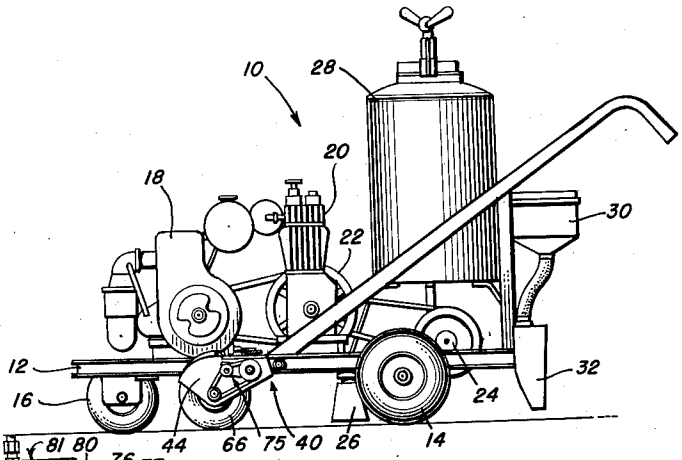
June 26, 1962 R. B. BAGSHAW 3,040,594

SKIP-LINE ATTACHMENT WITH CYCLE ADJUSTER

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FIG. 1



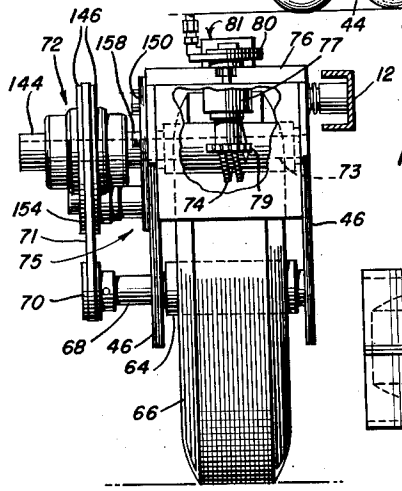
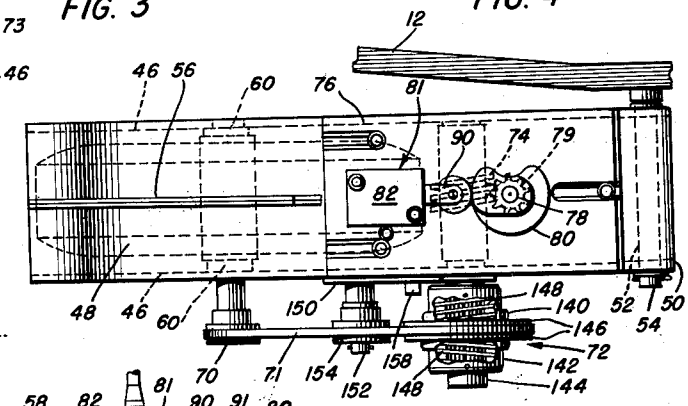


FIG. 3

FIG. 4



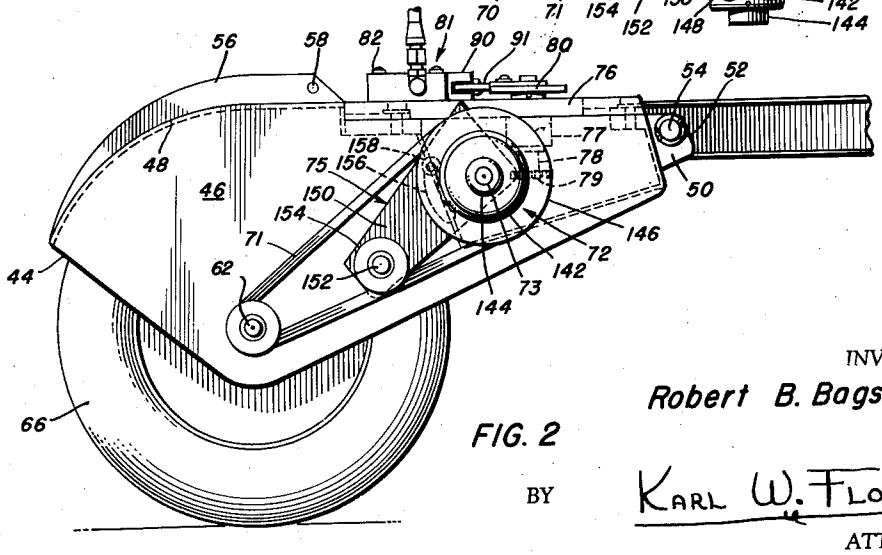


FIG. 2

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SKIP-LINE ATTACHMENT WITH CYCLE ADJUSTER

