July 9, 1957 R. W. WILSON 2,798,765

SURFACE MARKING APPARATUS

Filed Dec. 31, 1954 3 Sheets-Sheet 1

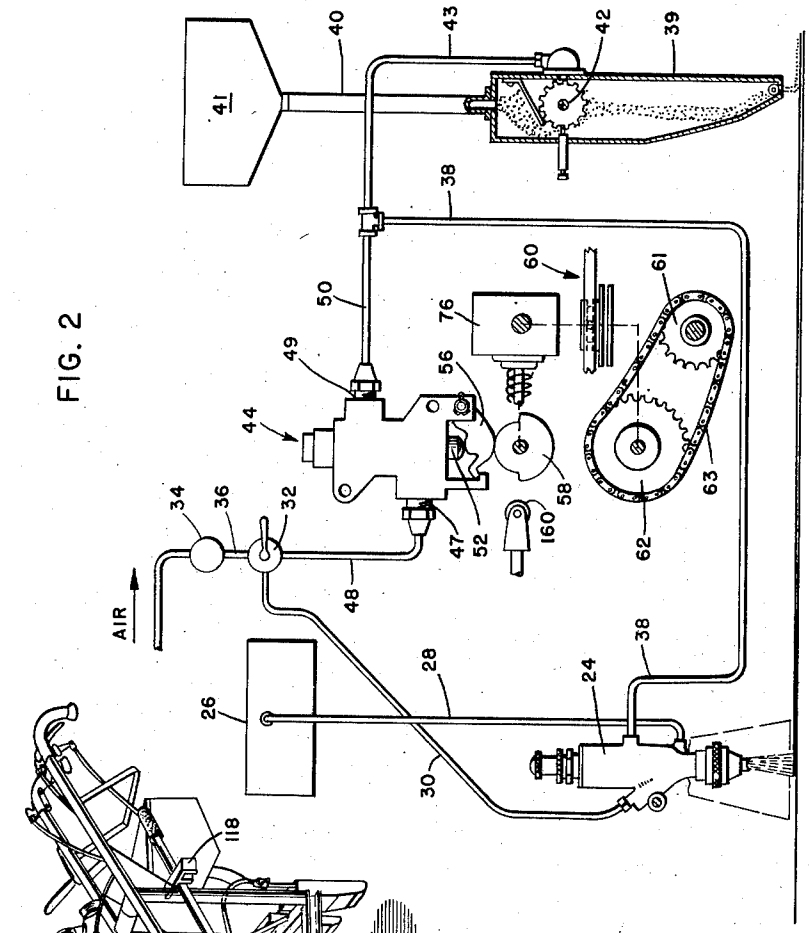


FIG. 2

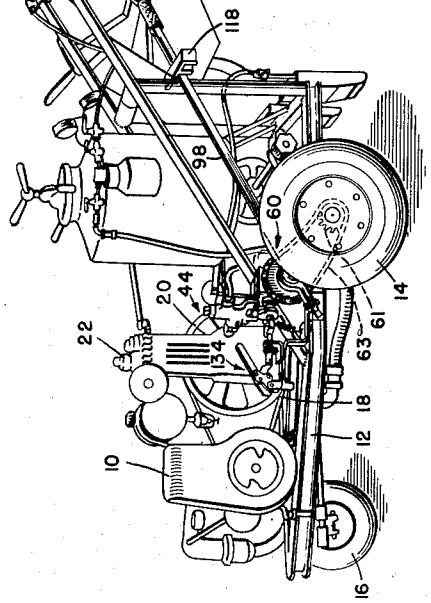


FIG. 1

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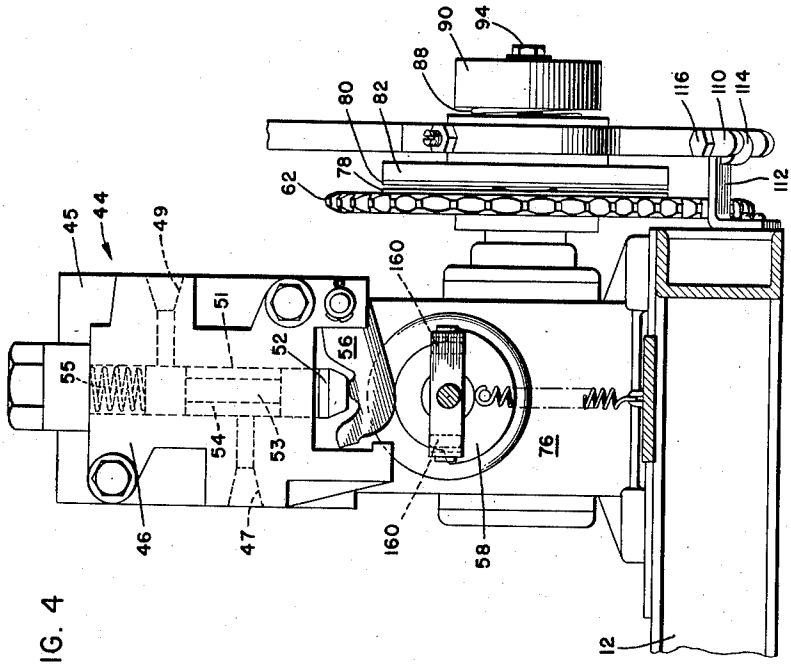


