March 19, 1946. P. BLUMBERG 2,396,981

ROAD MARKING DEVICE

Filed Oct. 18, 1943 3 Sheets-Sheet 1

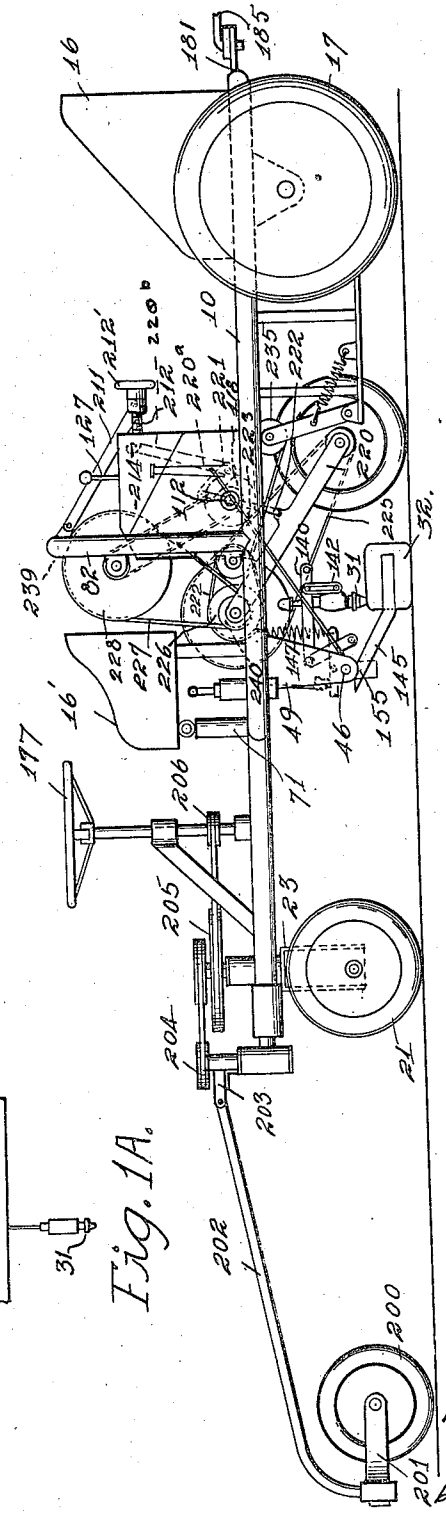


Fig. 1.

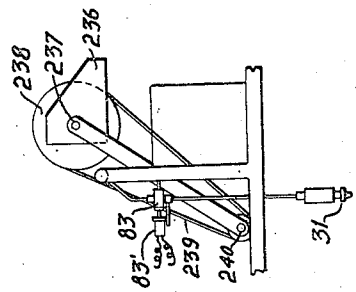


Fig. 1A.

