

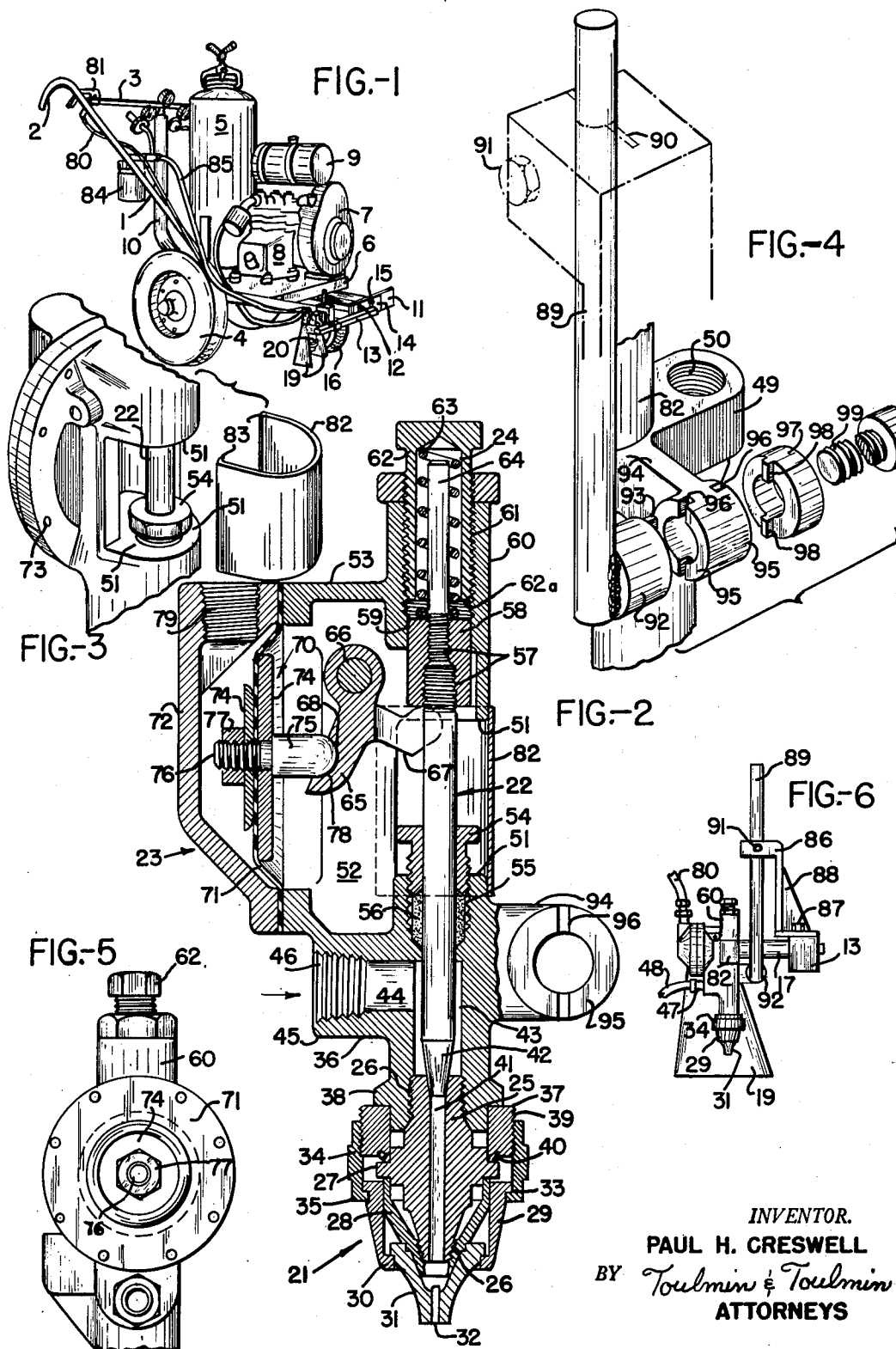
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STRIPING GUN FOR ROAD MARKING

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STRIPING GUN FOR ROAD MARKING

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9 Claims. (Cl. 299—86)

The present invention relates to striping machines for marking or painting lines on streets and highways, and more especially to the striping or paint guns used in these machines.