FIG. 4

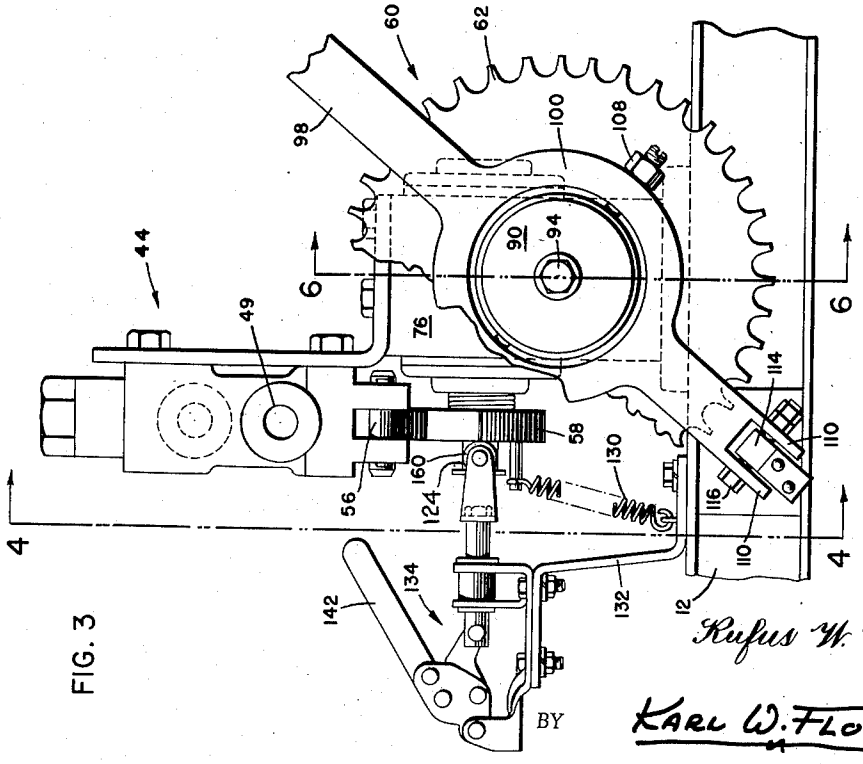


FIG. 3

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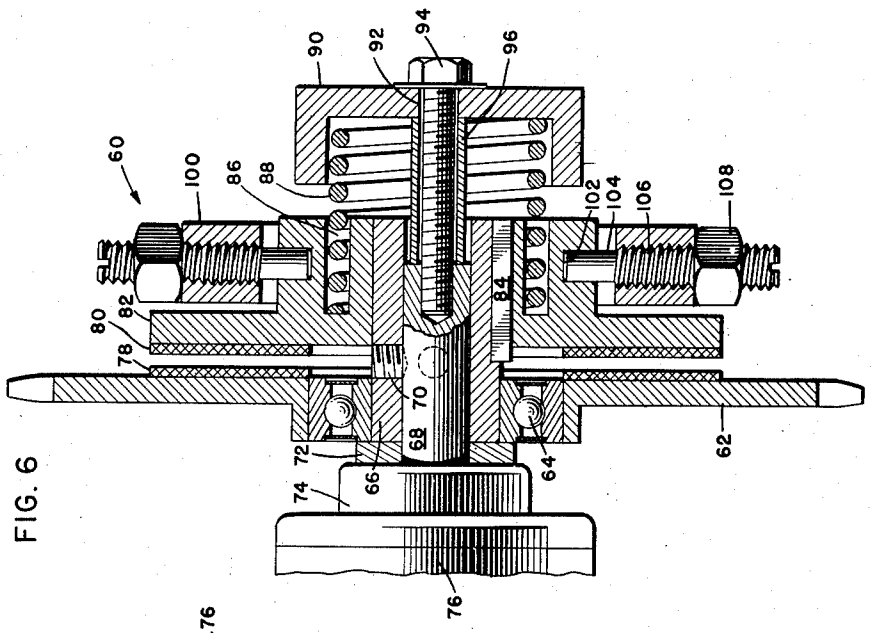


FIG. 6

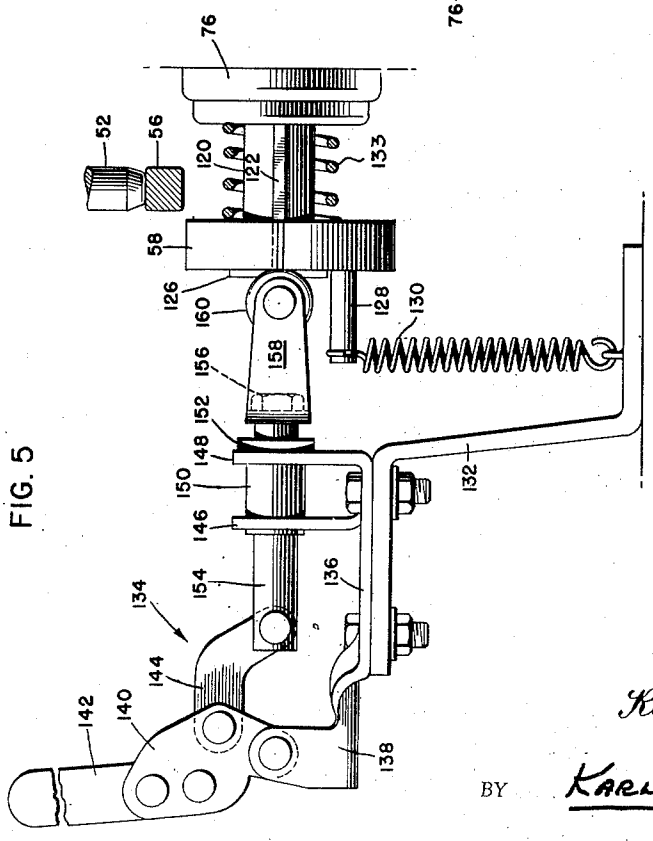


FIG. 5

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SURFACE MARKING APPARATUS

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Application December 31, 1954, Serial No. 479,209

11 Claims. (Cl. 299—25)

The present invention relates to apparatus for marking a surface. More particularly, the present invention relates to apparatus for applying an interrupted marking or dash-line on a surface.

