spacing adjustment

It will be appreciated that there may be occasions to alter the relative spacing between the parallel marking lines, and to accomplish this provision is made to shift each of the outside spray guns 31 outwardly to a different position on the marking carriage 38. This may be easily accomplished by removing the machine screws 39 which secure the brackets 37 to the carriage 38 and shifting these brackets outwardly to outer mounting holes 151 provided for the purpose. It is essential, of course, that whenever the spray guns 31 are shifted the shields 32 associated with the nozzles should also be shifted and to accomplish this each pair of shields 32 is individually mounted for transverse sliding movement along the cross shaft 152 extending between the brackets 48 and 49. (See Fig. 7.) It will be seen that each of the shield arms 145 is mounted on the pivot 146 carried by the casing 153 and that each pair of castings 153 is joined by sleeve 154 provided with collars 155. The arrangement is such that the castings 153 are rigidly secured to the sleeve 154, but the entire sleeve assembly may be shifted along the shaft 152 and locked in any predetermined position by means of the bracket 156 which extends upwardly from the sleeve 154 and is bolted to the lower surface of the marker carriage 38 by the machine screws 157. Thus whenever the spray guns 31 are shifted the machine screws 157 are removed and the shield mounting assembly shifted correspondingly to outside mounting holes 158 corresponding to the mounting holes 151 for the spray gun brackets 37.

The compensating vehicle coupling

Whenever a trailer is being drawn around a curve by a truck or other vehicle there is a tendency for the trailer to follow a different path than the path of the tractor vehicle, with the result that some difficulty has been encountered in attempting to accurately mark curves by virtue of the fact that coupling between the trailer and the tractor vehicle did not permit proper adjustment to be made to keep the trailer in proper alignment with the center of the highway.

This difficulty is overcome in the present invention by providing a compensating coupling associated with the draw bar of the trailer so that the point of connection between the draw bar and the tractor vehicle could be shifted from side to side to compensate for the natural effect of the curve. By examination of Figs. 1, 4 and 5 it will be seen that the draw bar 25 is connected to the transverse plate 27 by means of a roller 161 arranged to move in the cross slot 162. This in effect provides a transverse sliding connection between the plate 27, which is secured to the tractor vehicle, and the draw bar 25, which is secured to the trailer. To shift the draw bar 25 from side to side in the slot 162 a bell crank 163 is mounted on the draw bar 25 by a stationary pivot 164 and one arm of the bell crank 163 is connected to the transverse plate 27 by a link 165 extending between the rivets 166 and 167. The opposite end of the bell crank 163 is linked to a slide member 168 by the link 169 extending between the rivets 171 and 172. The slide 168 is longitudinally shiftable along the draw bar 25 by the screw-threaded shaft 173, which extends between the nut 174 mounted on a universal mounting 175 and a bearing 176 carried by the transverse frame member 62. A hand wheel 177 is provided so that the shaft may be conveniently rotated from the operator's station to shift the roller 161 in either direction along the slot 162 to compensate for the effect of a curve in the highway and to permit the operator to maintain the spray gun 31 in the proper position while rounding a curve. (See Fig. 5.)

Operation

While it is believed that the operation of the mechanism has been brought out by the foregoing description, it will be here briefly reviewed. The trailer will be coupled to a truck or other tractor vehicle by holding the transverse plate 27 to the rear of such vehicle and connecting the paint lines 74, 75, and 76 to paint containers carried by the truck. The air supply line 81 will also be connected to an air compressor on the truck so that the trailer here illustrated may be drawn along the highway and continuously supplied with paint and compressed air from the tractor vehicle.

The operator will be seated in the seat 16 and as the vehicle proceeds, it will not ordinarily be necessary for him to steer the trailer since the draw bar 25 will control the position of the front guide wheel 21 and maintain the entire trailer in approximately the proper position on the highway. However, when it is necessary to renew highway markings which have become partly obliterated by wear it is desirable that the new markings be applied with great accuracy to give a clean, neat appearance to the finished work. To accomplish perfect alignment the operator will rotate the hand wheel 53 to shift the marker carriage 38 laterally until the edges of the shields

32 correspond exactly with the edges of the existing lines. At this time the operator will move one or more of the control handles 127 into the notch 133 to open the air valve 83 and start the operation of one or more of the spray guns 31. Simultaneously with the commencement of the spraying the manipulation of the control arm 127 will lower the shield plates 32 into contact with the highway surface to limit the spread of the paint spray and define sharp side edges of the paint lines.

To interrupt the line the operator will shift the lever 137 back into the center notch 132, and this operation will be effective to lower the arm 122, close the valve 83, and simultaneously lift the shield plates from the road surface to prevent ragged markings or fine paint lines beyond the end of the broad line left by the paint spray.

If the operator desires to paint a single line, it will, of course, be only necessary to manipulate one of the levers 127, but if it is desired to paint two or more parallel lines, this may be done by manipulating the proper levers, it being understood that each lever acts as an individual control for one of the individual spray guns 31.

To apply code marking, as for example an interrupted line, the operator may shift the control lever 127 into the notch 131 to provide automatic operation of the spray. At this time the valve 83 will be opened and closed responsive to the operation of the cam segments 119, and since the cam shaft 112 is directly coupled to the wheel 17 of the trailer, the markings will be automatically measured and will be absolutely uniform. It will be understood, however, that irrespective of whether the valves 83 are controlled by manual manipulation of the levers 127 or by automatic operation of the cam segments 119, the movement of the shield plates 32 is at all times responsive to the operation of the valves so that the shields will be lowered into contact with the road surface whenever the sprays are operated and will be raised above the surface of the highway whenever the spray operation ceases.