Under modern road marking conditions, it is necessary that the stripes be laid down not only as a continuous line, but also intermittently as sharply defined short lengths at varying distances lengthwise apart. To achieve this, it has been customary to move the nozzle needle valve in the paint spray head, on and off, by means of an actuating cylinder and piston structure to which pressure fluid is predeterminedly admitted. However, it has been found that when high pressure is used to operate the piston within its cylinder so as to obtain fast admission and cut-off of the paint to the nozzle, the packing gland or glands around the piston would develop a leak.

The frequency of these air leaks is increased when glass spheres or beads are used in the paint, which are prone to cut the needle and the upper packing box out very quickly. The air leaks detract from the efficiency of the striping gun and in some instances have made it necessary to use a larger capacity air compressor which, in turn, requires a heavier and clumsy machine.

The primary object of the invention is to provide an improved striping gun in which no packing glands are required around the needle valve actuating member at a position which receives high pressure air.

Another object is to provide an air pressure operated striping gun which eliminates the use of a piston and cylinder as the actuating mechanism and therefore has less tendency to leak and require expensive repair.

Still another object is to provide an air pressure operated striping gun in which the actuating element for operating the needle valve is physically isolated or separated from the compartment which contains the needle valve, so that no air under pressure used for control purposes either leaks past or finds its way toward the cylinder in which the needle valve and its valve rod operate.

Still another object of the invention is to provide an air pressure operated striping gun having a needle valve and a valve rod in alignment, together with an actuating mechanism which is not positioned on the axis of the valve rod but, instead, is separated from the latter and is arranged parallel therewith.

Another object is to provide a striping gun having a needle valve and a valve rod, together with an actuating mechanism for opening and closing the needle valve, but having said mechanism separated from the needle valve and its valve rod and operating in conjunction with a regulatable spring for holding the needle valve in closed position when the actuating mechanism is not being operated.

Still another object of the invention is not only to separate the position of the needle valve and its valve rod from the position of the actuating member, but also to provide a removable cover which extends over the valve rod for lubricating, cleaning, adjustment and observation purposes.

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Another object is to provide an instantly active actuator for the needle valve of a striping gun and which responds to air pressure and permits the use of a strong retracting spring on the needle valve.

5 A still further object is to provide in a striping gun of the air pressure operated type, and which employs a needle valve and a valve rod, a retracting spring arrangement for holding the needle valve on its seat when not otherwise operated, together with an adjustment by which the pressure of the needle valve against its seat can be readily adjusted.

10 The final object is to provide an improved actuating mechanism for the needle valve of a striping gun and which is of simpler construction and requires less parts than the cylinder and piston arrangement.

15 The above objects are carried out, in brief, by providing actuating mechanism formed of a diaphragm operated by air pressure and the force exerted by the diaphragm being communicated to the needle valve of the striping gun by means of a pivoted lever which moves against the spring pressure.

20 The diaphragm is of large size and the air pressure considerable, so that the retracting spring can be strong to give a rapid closing of the needle valve. A hollow cap bolt arrangement is provided for controlling the compressive action of the spring.

25 The above mechanism insures a well defined start and stop of the striping line under the rigid control of the operator.

30 Other objects and features will be apparent as the specification is perused in connection with the accompanying drawings, in which:

35 Figure 1 is a perspective view, somewhat in miniature, of a self-contained hand-operated striping machine provided with the improved striping gun; the purpose of this figure is merely to show the approximate position of the gun with respect to the remaining parts of the machine as a whole;

40 Figure 2 represents an enlarged vertical sectional view of the improved striping gun with a few parts shown in elevation for clearness;

45 Figure 3 illustrates a fragmentary perspective view of the casing which houses the actuating diaphragm, also showing the upper or valve rod portion of the needle valve;

50 Figure 4 is a perspective view of a supporting structure of the gun and showing, in phantom, a bracket secured to the frame of the machine for suspending the supporting structure;

55 Figure 5 represents a rear elevational view of the actuating member for the needle valve and specifically the casing which encloses the actuating diaphragm; and

60 Figure 6 depicts, again in miniature, the side view of the striping gun and immediately associated apparatus, including one of the air curtains.