In the application of traffic lane stripes on a road, highway, street or the like, it is frequently desirable or necessary to interrupt the stripe at intervals to effect a dash or skip line, that is, a line consisting of a series of spaced markings having a predetermined length. Prior to the instant invention, dash or skip lines were either applied by manual control of a conventional striping machine or by special apparatus designed to effect the interrupted marking in a predetermined sequence. Controlling the marking of a dash-line by the operator was, of course, a difficult task and usually resulted in lines of varying lengths. Although the heretofore known machines, which were designed to apply skip lines, accomplished the intended result, they were not only difficult to operate but were economically undesirable; that is, these prior skip line machines were expensive in the first instance and also required considerable maintenance.

It is therefore an object of the present invention to provide apparatus for applying an interrupted line or marking to a surface, the apparatus being relatively inexpensive and simple in construction, thereby requiring little maintenance.

Another object of the present invention is to provide apparatus for applying an interrupted marking to surfaces which includes means for intermittently controlling the application of the marking material to the surface.

Still another object of the present invention is to provide apparatus for intermittently marking a surface wherein the means for applying the marking material is controlled by cam means having a predetermined contour.

Still another object of the present invention is to provide a novel clutch for positively engaging the power means with the dash-line control means.

Still another object of the present invention is to provide apparatus for applying an interrupted marking to a surface, the apparatus including means for resetting the position of the means for controlling the length of each marking.

Still another object of the present invention is to provide apparatus for applying an interrupted marking to a surface wherein manually controlled means is provided for resetting the marking control means to a zero position when an incomplete marking is applied to the surface.

Other objects and the nature and advantages of the instant invention will be apparent from the following description taken in conjunction with the accompanying drawings, wherein:

Fig. 1 is a perspective view of a highway striping machine which includes the skip-line marking apparatus embodied in the present invention;

Fig. 2 is a diagrammatic illustration of the line marking apparatus and the means for intermittently controlling the operation thereof;

Fig. 3 is a side elevational view with parts broken away of the control apparatus embodied herein;

Fig. 4 is a view taken along the line 4—4 of Fig. 3;

Fig. 5 is an enlarged view of a portion of the apparatus shown in Fig. 3; and

Fig. 6 is a sectional view taken along the line 6—6 of Fig. 3 and illustrating the clutch embodied herein.

Referring now to Fig. 1, a line striping machine or vehicle is illustrated and is generally of that type that is adapted to be self-propelled. In order to provide for the power to propel the vehicle, a gasoline engine **10** is mounted on a frame **12**, the frame **12** having a pair of rear traction wheels **14** and a front wheel **16** rotatably mounted thereon. Also mounted on the frame **12** and operatively connected to the gasoline engine **10** through a belt **18** and a pulley **20** is an air compressor **22**. The air compressor **22** is adapted to supply the necessary compressed air for operating the line striping equipment and particularly paint generating means shown in Fig. 2 in the form of a conventional paint gun **24**. The vehicle necessarily carries its own supply of paint binder and a receptacle **26** is shown mounted on the frame **12** and operatively connected to the paint gun **24** through a conduit **28**.

An air line **30** connects the paint gun **24** to a manually operated air control valve **32** which communicates with a manifold **34** through an air line **36**. The manifold **34** receives the compressed air from the compressor **22** and stores it for distribution, which distribution is controlled by the operator through the control valve **32**. The air admitted to the paint gun through air line **30** is for the purpose of atomizing the paint binder introduced into the gun through the conduit **28**, but an additional supply of air must be introduced into the gun through an air line **38** to operate a spring biased valve (not shown) positioned in the gun, which valve controls the flow of the atomized paint binder through the paint gun nozzle. Thus, it is seen that if the air supply through air line **38** is controlled in an intermittent manner, the flow of paint binder through the gun nozzle will be intermittent, and an interrupted, dash or skip-line will then be applied to the surface upon which the vehicle is traveling.