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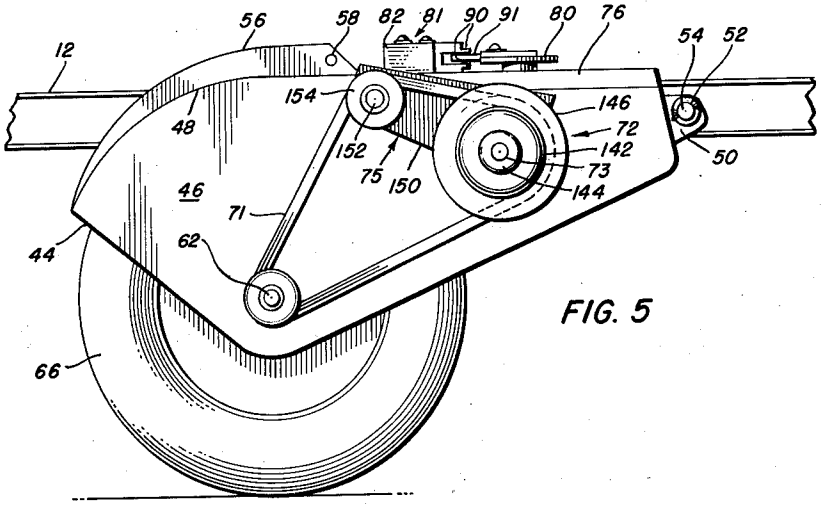


FIG. 5

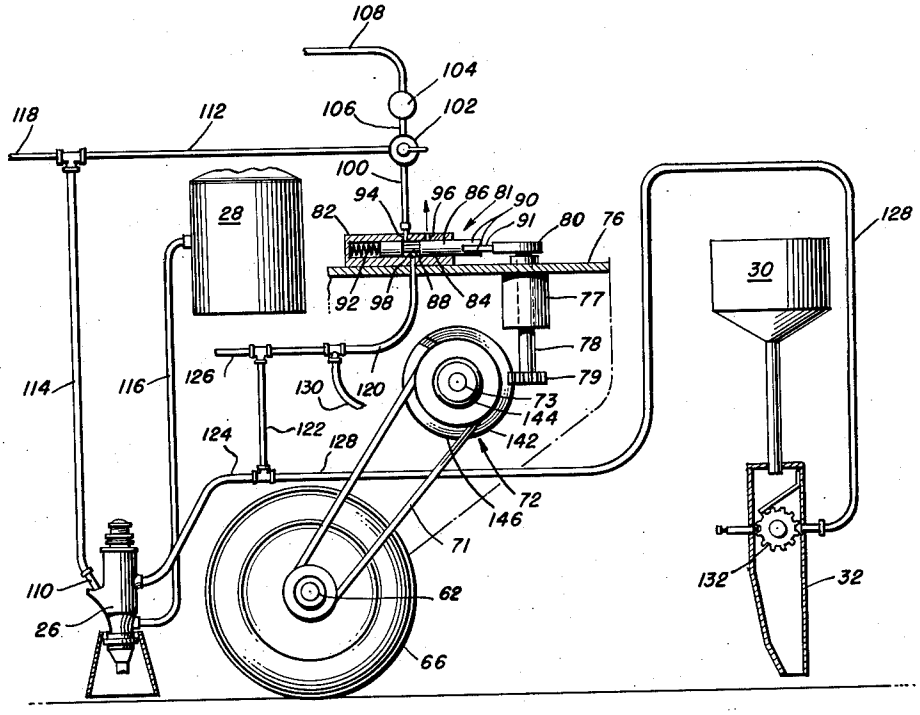


FIG. 6

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3,040,594
SKIP-LINE ATTACHMENT WITH CYCLE ADJUSTER

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6 Claims. (Cl. 74—230.17)

The present invention relates to apparatus for marking a surface. More particularly, the present invention relates to an attachment for road striping apparatus that is adapted to control the operation of paint spray guns for producing a broken or interrupted paint line on a road or highway surface.

In applying a marking to a surface, such as a road or highway, it is frequently desirable to form the marking in a discontinuous manner to effect an interrupted or dash line. The interrupted line or stripe may indicate a center line, or may flank a solid center stripe to indicate a passing zone on the highway, or may indicate some specific location, such as a parking lane.