65 Referring more particularly to Fig. 1, reference character 1 designates a frame or mounting which may be of any suitable construction such as drawn tubular steel or the like. The frame terminates at the top in handle bars 2 for the convenience of the operator, these bars being separated and supported by a cross-bar 3.

70 The frame is provided with wheels 4 which may be of the ball bearing pneumatic tire type, designed to support a paint or lacquer tank 5. Preferably, a single paint tank is employed but, when desired, a plurality of tanks or containers may be used for this purpose.

At the forward end of the frame and spanning the two frame members 1 there is a platform 6 on which is mounted an engine 7 belted to a compressor 8. This engine is preferably of the automotive type, using fuel from a tank 9 and the compressor is of any suitable and conventional design to give air pressures of approximately

100 pounds per square inch in the case of the small portable machine shown in Figure 1.

There is a large conduit or pipe 10 which passes underneath the engine platform 6 and projects forwardly thereof, this conduit also extending upwardly to a position adjacent the cross-bar 3. A conduit (not shown) is taken from the compressor 8 to this pipe 10, the latter serving as a source of air supply under pressure and also constituting part of the frame. Each end of the pipe 10 is sealed off, and across the forward end there is a plate 11 having bolts 12 and serves as a support for a pipe 13, closed at both ends. The latter is carried on a plate 14 which is slotted, as indicated at 15, at the position of the bolts 12 so that the plate and the pipe 13 can be adjusted in a vertical direction with respect to the plate 11.

Another frame member which may be in the form of an angle iron is welded to the forward edge of the platform 6 and extends forwardly in a parallel direction with respect to the forward end of the conduit 10. This angle iron, together with the conduit 10, serve as supports for bearings carrying a tired wheel 16. This wheel 16 and the two rear wheels 4 rotatably support the entire weight of the machine so that an operator grasping the handles 2 can push the machine forwardly or to the rear and the proper pressure on one handle 2 or the other can cause the machine to swing around wide arcs.

Conduits 17 extend inwardly from the conduit 13 (Fig. 6) and are in communication therewith. The conduits 17 carry at their ends a pair of spaced downwardly directed and triangularly shaped air curtains 19. The air curtains have been shown and described in detail in Patent No. 2,220,316, granted November 5, 1940, to Paul H. Creswell and Robert A. Kelly.

A flexible conduit (not shown) is taken from the exhaust pipe of the engine 7 to the pipe 13 so that exhaust gas is caused to flow downwardly through the interiors of the air curtains 19, as explained in the said Creswell et al. patent.

A paint or striping gun 20 is supported from the conduit 13 at a position between the air curtains 19 so that when atomized paint is emitted under pressure from the gun 20 and directed downwardly toward the road, the exhaust gas from the curtains 19 which is also projected downwardly, constrains the paint to a limited space widthwise and thereby causes the paint to be deposited on the road as a stripe with clearly defined edges.

It will be understood that the lower ends of the curtains 19 do not contact the road so that there is no mechanical wear on the air curtains as all the weight of the machine is taken by the wheels 4, 16.

The foregoing description is given mainly to show the position of the striping gun 20 on which the present invention is predicated with respect to the related parts of a striping machine. The details of the striping gun are shown more particularly in Figs. 2 to 5 inclusive, while Fig. 6 shows the details by which the gun is supported from the frame of the machine.

It will be understood that when operating a striping machine it is necessary to furnish paint at the gun 20 under pressure at a predetermined instant and under the control of the operator, and then to cut off the paint supply at another instant and without any dripping, for otherwise the striping line would not have a sharply defined beginning and an equally sharp termination.