The line striping machine illustrated in Fig. 1 is also adapted to apply an intermittent stream of small glass autocollimating spheres to the paint binder after the application thereof to the surface and for this purpose an air operated sphere dispenser **39** is shown mounted on the vehicle frame **12**. The sphere dispenser **39** is adapted to receive a continuous supply of the glass spheres through a conduit **40**, the conduit **40** being connected to a sphere hopper **41**. A rotor **42** having grooves formed therein is rotatably mounted in the dispenser **39** and is responsive to the air supplied through an air line **43** to distribute the spheres to the bottom of the dispenser for distribution onto the newly applied paint binder as is well known in the art. It is seen, therefore, that if the air is intermittently supplied through line **43** the rotor **42** will be rotated intermittently, thereby resulting in intermittent dispensing of the spheres from the dispenser **39**.

In order to control the supply of air through the air lines **38** and **43**, a control valve generally indicated at **44** is provided and is mounted on a bracket **45** (Fig. 4) that is secured to the frame **12**. As shown in Fig. 4, the control valve **44** includes a housing **46** that is formed with an inlet port **47** that communicates with an air line **48**, the air line **48** being connected to the valve **32**. Also formed in the housing **46** of the valve **44** is an outlet port **49** which communicates with an air line **50** connected to the air lines **38** and **43**. The control valve **44** may be of any suitable construction that would provide for the intermittent communication between the ports **47** and **49** and for this purpose has a bore **51** formed

therein in which a valve plunger 52 is slidably mounted. The plunger 52 is formed with a reduced portion 53, thereby defining an annular chamber 54, the plunger 52 being normally urged in a downwardly direction by a spring 55 positioned in the upper portion of the bore 51. Pivotally secured to the lowermost portion of the valve housing 46 is a follower arm 56 that abuts against the lowermost end of the plunger 52 and is adapted to vertically reciprocate the plunger when actuated by a cam 58. As shown, the cam 58 is formed with an eccentric portion that acts to force the follower arm 56 upwardly when the cam is rotated. Upward movement of the follower arm 56 results in vertical movement of the valve plunger 52, thereby causing communication between inlet port 47 and outlet port 49 through the annular chamber 54. Since the eccentric portion of the cam 58 defines 180° of travel thereof, air will flow continuously through the valve 44 for that interval of time thereby resulting in operation of the paint gun 24 and sphere dispenser 39. As soon as the eccentric portion of the cam moves out of contact with the follower arm 56, the plunger 52 falls downwardly being positively depressed by the spring 55, and the air flow to the paint gun 24 and sphere dispenser 39 is interrupted. It is seen that continuous rotation of the cam 58 will result in an intermittent supply of air to the paint gun 24 and sphere dispenser 39, thereby resulting in the application of an interrupted or dash-line to the surface over which this vehicle is traveling.

In order to drive the cam 58, a novel clutch assembly is provided and is generally indicated at 60 in Fig. 6. Drivingly connected to the clutch assembly 60 is a sprocket gear 61 that is secured to the axle of the traction wheels 14. The sprocket gear 61 drives a relatively large sprocket gear 62 through a chain 63, the sprocket gear 62 defining the driving element of the clutch assembly. The sprocket gear 62 is mounted for rotation on a ball bearing 64, the inner race of which is secured to a collar 66. The collar 66 is secured to a shaft 68 by a set screw 70 and a washer 72 is positioned around the shaft abutting against an extension 74 of a speed reducer indicated at 76, the washer 72 thereby preventing endwise movement of the collar 66 and bearing 64. Secured to the outer face of the sprocket gear 62 is a friction drive plate 78 which is adapted to engage a corresponding friction driven plate 80 joined to a longitudinally movable thrust collar 82. The hub of the thrust collar 82 is secured to the collar 66 by a key 84 and is provided with an annular chamber 86 which receives a spring 88 therein. Surrounding the exposed portion of the spring 88 is a cup-shaped element 90 which has a central opening 92 formed therein through which extends a bolt 94. The bolt 94 extends through a tubular member 96 which abuts against the inner face of the element 90 and the outer end of the shaft 66, the bolt 94 being threadedly received in an opening formed in the end of the shaft 66. It is seen that the thrust collar 82 is normally urged toward the sprocket gear 62 and thus the sprocket gear 62 is adapted to drive the stub shaft 66 upon contact of the friction plates 78, 80. In order to move the friction plates 78, 80 out of engagement, a manually operated handle 98 is provided. As shown in Fig. 3, the lower portion of the handle 98 is enlarged as indicated at 100, the enlarged lower portion 100 being formed with an opening that is adapted to be fitted around the hub of the thrust collar 82. Also formed in the hub of the thrust collar 82 is an annular slot 102 that receives lugs 104 therein, the lugs 104 having a threaded upper portion that is received by threaded openings 106 formed in the lower portion 100 of the handle 98. Nuts 108 engage the threaded portion of the lugs 106 which are thereby secured in the annular slot 102. The handle 98 is adapted to be pivotally moved to cause engagement of the friction plates 78, 80 and for this purpose is formed with a bifurcated lower end (Fig. 3)