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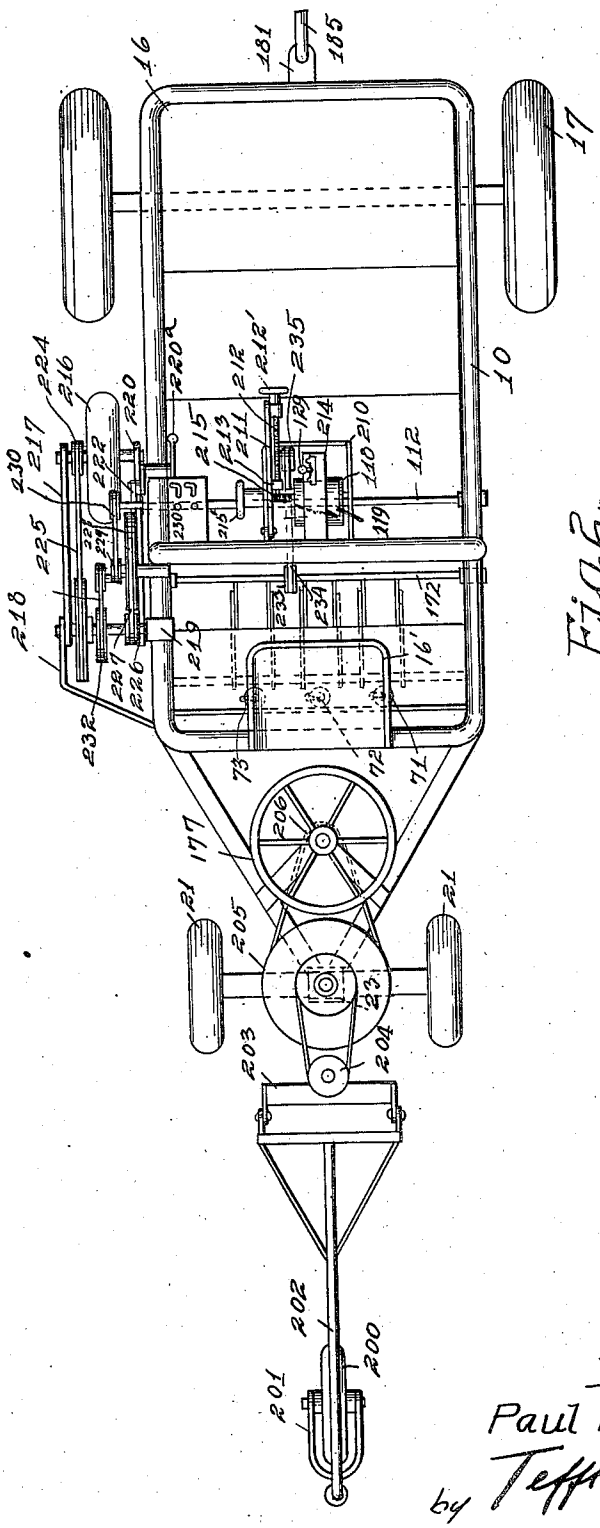


Fig. 2.

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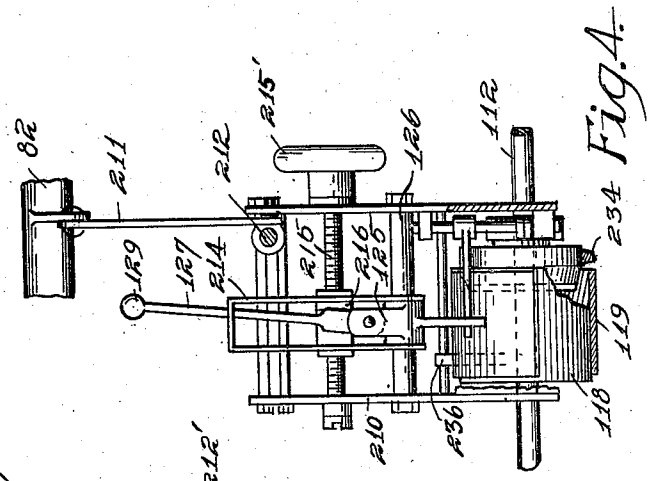


Fig. 4.

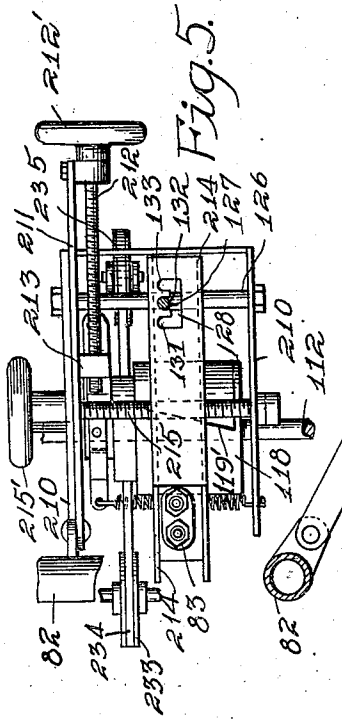


Fig. 5.