A needle valve is usually employed in the striping gun to control the emission and stoppage of the paint flow. Heretofore it has been the practice to operate this needle valve by means of a cylinder and piston so that by applying air under pressure to one side or the other of the piston, or by the use of a spring return, it was possible to move the needle valve from its seat and return it to its seat when the striping line was finished.

However, it was found that leakage occurred at the stuffing boxes between the piston rod and the cylinder

so that the air pressure available to do the work of forcing the needle valve from its seat becomes, in time, considerably reduced. This necessitates higher pressures available, which calls for a greater size of compressor and the engine driving it.

In accordance with my invention, this piston and cylinder are completely eliminated, together with the use of the upper packing gland which is normally employed for restraining the escape of air under pressure.

Referring more particularly to Fig. 2, there is shown the improved striping gun. The gun is formed essentially of the nozzle portion indicated generally at 21, the needle valve 22, the actuator chamber 23 for the needle valve, and the spring return 24.

The nozzle portion 21 is formed essentially of a head 25 threaded at both ends, as indicated at 26, and having an intermediate outwardly extending shoulder 27. A conically shaped hollow member 28 is threaded on the lower threads 25 and rests at its upper surface on the lower surface of the shoulder 27. There is a chuck member 29 snugly surrounding the outer diameter of the conical member 28 and terminates at the lower end in an inwardly projecting ledge 30. The nozzle proper of the gun is indicated at 31, having an opening 32 and at its upper end is clamped between the conical member 28 and the lower end of the chuck when upward pressure is exerted on the latter, as will be described hereinafter.

The conical member 21 is provided with a shoulder 33 and a sleeve 34 having a lip 35 is adapted to apply an upward pressure to the chuck member.

The upper threads 26 of the head 25 are screwed into a casting 36 and a ring 37 is secured to a flange portion 38 of the casting 36. This ring portion has threads 39 on the outside which engage threads on the clamping cylinder or sleeve 34. There is an O sealing ring 40 located between the shoulder 27 and the ring 37 so that by tightening the clamping cylinder or sleeve 34, an upward pressure is exerted on the nozzle member 31 to hold this member securely in place. It will be noted that all parts of the nozzle portion as a whole can be taken apart for cleaning purposes.

The head 25 has a longitudinal opening 41 there-through in line with the opening 32 in the nozzle proper. The upper end of the opening 41 is slightly flared outwardly to constitute a seat for the conical portion 42 of the needle valve 22.

The casting 36 is provided with an atomizing or mixing chamber 43 immediately surrounding the needle valve 22, and communicating with this chamber there is an opening 44 accommodated by an extension 45, which opening is provided with a pipe threaded end 46. A pipe coupling 47 (Fig. 6) is received by the pipe threads 46, this coupling being connected through a flexible conduit 48 to the bottom of the paint tank 5 so that paint from the tank is furnished to the opening 43 which immediately surrounds the needle valve 22. To insure ready flow of the paint, a connection (not shown) may be taken from the compressed air line 10 and the bottom of the tank 5 to keep the paint under continuous pressure.

Extending directly back and in approximately the same line as the extension there is a large lug 49 having an opening therethrough (not shown) which communicates with the chamber 43, this opening terminating in a vertically extending threaded opening 50 which receives a pipe coupling (not shown). A flexible tube is taken from this coupling to the compressed air pipe 10 so that air under pressure is available within the chamber 43 for atomizing the paint which flows through the opening 44 and placing the mixture under pressure.

The casting 36 at approximately midway of its length is provided with a cut-away portion indicated at 51 to leave exposed the needle valve rod 22 and the interior of a chamber 52 which is formed out of a circular wall portion 53 integrally joined to the casting. Surrounding

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the needle valve rod there is a gland 54 which threadedly enters an opening 55 in the casting immediately above the compartment 43. A packing 56 is contained within the lower part of the opening 55 so that by turning down on the nut 54, pressure can be applied against the packing 56 and prevent the escape of the pressurized paint within the compartment 43.