Prior to the instant invention, the apparatus for applying an interrupted stripe generally consisted of the usual paint striping apparatus which included a self-propelled vehicle having a paint generating means mounted thereon which was adapted to spray a jet of paint binder onto a surface to effect the marking. Originally, in order to form the interrupted stripe or "skip-line," as it is commonly known, the operator of the striping apparatus manually controlled the operation of the machine to effect the skip-line. However, manual control gave inconsistent results and the lengths of the dash lines would thus vary. There has been developed in recent years skip-line striping machines that were designed to automatically apply dash lines of predetermined lengths and, although these heretofore known machines gave fairly consistent results, they were not completely satisfactory from an overall viewpoint. That is, these prior devices were large, cumbersome and expensive, requiring complicated driving systems and many component parts, thereby increasing production and maintenance costs.

The present invention avoids the disadvantages of the prior known striping machines by providing a device formed as a complete unit that may be conveniently attached to an existing striping machine. The attachment embodied in the present invention includes a ground engaging wheel that operatively drives a cam that in turn controls a valve for controlling the operation of the paint guns. The complete attachment embodied herein is adapted to be pivotally mounted on a new or existing striping machine and also includes means for varying the speed of rotation of the cam, the cycle of the skip line thereby being varied.

Accordingly, it is the object of the present invention to provide an attachment for a paint striping machine that is adapted to be utilized for the purpose of applying an interrupted or dash line to a surface.

Another object of the present invention is to provide an attachment for road striping apparatus which includes a ground engaging wheel that is adapted to automatically operate a control valve to control the application of an interrupted or dash line.

Still another object of the present invention is to provide an attachment for a road striping machine that is adapted to control the application of a "skip" or interrupted line, the attachment including means for varying the cycle of the skip or painted portions of the line being applied.

Still another object is to provide skip line cycle adjusting means which includes a variable diameter pulley.

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 self-propelled vehicle for applying a road marker or stripe and includes the attachment embodied in the present invention for effecting an interrupted or dash line;

FIG. 2 is a side elevational view of the attachment embodied in the present invention wherein the cycle adjusting means is illustrated in the normal position thereof;

FIG. 3 is a rear elevational view of the attachment with parts broken away and shown in dotted lines;

FIG. 4 is a plan view of the attachment with parts broken away and shown in dotted lines;

FIG. 5 is a side elevational view of the attachment similar to FIG. 2 with the cycle adjusting means shown in the maximum adjusted position thereof; and

FIG. 6 is a diagrammatic illustration of the paint striping apparatus showing the operation of the attachment embodied herein.

Generally, the present invention comprises a unit that is adapted to be attached to a conventional road striping machine, the unit modifying the operation of the machine to effect the application of an intermittent paint strip or dash line on a road or highway.

Referring now to FIG. 1, a conventional paint striping machine is illustrated and comprises a self-propelled vehicle generally indicated at **10**. The vehicle includes a frame **12** which has mounted thereon the equipment for driving the vehicle and for applying the paint stripe to the surface to be marked. The frame **12** is mounted on a triangular wheel base that includes rear traction wheels **14** and a front wheel **16**. A gasoline engine **18** is mounted adjacent the front of the vehicle and drives a compressor **20** through a pulley **22** and in addition drives the traction wheels **14** through suitable belts and pulleys and friction wheels **24** to propel the vehicle. The compressor **20** supplies the necessary compressed air to operate a pair of paint guns **26**, only one of which is shown suitably mounted on the frame **12** and which define paint generating means for applying the paint to the surface to be marked. The compressor **20** not only supplies air to control the operation of the paint guns **26**, as will hereinafter be described, but in addition supplies air thereto for atomizing the paint binder to be applied to the surface to be marked. Mounted on the vehicle **10** is a receptacle **28** which contains the paint binder to be applied to the surface to be marked and also mounted on the vehicle is a receptacle **30** which contains small spheres or autocollimating units which are adapted to be placed on the surface of the newly applied paint binder, which practice is well known in the art.

Normally, the vehicle **10** is adapted to move along the surface of the road to be marked, the paint guns **26** being controlled to spray a continuous stream of paint binder on the surface to effect the desired marking. Autocollimating glass beads are continuously dropped from dispensers **32** located rearwardly of the paint guns **26** and thereby reflectorize the marking as is well known in the art. In order to apply an interrupted or dash-line marking, the paint guns **26** and sphere dispensers **32** must be intermittently operated and for this purpose a separate unit or skip-line attachment is provided and is illustrated in FIGS. 3, 4 and 5.