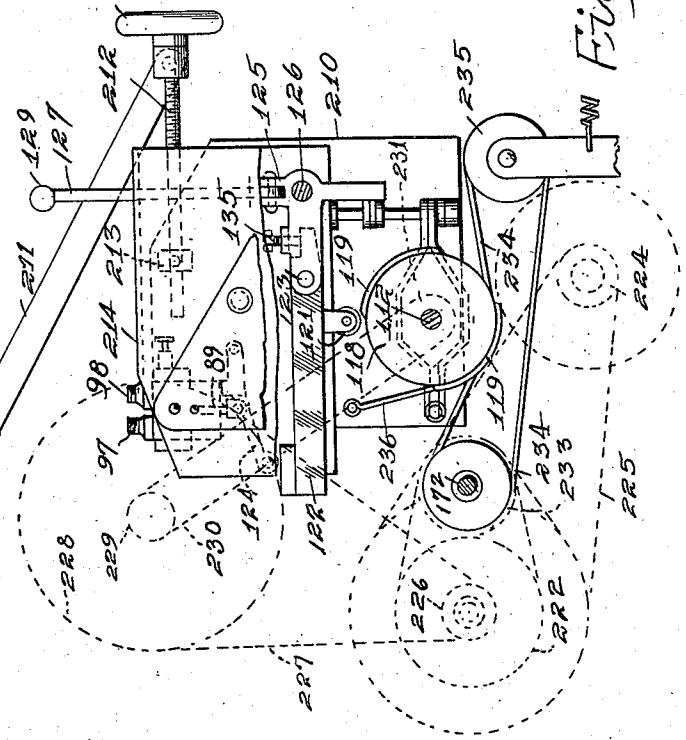


Fig. 3.

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Patented Mar. 19, 1946 2,396,981

UNITED STATES PATENT OFFICE

2,396,981

ROAD MARKING DEVICE

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Application October 18, 1943, Serial No. 506,774

6 Claims. (Cl. 91—12)

This invention relates to highway marking devices and more particularly to an improved highway marker comprising a vehicle having a plurality of paint applicators and control devices therefor, all arranged to be conveniently operated by operators seated on the vehicle. This application is a continuation-in-part of my copending application Serial No. 352,084, filed August 10, 1940, issued as Patent No. 2,345,653, April 4, 1944.

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 vehicle having a plurality of paint applicators arranged to be simultaneously or independently operated by an operator seated on the vehicle in such a position that he may easily observe the operation of the paint applicators and may thus instantly note any improper 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 following 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 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 combinations 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 vehicle adapted to be pushed by a truck or other tractor vehicle which will preferably also serve to carry paint supply tanks and an air compressor. The vehicle consists in general of a framework of tubular members having a pair of rear wheels spaced apart from each other and dual front wheels pivoted on a kingpin to permit steering. The paint applicators themselves consist of spray guns or air brushes as is well understood in the art. 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.

Now referring to the drawings showing a preferred embodiment of the invention,

Fig. 1 is a side elevation of my highway marking device constructed in accordance with the teachings of this invention.

Fig. 1A shows an optional electrical equipment which will later be described in detail.

Fig. 2 is a top plan view of the device shown in Fig. 1.

Fig. 3 is an enlarged fragmental side view of the control device with the driving means shown somewhat diagrammatically.

Fig. 4 is a rear elevation view of the control device shown in Fig. 3.

Fig. 5 is a top plan view of the same device shown in Figures 3 and 4.

The vehicle

The vehicle is a conventional tubular frame structure arranged to be pushed by a truck. Inasmuch as the vehicle per se is not a part of this invention, it will not be described in detail. In general, I have given the same or similar parts the same numerals as the corresponding parts in my co-pending application in which the vehicle and its functions were described in detail.

The frame 10 is supported on two rear wheels 17 and dual pivotal front wheels 21, mounted in a conventional manner. The rear seat 16 is provided for the operator of the marker control device and the front seat 16' is provided for the steersman. The steersman holds the vehicle in proper alignment by means of the hand wheel 177, which traces the guide wheel over the center line of the roadway. The guide wheel is extended forwardly in proper position to align the vehicle and is supported by the fork 201, the rod 202, and the pivotal clevis 203. The steersman controls the guide wheel by the hand wheel 177, actuating the guide wheel 200 and the front wheel 21 by conventional chain and sprocket means 204, 205 and 206. The vehicle is pushed along the highway by a truck through conventional hook-up means 181 and 185.

Paint and air supply

The paint supply and air compressor are preferably carried on the pusher truck. Three paint containers are provided to permit three color variations as may be required by the official highway marking code. The paint is supplied to headers 71—72 and 73, by hose lines, (not shown in the present drawings but well illustrated in my co-pending application). The headers in turn are connected to the three spray guns as will be well understood as explained in my co-pending application.

The compressed air to operate the spray guns is supplied by a flexible hose, (not shown) and is controlled to each individual spray gun by a control valve 83. The air enters at the connector 97 and is discharged through the outlet 98 to the spray gun 31. Thus the flow of paint through to each gun is controlled by the air as outlined above.