The upper end of the needle valve rod 22 is threaded to two different diameters, as indicated at 57, for receiving a plug 58 which slidably fits within an opening 59 of a cylindrical boss member 60 and thus serves as a centering element for the upper end of the rod 22.

The opening 59 is threaded at the upper end as indicated at 61 to receive a hollow cap screw 62, closed at the upper end and containing a compression spring 63 which bears against the upper end of the screw at one end and against the upper surface of the plug 58 at the other end. This spring snugly but slidably surrounds the upper end 64 of the needle valve rod 22. The lower end of the cap screw 62 terminates in a shoulder 63a which serves as an upper stop for the plug 58.

The purpose of the spring is firmly to hold the conical valve 42 in its seat within the head 25, and also serves as a spring guide for the small end portion 64 of the valve rod. It is apparent that by tightening the cap screw 62, the spring 63 may be placed under any pressure desired and thus control the firmness with which the needle valve 42 presses against the seat. The shoulder 63a is also brought nearer the upper surface of the plug 58 to decrease the vertical distance through which the valve rod can travel.

For actuating the needle valve, when desired, a swingable two-armed lever or trigger 65 is employed. This lever is swingably carried on a pin 66 within the compartment 52 and one of its arms 67 is formed as a fork member which straddles the rod 22 and presses against the lower surface of the plug 58. The other arm of the lever 65 has a countersunk opening 68 therein against which bears the pin 69 secured to a diaphragm assembly generally indicated at 70. The diaphragm 71 of the assembly is flexibly held between a cap 72 of a general circular configuration and is secured to the wall 53 of the compartment 52 by means of screws 73.

On each side of the diaphragm 71 there is a strengthening plate 74, the entire diaphragm assembly carrying a shouldered pin 75 which is threaded at one end 76 to receive a nut 77. The end of the pin opposite from the threaded end terminates in a hemispherical portion 78 which is received within a curved recess in the lever 65. The arrangement is such that when the diaphragm 71 is caused to move to the right (as seen in Fig. 2) in the manner hereinafter to be described, the lever 65 is swung about the pin 66, causing the forked arm 67 to push the plug 58 upwardly and to carry with it the valve rod 22. When the diaphragm 71 is released the compression spring 63 presses against the upper surface of the plug 58 and causes the needle valve 42 to be pressed against its seat in the head 25.

There is an opening 79 in the compartment to the left of the diaphragm 71, this opening being threaded to receive a pipe coupling to which air under pressure is admitted through a flexible tubing 80 (Fig. 1). A two-way valve 81 which is lever-operated is secured to the crossbar 3 (Fig. 1), this valve being of the so-called "on-off-exhaust" type.

Air under pressure is delivered by a conduit (not shown) from the main air pipe 10, the arrangement being such that when the lever on the valve is depressed, air under pressure is introduced to the left-hand side (Fig. 2) of the diaphragm to cause the lever 65 to swing counter-clockwise about its pin 66 in the manner described hereinbefore. However, when the lever of the valve 81 is pulled upwardly (as seen in Fig. 1), the supply of compressed air to the diaphragm is cut off and the air under pressure that remains on the left-hand side of the dia-

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phragm can now be exhausted through the valve 81. Thus the operator, by controlling the lever of the valve, can move the diaphragm 71 to the right, as seen in Fig. 2, or permit the spring 24 to push the diaphragm to the left through the plug 58 and the lever 65.

As shown, the diaphragm is provided with a re-entrant portion positioned between the plate 74 so that the distance between the diametral points of support and following the contour of the diaphragm, is greater than the straight line distance measured across the supports. This construction permits the diaphragm to distort when air under pressure is admitted to the chamber 23 to thus accommodate any angular position necessary for the hemispherical portion of the pin 75 to maintain contact with the trigger 65 as the latter is swung about the pivot 66.

It will be noted that none of the paint spray or any dust from the road can enter the chamber to the left of the diaphragm since this chamber is completely sealed off, so that there can be no interference with the effective operation or the flexing action of the diaphragm even when paint containing small glass reflecting spheres is being laid down as a stripe on the road.