The skip-line attachment embodied herein is generally indicated at **40** and includes a housing **44**. The housing **44** has a fender-like configuration and is defined by side walls or skirts **46** and a curved top wall **48** joined to the side walls **46**. The lower edges of the side walls are inclined to define a V-configuration the lower front edge

being joined to the curved top wall 48 and the lower rear edge extending rearwardly, terminating in an extension 50. The extension 50 is provided with an opening 52 through which a pivot pin 54 extends for pivotally securing the attachment 40 to the frame 12 of the vehicle 10. In order to firmly support the attachment 40 on the frame 12, a mounting fin 56 is secured to the central part of the top wall 48 and is formed with a curved configuration generally corresponding to the top wall 48. An opening 58 is formed in the rearmost portion of the fin 56 and is adapted to receive a link of a supporting chain, strap or the like, the supporting strap (not shown) being secured to the frame of the vehicle 10. Secured in suitable openings formed in the side walls 46 of the housing 44 are bushings 60 in which a shaft 62 is journalled for rotation. Secured to the shaft 62 by means of a hub 64 is a ground wheel 66, the ground wheel 66 being partially enclosed by the top wall 48 and side walls 46 of the housing 44. The shaft 62 extends outwardly beyond the outermost side wall 46 of the housing 44 through a bushing 68 and has a pulley or sheave 70 secured to the outer end thereof. Drivingly engaging the pulley 70 is a belt 71 that also engages a variable diameter pulley indicated at 72. The variable diameter pulley 72 is operatively secured for rotation to a shaft 73 that is journalled in the side walls 46 and that has a worm 74 secured thereto, the worm 74 being disposed within the housing 44.

In applying the skip or interrupted line on the roadway surface, it is the usual practice to set the operating mechanism to carry out a predetermined marking cycle. However, it is oftentimes necessary to vary the marking cycle and it is for this purpose that the variable diameter pulley 72 is provided. The specific structure and operation of this device will be described in more detail hereinafter but it is sufficient to state at this point that the pulley 72 transfers the drive from the ground wheel 66 to the worm 74. A cycle adjusting device indicated at 75 and pivotally mounted on the shaft 73 will be described hereinafter, together with the description of the variable diameter pulley 72.

Formed in the top wall 48 of the housing 44 is an opening which is disposed directly over the worm 74. A mounting plate 76 is secured to the top wall 48 and covers the opening and as shown in FIG. 6 has a bearing block 77 secured to the underside thereof. Extending downwardly through the mounting plate 76 and bearing block 77 into the housing 44 is a cam shaft 78, a worm gear 79 being secured to the lowermost end of the shaft 78 and engaging the worm 74. The upper end of the shaft 78 extends above the plate 76 and has a cam 80 secured thereto. The cam 80 includes two separate segments (not shown) that are adjustable with respect to each other so that the total length of the painted or skip portion of the striping cycle can be adjusted as required.

Referring now to FIG. 6, the skip line attachment is shown operatively connected to the paint spraying apparatus for controlling the operation thereof, to effect the interrupted or dash line marking. In order to control the operation of the paint guns 26 and sphere dispensers 32, a control valve generally indicated at 81 is provided and includes a housing 82 having a bore 84 formed therein. Slidably mounted in the bore 84 is a slide or plunger 86 that is formed with a reduced neck portion 88 and that has a bifurcated portion defining arms 90 integrally joined to the outer end thereof. A follower 91 is secured between the arms 90 of the plunger 86 and the plunger 86 will thus be caused to reciprocate in timed relation in response to the rotation of the cam 80. A spring 92 is positioned in the inner portion of the bore 84 and abuts against the innermost end of the plunger 86, the plunger thereby being normally urged to an outwardly position. The reduced portion 88 of the plunger 86 defines an annular chamber which is adapted to communicate with an inlet port 94, an exhaust port 96, and outlet port 98 formed in the housing 82, the arrangement of the parts being such that when the plunger 86 is in its inward position the annular chamber places the inlet port 94 and outlet port 98 in communication with each other, whereas when the plunger 86 is in its outwardly position the outlet port 98 is placed in communication with the exhaust port 96. The port 94 communicates with an air hose or conduit 100 that is connected to a manually controlled valve 102. The valve 102 receives compressed air from a manifold 104 through an air hose 106, the manifold in turn receiving the compressed air from the compressor 20 through an air hose 108. Compressed air is supplied to an inlet port 110 of the paint guns 26 through air conduits 112, 114, the air conduit 112 being connected to the valve 102. The air introduced into the paint gun through port 110 is adapted to atomize the paint binder during the spraying operation, as is wel known in the art. The paint binder to be atomized for spraying onto the surface to be marked is introduced into the paint gun 26 through a conduit 116 which is connected to the paint receptacle 28. Although only one paint gun is illustrated in FIG. 6, it is understood that an air conduit 118 and a paint binder supply conduit similar to conduit 116 may be employed to supply air and paint binder to the second paint gun. If necessary, additional paint guns may be mounted on the frame 12 of the vehicle 10 as desired and connected in the system in the manner described above.