Adjustable automatic valve control

The adjustable automatic valve control is the pertinent improvement of the present invention. The essence of the invention lies in the means to adjust the lengths of the dotted lines when the vehicle is in motion and to adjust the starting position of the lines to coincide with previous markings on the roadway. This, of course, is in addition to the manual control of the spray guns which is always available to the operator.

In order to simplify the drawings and facilitate the description, I have illustrated only the central spray gun control head. It will be understood that similar heads for each of the side lines are mounted one on each side of the central head illustrated.

The cross shaft 112 is mounted in a conventional manner on the frame 10. On this shaft 112 are mounted three cam drums 118, carrying dual cams 119. A box frame 210 is pivotally mounted on the cross shaft 112 and retained in adjustable pivoted position by the link 211, pivotally connected to the cross brace 82 and the adjustment screw 212 with its companion nut 213 pivotally supported on the frame 210. By this structure it is apparent that the frame 210 can be pivotally adjusted on the shaft 112 by the hand wheel 212'.

The hand lever 127—129 is mounted in sub-frame 214, slidably mounted on the frame 210 by the cross pin 126. The lever 127 may be moved from the central neutral position 132 as shown, to the automatic marking position 133, the same as described in my co-pending application. When in the automatic marking position 131, the cam roller 121 is moved into contact with the cam 119 and is controlled by this cam. The cam roller actuates the air valve 83 through the levers 122—124 and the valve rod 89. When the lever 127 is in continuous marking position 133, the valve 83 is held open by the same system of levers.

By the pivotal mounting of the frame 210 and sub-frame 214 on the cross shaft 112, the frames may be adjustably pivoted around the shaft 112 by the hand wheel 212', and the adjustable screw mechanism 211, 212, and 213, bearing on the cross frame 82. It will be obvious that the cam roller is thus moved radially around the drum 118 and is thus adjustable in its relation to the cams 119. Thus I provide means to advance or retard the opening of the valve 83, and the marking of the roadway.

The sub frame 214 is further slidably supported by a cross screw 215 in the frame 210 by means of a nut inserted in the sub frame 214. By this structure the cam roller 121 may now be moved sidewise in relation to the cams 119. Now referring to Fig. 5, it will be noted that I provide angular faces 119', on the cams 119 and thus a variable cam surface is presented to the cam roller 121. By this structure I am able to vary the length of the dotted lines to correspond to the marks on the highway and thus may retrace or renew such marks.

The cam cross shaft 112 is driven at any desired speed to correspond with the cams 119 by a drive wheel 216 pivotally mounted on the frame 10 by bracket structure 217—218—219—220, as shown and may be moved onto or out of contact with the roadway by conventional lever mechanism 220*a*—221—222 as best shown in Fig. 1. Thus it will be apparent that I have provided means to stop and start the control devices at the will of the operator. Although the extra drive wheel 216 is shown and described, I desire to point out that the same results could be obtained by driving from the rear wheels 17 through a conventional clutch. The control of the spray shields 32 and the spray gun 31 is accomplished in a similar manner as in my co-pending application, by the lever 220*b* through the link 223 attached to the pivotal suspension mechanisms 46—49—140—142—145—147 as shown. This mechanism is conventional and will not be described in detail. It will be understood that the shield and spray gun are pivotally adjusted in relation to the roadway in a similar manner as that described in my copending application and that this movement is controlled by the lever 220 through the link 223.

Setting of cams

Although the adjustment of the marker drive as previously described will permit a considerable adjustment, it has been my experience that these adjustments do not have sufficient range to cover all practical requirements. It is necessary, therefore, to provide means whereby the

cams 119 can be brought to a starting position closely approximating the proper starting point for the marks. In order to accomplish this result I provide a reversing belt drive to each drum 118 which has sufficient power to slip the friction fit of the drum 118 on the cross shaft 112. This reversing drive is best illustrated diagrammatically in Fig. 3 by the V belt and pulley mechanism 232—233—234—235. This mechanism under the control of the operator will rotate the drum 118 in a reverse direction until the cam 119 contacts the ratcheting spring arm 236, which is positioned to stop the drum at approximately the point where the cam roller 121 contacts the dual cam 119. By this arrangement the operator is enabled to bring any cam into approximately the proper position to open the air valve and to start the mark. Any further adjustment may be easily accomplished by the hand wheels 212' or 215'.