When a piston and cylinder arrangement is employed for raising and/or lowering the valve rod 22, foreign matter would often attach themselves to the active surfaces of the piston, often passing through the packing gland, which would render the life of the gun fairly short. However, in accordance with one of the features of my invention, by employing a diaphragm, one side of which is contained within a completely closed compartment, complete isolation from the entrance of any foreign matter from the road is achieved.

It may be desired on occasion to observe the operation of the lever 65, but more especially to tighten the gland nut 54, and yet these parts should be kept as free from the dust or paint of the road as possible. For this reason an arcuate form of metal shield 82 (Fig. 3) is provided which slips over the opening formed by the cut-away portion 51. This shield may be shaped to give a compressive clamping effect by means of inwardly extending jaws 83 so as to be retained rigidly in position when pushed into place.

It may be desirable from time to time to keep the gun head 25 and the valve seat and the lower end of the needle valve as free as possible from paint. For this purpose a solvent contained in a jar 84 (Fig. 1) may be employed, this solvent being held under pressure by a conduit (not shown) connected to the main compressed air pipe 10 and admitted by means of a lever (not shown) attached to the jar into the conduit 85 which carries the air under pressure to the opening 50. Since the application of this solvent under pressure to the paint head does not constitute part of my invention, it is not believed necessary to describe this part of the machine shown in Fig. 1 in any greater detail.

The improved striping gun assembly, as shown in Fig. 2, is supported on the frame of the machine in the manner indicated in Fig. 6. An inverted S-shaped bracket 86 is bolted, as indicated at 87, to the conduit 17, this bracket being webbed as shown at 88, and having an opening at the top for slidably receiving a vertical rod 89.

The top portion of the bracket is preferably slotted, as indicated at 90 in phantom (Fig. 4) so that by drawing up on a cap screw 91 the rod 89 can be held rigidly in any vertical position. To the lower part of the rod 89 there is attached, by welding, a cylindrical member 92 having an integral key 93. A web 94 projects outwardly from the casting 36 opposite from the extension 45 and there is a pair of bosses 95 on each side of the web 94, these bosses being in line with the cylindrical member 92.

A pair of slots 96 are provided on these bosses, the left-hand slot, as seen in Fig. 4, registering with the key or tongue 93 of the cylindrical member 92. Another cylindrical member 97 is provided having a key or tongue

98 which registers with the slot 96 in the boss 95. The cylindrical members 92, 97, the bosses 95, and the web 94 have openings therethrough in register with one another and the opening in the cylindrical member 92 is threaded to receive a relatively long cap screw 99 so that by tightening this cap screw, the entire striping gun assembly can be rigidly held on the vertical rod 89.

It has been explained that the striping gun assembly 20 is positioned between the air curtains 19 (Fig. 1) and when air under pressure is delivered to the air curtains through the conduits 13, 17 and paint and atomized air under pressure is introduced into the chamber 43, a spray of paint traveling at high velocity is delivered at the nozzle 33 and is constrained to a predetermined width as it strikes the roadway, by the air issuing from the air curtains 19. By manipulating the on-off and exhaust valve 81, the movement to the right of the diaphragm assembly 70 can be controlled so as to move the valve 42 in a predetermined manner from its seat, and thus introduce the combined paint and air under pressure to the opening 41 in the nozzle head and the opening 32 in the nozzle.

It will be noted that by sliding the rod 89 to any desired vertical position after loosening and then tightening the cap screw 91, any height of the striping gun with respect to the air curtains and the roadway may be effected to give optimum results.

It has been further found that by reason of the diaphragm assembly 70 which necessitates no sliding surfaces but relies purely upon a flexing action, greater operating life is given to the actuating member, as well as obtaining a greater lifting force on the valve rod 22 which, in turn, permits a stronger compression spring 24 to be employed.