defined by extensions 110, both of the extensions 110 being formed with an opening therein. Secured to the frame 12 by suitable bolts or rivets is an arm 112 which is formed with an angle portion (Fig. 4) that is turned over at 114 to form an opening. The turned over portion of the arm 112 is received between the extensions 110 of the handle 98 and a bolt 116 extends through the opening defined by the turned over portion and through the openings in the extensions 110 to pivotally secure the handle 98 to the frame 12. In operation of the device, the clutch 60 is actuated by releasing the handle 98 which causes the thrust collar 82 to move through the action of the spring 88 to bring the friction elements 78, 80 in contact. The handle 98 is retained in the inoperative position by providing a latch 118 (Fig. 1) secured to a vertical member of the frame 12 adjacent the operator. As shown in Fig. 1, the latch comprises an inverted U-section that receives the handle and thereby locks the thrust collar 82 in the inoperative position. It is seen that when the thrust collar 82 is moved to the left, as seen in Fig. 6, by the spring 88, the sprocket gear 62 will drive the thrust collar 82 which, in turn, drives the shaft 68. It is apparent that during rotation of the thrust collar 82, the lugs 104 will freely slide in the rotating annular slot 102.

Connected directly to the shaft 68 and driven thereby is the speed reducer 76 which may be of any conventional type and may include any arrangement of a step down speed reduction gear system. The speed reducer 76 is adapted to drive the cam 58 and includes a shaft 120 connected to the driven side of the speed reducer, the shaft 120 having a key 122 formed thereon. The cam 58 is mounted for rotation on the shaft 120 (Fig. 3) but, as shown in Fig. 5, may be moved to an inoperative position by the operator of the device, as desired. It is frequently necessary when applying the dash or skip lines to a surface to foreshorten a line. In such a case, the cycle of the cam is incomplete and if it is desired to begin a new cycle the cam heretofore had to be turned by hand to the starting position. The present invention provides for the automatic resetting of the cam to the zero position whenever a cycle has not been completed and for this purpose the shaft 122 is formed with an outer portion 124 (Fig. 3) that does not have a key formed thereon and thereby will loosely receive the cam 58 when it is moved thereon. Secured to the outer end of the shaft is a collar 126 that prevents removal of the cam when it is moved onto the outer portion 124. Joined to the outer face of the cam 58 is a pin 128 (Fig. 5) that has a spring 130 secured to the outer end thereof. The spring 130 is also secured to an L-shaped support bracket 132 that is mounted on the frame 12 of the vehicle (Fig. 3). The cam 58 is normally urged to the outer portion 124 of the shaft 120 by a spring 133 surrounding the shaft 120 and in this outer position, the cam 58 moves out of contact with the follower arm 56. It is seen that when the cam is moved out of engagement with the key 122 and is located on the outer portion 124 of the shaft 120, it will be responsive to the spring 130. Thus, if the cam has completed only a portion of the cycle thereof and the pin 128 is located somewhere other than the lowermost position shown in Figs. 3 and 5, the spring 130 will act to rotate the cam until this lowermost position of the pin is obtained. It is apparent that the cam 58 is initially formed so that the operating cycle of the skip-line spraying apparatus will begin when the pin 128 is located in the lowermost position as shown in Figs. 3 and 5 and this point defines a zero position, that is, that position that the length of skip or dash-line is begun.