Optional electrical control

Although I have described a preferred embodiment of my invention, utilizing mechanical control means, it is obvious that the same results can be accomplished electrically and I have built and successfully operated such electrical devices. To do this I have an enclosed cabinet, shown in small Fig. 1A, mounted within easy reach of the operator. A cross shaft 237 corresponding to the cam drive shaft 112 is mounted in the cabinet and driven by belt and pulley drives 238—239 and 240 as shown in dotted outline.

Electrical contact drums similar to drums 118 are mounted on the shaft 237 and electrical contact plates corresponding to the cams 119 are inserted in the drums. Conventional solenoid controlled air valves 83' are substituted for the mechanical air valves 83 and electrical circuits connected between the cam-like contacts on the drum and the solenoid valves. Push button switches control the closing of the cam circuits, another button switch controls a separate continuous full line circuit, and a third button switch cuts off both circuits. As the electrical contacts are very light, I arrange to merely slip the drums on the drive shaft to provide the drum adjustment to starting position. I thus provide electrical means to accomplish the same results as the mechanical means described.

Cam drum drive

The cross shaft 172 and cam drums 118 are driven by conventional V belt and pulley drive mechanisms from the drive wheel 216 as best shown diagrammatically in Fig. 3 by the connected drive mechanism 224—225—226—227—228—229—230 and 231. It will be appreciated that this drive is proportioned and arranged to drive the cam drums at the speed to make the proper lengths of roadway marks as determined by the cams 119.

Summary

In the foregoing drawings and specifications I have described and explained the improvements in my present invention over my co-pending application. These improvements provide additional means for,

(a) Adjusting the lengths of the broken or dotted lines, even while the road marking vehicle is in motion, to correspond with existing lines on the highway, and

(b) Controlling the starting point of such lines to coincide with the existing lines in order that such lines may be retraced and renewed.

Although my invention has been described with respect to a preferred embodiment thereof, it is to be understood that it is not to be so limited since modifications and alterations can be made therein which are within the full intended scope of my invention as defined by the appended claims.

I claim:

1. In an intermittent traffic-line marking device, a wheeled vehicle, a spray gun for painting traffic lines mounted on the vehicle, a control valve for starting and stopping the operation of the gun, mechanically adjustable actuating means for the control valve, to vary the lengths of intermittent lines, driving means for the actuating means including a vehicle wheel, clutch means to interrupt the driving means, means operable while the machine is in motion for adjusting the adjustable actuating means, whereby intermittent lines of variable lengths and gaps may be marked and existing lines of the highway may be traced.

2. In a traffic marker as defined in claim 1: including mechanical means to return and reset the valve actuating means to a position closely adjacent the valve opening position of the actuating means.

3. In a traffic marker as defined in claim 1: including mechanical means to return and reset the valve actuating means to a position closely adjacent the valve opening position of the actuating means, said mechanical reset means of the valve actuating means being rapidly operable while the vehicle is in motion.

4. In a traffic marker as specified in claim 1: said valve actuating means including a solenoid.

5. In an intermittent traffic-line marking device, a wheeled vehicle, a spray gun for painting traffic lines mounted on the vehicle, a control valve for starting and stopping the operation of the gun, adjustable actuating means for the control valve including a rotatable drum with a cam mounted thereon having an actuating face tapered rearwardly with respect to a radial plane of the drum, driving means for the actuating means including a vehicle wheel adapted to be raised out of contact with the roadway to interrupt the drive and to be lowered into contact to start the drive, while the vehicle is in motion, whereby intermittent lines of variable lengths and gaps may be marked and existing lines on the highways may be traced.

6. In an intermittent traffic-line marking device, a wheeled vehicle, a spray gun for painting traffic lines mounted on the vehicle, a control valve for starting and stopping the operation of the gun, adjustable actuating means for the control valve including a rotatable drum with a cam mounted thereon having an actuating face tapered rearwardly with respect to a radial plane of the drum, a cam roller adapted to be actuated by the tapered face drum cam to operate the control valve, and means to shift the cam roller radially and sidewise of the cam drum to vary the action of the cam, whereby intermittent lines of variable lengths and gaps may be marked and existing lines on the highway may be traced.

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