A conduit 120 communicates with the outlet port 98 of the control valve 81, and this conduit 120 is connected to the paint gun 26 through air conduits 122 and 124. Another paint gun (not shown) may be connected to the conduit 120 by way of conduit 126. The air supplied to the paint gun or guns 26 through the conduits 120, 122, 124, 126, operates a spring biased valve (not shown) located in each of the paint guns, the valves being adapted to control the flow of paint binder through the paint gun nozzles. Thus, if air is admitted into the paint guns, their nozzle control valves will be opened to permit the spraying of the paint binder through the nozzles onto the surface to be marked.

Also communicating with the conduit line 120, 122 is a conduit 128 which is connected to the glass sphere dispenser 32, and another dispenser (not shown) may be connected to the conduit 120 by way of a conduit 130. A rotor 132 located in each sphere dispenser is adapted to be operated by the air supplied through the lines 128, 130, and the glass spheres located in the dispenser 32 are thus caused to be dispensed through the bottom thereof onto the freshly applied paint binder.

It is seen that by controlling the flow of air through the outlet port 98, the operation of the paint guns 26 and the sphere dispensers 32 will be controlled. Thus, when the plunger 86 is held in its inward position by the cam 80 against the action of the spring 92, the inlet port 94 and outlet port 98 are in communication with each other so that compressed air will be supplied to the paint guns and sphere dispensers, thereby causing them to operate, whereas when the cam 80 allows the plunger to be moved into and maintained in its outwardly position under the influence of the spring 92, the port 98 will be in communication with the exhaust port 96, thereby venting the paint guns and sphere dispensers to atmosphere so as to stop their operation.

Although a sphere dispenser as well as a conduit for a second sphere dispenser are illustrated, it is understood that the paint binder and spheres may be premixed, which would therefore eliminate the necessity of employing sphere dispensers in the device embodied herein.

As discussed above, the present invention embodies means for varying the striping cycle whereby the painted and unpainted portions of the skip line may be lengthened or shortened as desired. Since the length of the skip or painted portions of the line is directly proportional to the speed of rotation of the cam 80, the striping cycle can be varied by simply varying the rotational speed of the cam 80. In order to accomplish this result, the variable

diameter pulley **72** is provided and cooperates with the cycle adjusting means **75** to produce variations in the rotational speed of the cam. As shown in FIG. 4, the variable diameter pulley **72** includes opposed sections **140**, **142** that are splined to a collar **144**, that is in turn pinned to the shaft **73**. Both sections **140**, **142** include flanges **146** that define a V-groove therebetween for receiving the belt **71** therein. Springs **148** are positioned within the sections **140**, **142** and serve to normally retain the flanges **146** in the closed position. In the position shown in FIGS. 2, 3 and 4, the speed of rotation of the pulley **72** is at a minimum and assuming a constant rotation of the ground wheel **66** the pulley **72** transmits the minimum rotational speed to the cam **80**. Upon separation of the flanges **146**, the belt **71** rides deeper therebetween until it rests on the collar **144**. The effective diameter of the pulley **72** is then decreased to a minimum and in this position the pulley **72** transmits maximum rotational speed to the cam **80**.