In order to move the cam 58 into the operating position shown in Fig. 3, a manual control is provided and is indicated generally at 134. As shown more clearly in Fig. 5, the manual control 134 comprises a bracket 136 which is secured to the supporting bracket 132. The bracket 136 is formed with a U-shaped extension defined by ears 138, the ears 138 having a lever 140 pivotally

secured therebetween. The lever **140** is defined by a pair of spaced plates which have a handle **142** positively secured therebetween at the upper portion thereof and a substantially L-shaped link **144** pivotally secured therebetween adjacent the inner edges thereof. The bracket **136** is also formed with integral vertical pieces **146**, **148** that have circular openings formed therein which receive a bearing block **150**, the bearing block **150** having a flange **152** formed thereon which defines a stop for engaging the vertical piece **148**. Slidably mounted in the bearing block **150** is a bar **154** that is provided with a slot on one end thereof in which is secured the link **144**. Secured to the opposite end of the bar **154** by a bolt **156** is a U-bracket **158** that has a pair of contact rollers **160** secured to the extreme ends thereof (Fig. 4), the rollers **160** contacting the outer face of the cam **58**. In operation of the device, the handle **142** is moved to the position shown in Fig. 3, the links **140** and **144** pivoting to effect an over-center locking action. Pivotal movement of the link **144** causes the rod **154** to slide in the direction of the cam **58**, thereby causing the rollers **160** to urge the cam **58** against the action of the spring **133** into engagement with the follower arm **56**. When the cam **58** has reached this position, the keyway formed in the central opening therein engages the key **122** formed on the shaft **120**, thereby locking the cam **58** to the shaft **120** for rotation therewith. Rotation of the shaft **120** will then start the operating cycle of the skip-line device. It is seen that release of the handle **142** will cause the spring **133** to urge the cam **58** to the outer portion **124** of the shaft **120** whereupon the spring **130** rotates the cam to its zero position. During the operation of the skip-line device with the cam **58** rotating on the shaft **120**, the spring **130** will be continuously distended and retracted as the pin **128** rotates with the cam.

The operation of the device is as follows:

The surface marking vehicle is moved in position on the surface to be marked and the manually controlled valve **32** is opened to admit compressed air to the atomizing chamber of the paint gun **30** and to the inlet port **46** of the control valve **44**. The handle **142** of the manual control **134** is rotated to the position shown in Fig. 3, thereby moving the cam **58** into contact with the follower arm **56**, and the clutch control handle **98** is released to throw the friction plate **80** of the thrust collar **82** into engagement with the friction plate **78** secured to the sprocket gear **62**. Movement of the vehicle then causes rotation of the sprocket gear **60**, sprocket gear **63** and shaft **68**. Rotation of the shaft **68** drives the speed reducer **76** which results in the rotation of the shaft **120** and the cam **58**. As the cam **58** rotates, the follower arm **56** reciprocates the valve plunger **54** which acts to intermittently permit flow of compressed air to the outlet port **49** of the control valve **44**. The nozzle control valve in the paint gun **24** and the rotor in the sphere dispenser **30** are then intermittently operated to cause the paint binder and spheres to be sprayed and dispensed respectively in equally distributed dash lines onto the surface over which the vehicle is traveling. If the operation of the device is to be discontinued for any purpose, the handle **98** may be pivoted to unclutch the friction plates **78**, **80**, thereby stopping rotation of the thrust collar **82**, shaft **68** and shaft **120**. If only a portion of a dash-line is applied to the surface and it is desired to again begin a new cycle, the handle **142** is rotated to the left as seen in Fig. 5, thereby releasing the cam from engagement with the shaft **120** and causing the spring **130** to return the cam **58** to its zero position.