Thus, maximum precision is obtained in opening and closing the valve 42 controlled at the hand-operated lever 81 so that the starting and stopping of the paint under pressure at the nozzle opening 32 is more exact and better defined than when a cylinder and piston arrangement is employed to operate the valve rod 22. Thus, intermittent stripes on the roadway are more sharply defined at their beginnings and ends.

It will be understood that various modifications and arrangements in structure could be made without departing from the spirit of my invention and, accordingly, I desire to comprehend such modifications and substitutions of equivalents as may be considered to come within the scope of the appended claims.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. A striping gun for a machine for applying marking material to a road, said gun comprising a head having an opening therethrough, a nozzle secured to the head in line with said opening, a valve seat in said head, a valve for said seat and a valve rod for the valve in line with said opening, a compartment around the valve rod and a pair of openings from the exterior of the gun into said compartment, means for supplying one of said openings with a fluid under pressure and the other of said openings with marking material so that the compartment is filled with said material under pressure but is prevented from reaching the opening in the head while the valve is seated, means for unseating the valve at the will of the operator, said means including a cylindrical compartment extending from the gun and containing a flexible member which completely seals off the interior of the gun from the interior of said compartment, said flexible member extending within a plane which is parallel to the longitudinal axis of said valve rod, and means for communicating the transverse movements of the diaphragm into longitudinal movements of the valve rod, and means for supplying the compartment containing the diaphragm with air under pressure at the will of the operator in order to unseat the valve by movement of the valve rod,

whereby marking material under pressure is caused to flow through the longitudinal opening in the head and out through the nozzle during the time that the valve is unseated.

2. A striping gun for a machine for applying marking material to a road, said gun comprising a head having an opening therethrough, a nozzle secured to the head in line with said opening, a valve seat in said head, a valve for said seat and a valve rod for the valve in line with said opening, a compartment around the valve rod and a pair of openings from the exterior of the gun into said compartment, means for supplying one of said openings with a fluid under pressure and the other of said openings with marking material so that the compartment is filled with said material under pressure but is prevented from reaching the opening in the head while the valve is seated, means for unseating the valve at the will of the operator, said means including a cylindrical compartment extending from the gun and containing a flexible member which completely seals off the interior of the gun from the interior of said compartment, said flexible member extending within a plane which is parallel to the longitudinal axis of said valve rod, means for communicating the transverse movements of the diaphragm into longitudinal movements of the valve rod, means for supplying the compartment containing the diaphragm with air under pressure at will of the operator in order to unseat the valve by movement of the valve rod, whereby marking material under pressure is caused to flow through the longitudinal opening in the head and out through the nozzle during the time that the valve is unseated, and means for seating the valve when air pressure is withdrawn from the active side of the diaphragm, said means including a compression spring positioned in a cylindrical extension which is in line with the valve rod.

3. A striping gun for a machine for applying paint to a road, said gun comprising a head having a compartment adapted to receive paint and air under pressure, a nozzle leading from said compartment, an on-and-off valve for admitting paint and air to said compartment, a valve rod for said valve and means for controlling said valve, said means including a planar flexible member which is actuated by air pressure on one side, and means for transmitting the movements of said flexible member to said valve rod to cause the valve rod to lift said valve, a hollow cylindrical member extending from said gun and in line with said valve rod, a plug on said valve rod adapted to slide within said cylindrical member when the rod is moved in accordance with the movements of the flexible member, a hollow screw within said cylindrical member and containing a spring which slidably surrounds the valve rod and presses against one end of said plug member in order to exert a pushing effect against said plug member and the valve rod to seat the valve when air pressure is removed from the said one side of the flexible member.

4. A striping gun for a machine for applying paint to a road, said gun comprising a head having a compartment adapted to receive paint and air under pressure, a nozzle leading from said compartment, an on-and-off valve for admitting paint and air to said compartment, a valve rod for said valve and means for controlling said valve, said means including a planar flexible member which is actuated by air pressure on one side, and means for transmitting the movements of said flexible member to said valve rod to cause the valve rod to lift said valve, a hollow cylindrical member extending from said gun and in line with said valve rod, a plug on said valve rod adapted to slide within said cylindrical member when the rod is moved in accordance with the movements of the flexible member, a hollow screw within said cylindrical member and containing a spring which slidably surrounds the valve rod and bears at one end against the interior of said screw member and

at the other end against one surface of said plug member, said screw having a shoulder adjacent the surface of said plug member against which said spring presses, the distance between said shoulder and the adjacent surface of the plug being adapted to be adjusted by moving the screw with respect to said cylindrical member.