In order to vary the effective diameter of the pulley **72**, the cycle adjusting means **75** is provided and as shown in FIGS. 2, 3 and 4 includes a speed adjustment bracket **150** that is pivotally mounted on the collar **144** in abutting relation with the inner side wall **46** of the attachment housing **44**. Secured to the outer end of the pivotally mounted bracket **150** is a stub shaft **152** on which an idler or roller **154** is rotatably mounted. The roller **154** is adapted to engage the belt **71** in tensioning relation therewith and thus will cause the belt to ride deeper between the flanges **146** of the pulley **72**. Accordingly, the more tension that is applied to the belt **71** by the roller **154**, the less the effective diameter of the pulley **72** and the greater the rotational speed of the shaft **73**, worm **74** and cam **80**. Thus, the cycle of the intermittent line being applied will be varied. The speed adjustment bracket is adapted to be secured in various adjusted positions and for this purpose is formed with an arcuate slot **156**, shown in dotted lines in FIG. 2. A bolt is secured to the adjacent side wall **46** and extends into the arcuate slot **156**. As shown in FIGS. 3 and 4, an adjustment screw **158** engages the bolt and is adapted to be tightened on the bracket **150** to secure the bracket in any desired position. As shown in FIG. 2, the bracket **150** is located such that the roller **154** is not in tensioning relation with the belt **71** and the pulley **72** is accordingly transmitting minimum rotational speed to the cam **80**. In FIG. 5, the bracket has been pivotally moved to the upper position thereof whereby the roller **154** is disposed in maximum tensioning relation with respect to the belt **71**. In this instance, the effective diameter of the pulley **72** has been reduced to a minimum, and correspondingly the rotational speed of the cam **80** is at a maximum. It is understood that the tension in the belt **71** may be moved between the limits illustrated in FIGS. 2 and 5, to vary the speed of the cam **80** accordingly.

By providing a conventional striping machine with the attachment described herein, a dash-line is easily obtained at a minimum of initial cost and maintenance. The cycle of the dash line may be changed as desired by tensioning the belt **71** or by changing or adjusting the cam **80**. It is also within the scope of the present invention to provide special cams which would be employed with modified control valves to paint double, intermittent, parallel or staggered stripes or a staggered pair of intermittent stripes.

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. An attachment for controlling a spray gun valve in order to vary the marking cycle of road striping apparatus carried by a vehicle comprising a housing, a ground engaging wheel rotatively mounted in said housing, cam means operatively engaging the spray gun valve for controlling the operation thereof, a drive assembly mounted on said housing and operatively connected to said ground wheel for imparting rotational drive to said cam means, said drive assembly including a shaft extending through the center of said ground wheel, a sheave mounted on said shaft and driven thereby, a belt driven by said sheave, a pair of flanges forming a variable diameter pulley that defines a V-groove therebetween for receiving said belt, a pair of springs, each of said springs positioned so as to apply a thrust against one of each of said flanges in a direction so as to force said pair of flanges against each other in frictional relationship with said belt in the V-groove therebetween, and a pivotally mounted speed adjusting bracket, said speed adjusting bracket being pivotally movable to control the tension on the pulley belt, thereby allowing said flanges to automatically adjust the effective diameter of the variable diameter pulley formed therefrom, to the tension applied to said belt whereby the speed of said cam means is controlled.

2. An attachment for controlling a spray gun valve as set forth in claim 1 further characterized by said speed adjusting bracket having an arcuate slot formed therein for receiving a bolt therethrough, means engaging said bolt for fixing said bracket in various adjusted positions thereof, the limits of adjustment being determined by the length of said slot.

3. An attachment as set forth in claim 1 further including a worm journalled for rotation in said housing and operatively connected to said pair of flanges forming said variable diameter pulley, a gear engaging said worm and driven thereby and being connected to the lowermost end of a shaft that defines downwardly into said housing, said cam means being connected to the uppermost end of said shaft.

4. An attachment as set forth in claim 1 including means for pivotally mounting said housing on the road striping apparatus.

5. An attachment for controlling a spray gun valve in order to vary the marking cycle of road striping apparatus carried by a vehicle comprising a housing, a ground engaging wheel mounted for rotation within said housing, cam means operatively engaging the spray gun valve for controlling the operation thereof, a drive assembly mounted on said housing and operatively connected to said ground wheel for imparting rotational drive to said cam means, said drive assembly including a shaft extending through the center of said ground wheel, a sheave mounted on said shaft and driven thereby, a belt driven by said sheave, a pair of flanges forming a variable diameter pulley that defines a V-groove therebetween for receiving said belt, a pair of springs, each of said springs positioned so as to apply a thrust against one of each of said flanges in a direction so as to force said pair of flanges against each other in frictional relationship with said belt in the V-groove therebetween, a bracket mounted so as to pivot at a point concentric with said flanges, an idler mounted on said bracket for pivotal movement for engagement with said belt wtihin the projected peripheral surface of said belt, and a means located between said idler and pivot point of said bracket to adjustably position said idler in contact with said belt whereby the speed of said cam means is controlled through the automatic adjustment of said flanges by changing the effective diameter of the variable diameter pulley formed therefrom in relation to the tension applied to said belt.

6. An attachment as set forth in claim 5, wherein said means to adjustably position said idler in contact with said belt is located within the projected peripheral surface of said belt.

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