It is also contemplated to interconnect the handles **98** and **142** through a linkage system whereupon movement of the handle **98** to discontinue operation of the cam **58** will result in movement of the handle **142**. The cam **58** is then moved to the outer portion **124** of the shaft **120** and the spring **130** then rotates the cam to the zero position as described above.

It will be obvious to those skilled in the art that various changes may be made without departing from the spirit of the invention and therefore the invention is not limited to what is shown in the drawings and described in the specification but only as indicated in the appended claims.

What is claimed is:

1. In apparatus for marking a surface, a frame, traction wheels mounted on said frame, means carried by said frame for generating a spray of paint, a cam for controlling the operation of said paint generating means, means for driving said cam means, a control valve responsive to rotation of said cam for supplying fluid pressure to said paint generating means, thereby causing operation thereof, said cam being formed in a predetermined contour to cause said valve to operate intermittently, thereby resulting in intermittent operation of said paint generating means, whereupon an interrupted stripe is applied to said surface, and means operatively engaging said cam and adapted to move said cam to an inoperative position when the striping cycle is incomplete, said cam being automatically rotated in the inoperative position to a zero position, said zero position defining the origin of the striping cycle.

2. In apparatus for marking a surface as set forth in claim 1, wherein said last-named means includes a spring operatively secured to said cam and movable therewith as said cam is rotated during operation thereof.

3. In apparatus for marking a surface as set forth in claim 1, wherein said driving means includes a manually operated clutch, the driving member of said clutch being driven by said traction wheels.

4. In apparatus for marking a surface, a frame, traction wheels rotatably mounted on said frame, means carried by said frame for driving said traction wheels, a paint gun mounted on said frame, control means operatively connected to said paint gun and responsive to movement of said traction wheels for causing operation of said paint gun, said control means including a cam, the contour of said cam defining a paint striping cycle, and means engaging said cam for moving said cam to an inoperative position when the paint striping cycle is incomplete, said cam being automatically rotated by said engaging means to a zero position, said zero position defining the origin of said striping cycle.

5. In apparatus for marking a surface as set forth in claim 4, wherein said engaging means includes a manually operated longitudinally movable rod and a spring, said rod contacting said cam and adapted to move said cam to the inoperative position, and said spring being secured to said cam and being adapted to rotate said cam to the zero position.

6. In apparatus for marking a surface, means for generating a spray of paint, means for controlling said generating means, said controlling means including a cam, said cam having a predetermined contour defining the operating cycle of said generating means, means for rotating said cam, means for moving said cam to an inoperative position, and means engaging said cam for returning said cam in the inoperative position thereof to a zero position when said operating cycle is incomplete.

7. In apparatus for marking a surface as set forth in claim 6, wherein said moving means comprises a spring urging said cam to the inoperative position and a longitudinally movable rod engaging said cam, said rod being moved to force said cam into the operating positon against the action of said spring and being retracted from the cam operating position to allow said cam to move to the inoperative position under the influence of said spring.

8. In apparatus for marking a surface as set forth in claim 6, wherein said cam has a pin secured thereto, said returning means being secured to said pin and rotating said cam to the zero position when said cam has been moved to the inoperative position thereof.

9. In apparatus for marking a surface, means for generating a spray of paint, means for controlling said generating means, said controlling means including a cam and a valve operatively connected to said cam, said cam

having a predetermined contour defining the operating cycle of said generating means, said valve being responsive to rotation of said cam for causing intermittent operation of said generating means, said generating means thereby applying an interrupted marking on said surface, means for rotating said cam, means for moving said cam to an inoperative position, and means engaging said cam for returning said cam in the inoperative position thereof to a zero position when said operating cycle is incomplete.

10. In apparatus for marking a surface as set forth in claim 9, wherein a spring engages said cam and is adapted to normally move said cam to the inoperative position.

11. In apparatus for marking a surface as set forth in claim 10, wherein a second spring engages said cam and is adapted to rotate said cam in said inoperative position to the zero position when said operating cycle is incomplete.

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