5. A striping gun for a machine for applying paint to a road, said gun comprising a head having a compartment adapted to receive paint and air under pressure, a nozzle leading from said compartment, an on and off needle valve for admitting paint and air to said compartment, a valve rod for said valve, and means for controlling said valve, said means including a diaphragm member which is actuated by air pressure on one side, a link swivable about a fixed axis, a pin positioned between one end of the link and the diaphragm, the other end of the link being in contact with said valve rod, and said diaphragm being flexible in a plurality of directions whereby to accommodate the swivelling movement of the link as the air pressure flexes the diaphragm to press against said link through said pin and cause the link to operate the valve.

6. A striping gun for a machine for applying paint to a road, said gun comprising a head having a compartment adapted to receive paint and air under pressure, a nozzle leading from said compartment, an on and off needle valve for admitting paint and air to said compartment, a valve rod for said valve, means for controlling said valve, said means including a diaphragm member which is actuated by air pressure on one side, a double leg link swivable on a fixed axis, a pin secured to the diaphragm and adapted to contact one of the legs of said link, the other leg of the link being adapted to actuate said valve rod, said diaphragm having a re-entrant portion at the position of said pin whereby as the diaphragm is flexed upon admission of air pressure to operate the valve rod, the said connecting rod is adapted to follow the swinging movement of the leg of the link with which it contacts.

7. A striping gun for a machine for applying paint to a road, said gun comprising a head having a compartment adapted to receive paint and air under pressure, a nozzle leading from said compartment, an on and off needle valve for admitting paint and air to said compartment, a valve rod for said valve, means for controlling said valve, said means including a diaphragm member which is actuated by air pressure on one side, a double leg link swivable on a fixed axis, a pin secured to the diaphragm and adapted to contact one of the legs of said link, the other leg of the link being adapted to actuate said valve rod, said diaphragm having a re-entrant portion of circular

shape which is adapted to distort when air is admitted to one side thereof whereby the pin is permitted to accommodate itself to the swinging position of the link as the valve rod is operated.

8. A striping gun for a machine for applying paint to a road, said gun comprising a head having a compartment adapted to receive paint and air under pressure, a nozzle leading from said compartment, an on and off needle valve for admitting paint and air to said compartment, a valve rod for said valve, and means for controlling said valve, said means including a diaphragm member which is actuated by air pressure on one side, a pin secured to the diaphragm on the other side, a double leg link of which one leg contacts said pin and the other leg contacts said valve rod, said link being swivable on a fixed axis whereby when the diaphragm is flexed the link is caused to swing about its axis and thereby move the valve rod through said pin and link, said diaphragm being adapted to be flexed in a plurality of directions whereby the movement of the diaphragm and pin is caused to follow the swinging movement of said link when the valve rod is actuated.

9. A striping gun for a machine for applying paint to a rod, said gun comprising a head having a compartment adapted to receive paint and air under pressure, a nozzle leading from said compartment, an on and off needle valve for admitting paint and air to said compartment, a valve rod for said valve, and means for controlling said valve, said means including a diaphragm member which is actuated by air pressure on one side, a pin secured to the diaphragm on the other side, a double leg link of which one leg contacts said pin and the other leg contacts said valve rod, said link being swivable on a fixed axis whereby when the diaphragm is flexed the link is caused to swing about its axis and thereby move the valve rod, said diaphragm being secured at its edges, the length of the free surface of the diaphragm, as measured in any one direction, being greater than the straight line distance between the secured edges measured in any one direction whereby the diaphragm is caused to flex in any and all directions to follow the swinging movement of said link as the valve is actuated.

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