As the vehicle approaches a curve the operator may spin the hand wheel 177 to operate the bell crank 163 and shift the point of connection between the draw bar 25 and the plate 27 in either direction according to the direction of the curve. This operation is substantially the same with each of the species of coupling devices illustrated, and provides a compensating coupling and facilitates the application of markings on curved surfaces of the highway where the trailer would not ordinarily follow the true course of the tractor vehicle. It is appreciated, of course, that by properly guiding the tractor vehicle it would be theoretically possible to draw the trailer around the curve accurately, but as a practical matter this is an extremely remote possibility, particularly in view of the exact degree of accuracy required when following pre-existing worn markings.

From the above disclosure it will be apparent that by practicing the principles of this invention the difficulties heretofore encountered in highway markings may be greatly minimized since the compensating trailer coupling and the transversely shiftable carriage make it possible to easily and accurately follow existing road markings at a comparatively high rate of speed and the improved paint applicators are adapted

to operation at a more rapid rate than any of the paint applicators heretofore utilized in the art. It will also be appreciated that by the provision of the shield plates and the automatic control means for the shield plates responsive to the operator of the valves, it is possible to greatly improve the appearance of the highway markings as well as to gain advantages from the standpoint of convenience, cost, and speed.

While I have shown and described the present preferred embodiment of the invention, I am aware that it is subject to numerous alterations and modifications without departing from the invention spirit, and I do not, therefore, wish to be limited except as by the scope of the appended claims.

I claim:

1. In a highway marking vehicle including a frame and a plurality of wheels, an applicator carriage mounted for hand-controlled transverse shifting movement with respect to said vehicle while the vehicle is in motion, hand-controlled means for shifting the carriage, a plurality of paint applicators mounted on said carriage, each of which consists of a pneumatic spray-gun, a paint supply for said spray-gun, an air supply for said spray-gun and a pair of side shields adapted to contact the road surface and limit the spread of the spray; an air control valve for each of said spray-guns, a cam shaft and cams to control each of said air valves, manual means to render any of said cam control devices inoperative and to provide independent manual control for each of said air valves, and means responsive to the movement of the vehicle to control the movement of said cam shaft and interrupt the action of said paint applicators at predetermined and measured intervals, said last-mentioned means comprising a mechanical drive from one of the vehicle wheels to the cam shaft.

2. In a highway marking vehicle including a frame and a plurality of wheels, an applicator carriage mounted for hand-controlled transverse shifting movement with respect to said vehicle while the vehicle is in motion, hand-controlled means for shifting the carriage, a plurality of paint applicators mounted on said carriage, each of which consists of a pneumatic spray-gun, a paint supply for said spray-gun, an air supply for said spray-gun and a pair of side shields adapted to contact the road surface and limit the spread of the spray, an air control valve for each of said spray-guns, a cam shaft and cams to control each of said air valves, and manual means to render any of said cam control devices inoperative and to provide independent manual control for each of said air valves.

3. In a highway marking vehicle including a frame and a plurality of wheels, an applicator carriage mounted for hand-controlled transverse shifting movement with respect to said vehicle while the vehicle is in motion, hand-controlled means for shifting the carriage, a plurality of paint applicators mounted on said carriage, a cam shaft and cams to control each of said paint applicators, manual means to render any of said cam control devices inoperative and to provide independent manual control for each of said paint applicators, and means responsive to the movement of the vehicle to control the movement of said cam shaft and interrupt the action of said paint applicators at predetermined and measured intervals, said last-mentioned means comprising a mechanical drive from one of the vehicle wheels to the cam shaft.

4. In a highway marking vehicle including a frame and a plurality of wheels, an applicator carriage mounted for hand-controlled transverse shifting movement with respect to said vehicle while the vehicle is in motion, hand-controlled means for shifting the carriage, a plurality of paint applicators mounted on said carriage, each of which consists of a pneumatic spray-gun, a paint supply for said spray-gun, an air supply for said spray-gun and a pair of side shields adapted to contact the road surface and limit the spread of the spray, an air control valve for each of said spray-guns, a cam shaft and cams to control each of said air valves, manual means to render any of said cam control devices inoperative and to provide independent manual control for each of said air valves, and means responsive to the movement of the vehicle to control the movement of said cam shaft and interrupt the action of said paint applicators at predetermined and measured intervals.

5. In a highway marking device, a plurality of spray guns, a paint supply duct for each of said guns and an air supply duct for each of said guns, a valve in each of said air supply ducts, a pair of shield plates positioned on opposite sides of each of said spray guns and in close proximity to the surface to be marked, a manual control for said valves, an automatic control for said valves comprising a cam and cam follower, interconnected coacting mechanism for said dual control means, including connector links, to actuate the cam follower into and out of engagement with cam, and means responsive to the operation of the coacting mechanism to advance the shields toward the highway surface simultaneously with the commencement of operation of the spray guns, and to withdraw said shields from the highway surface simultaneously with the cessation of operation of said spray guns.

PAUL BLUMBERG.