

[72] Inventor **Andrew J. Clingan**
Bowie County, Texas (Rte 10 Box 814
Texarkana, Tex. 75501)

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[54] **FIXEDLY DIRECTED HAND OPERATED STRIPING MACHINE WITH ATTACHMENT FOR FACILITATING MANEUVERABILITY**
8 Claims, 6 Drawing Figs.

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[56]

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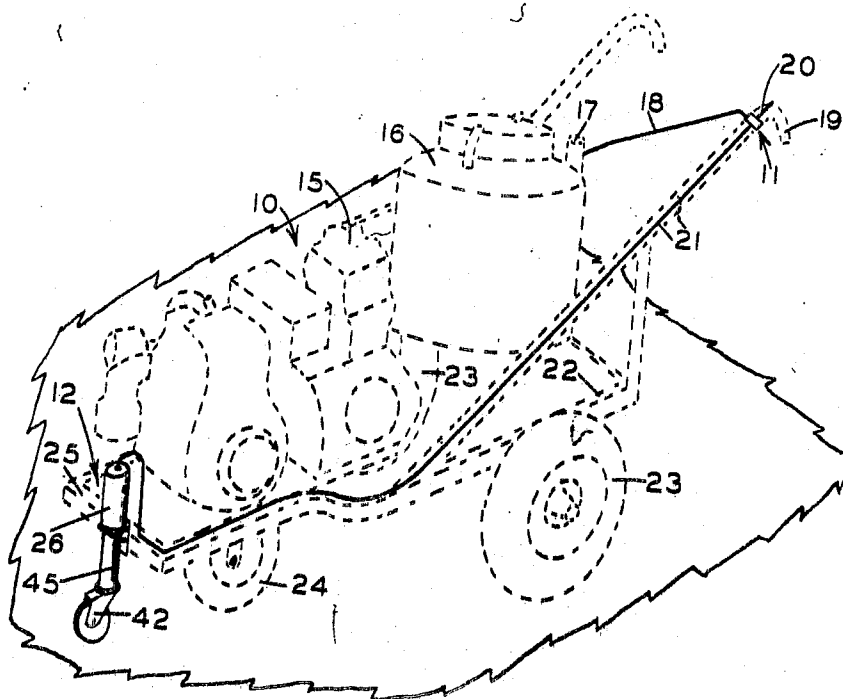
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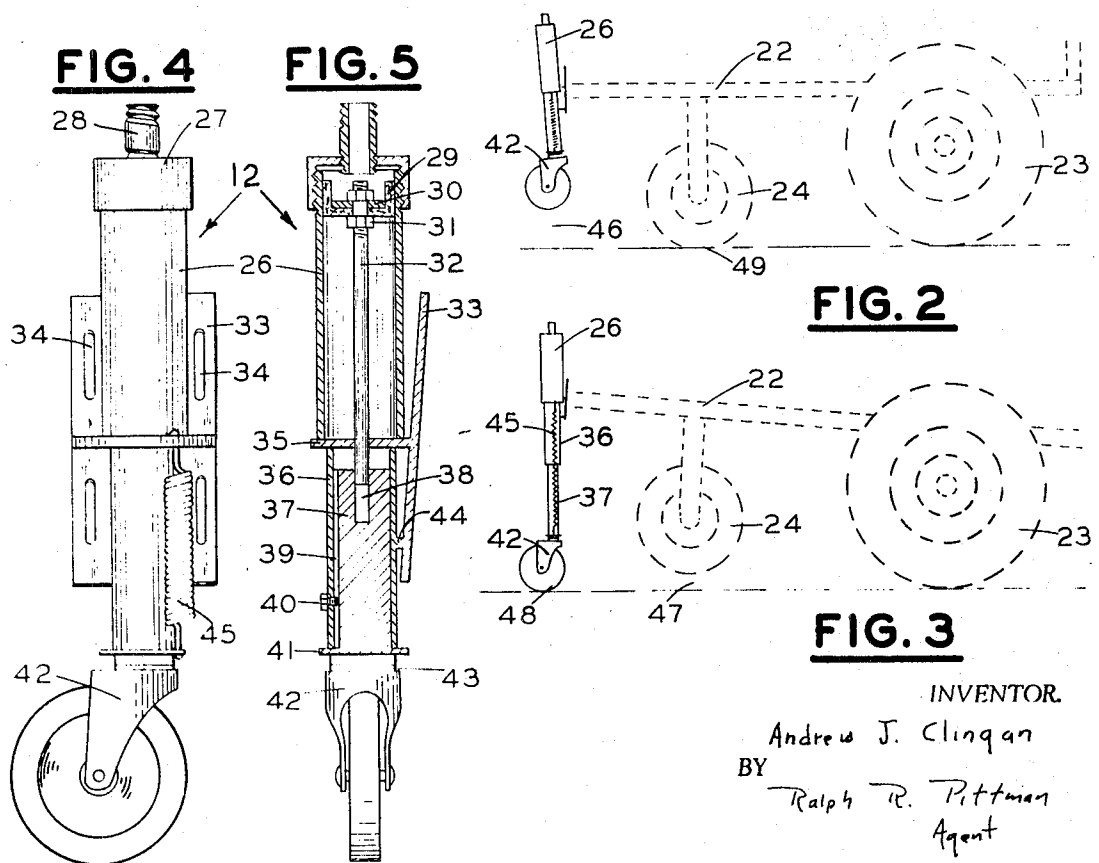
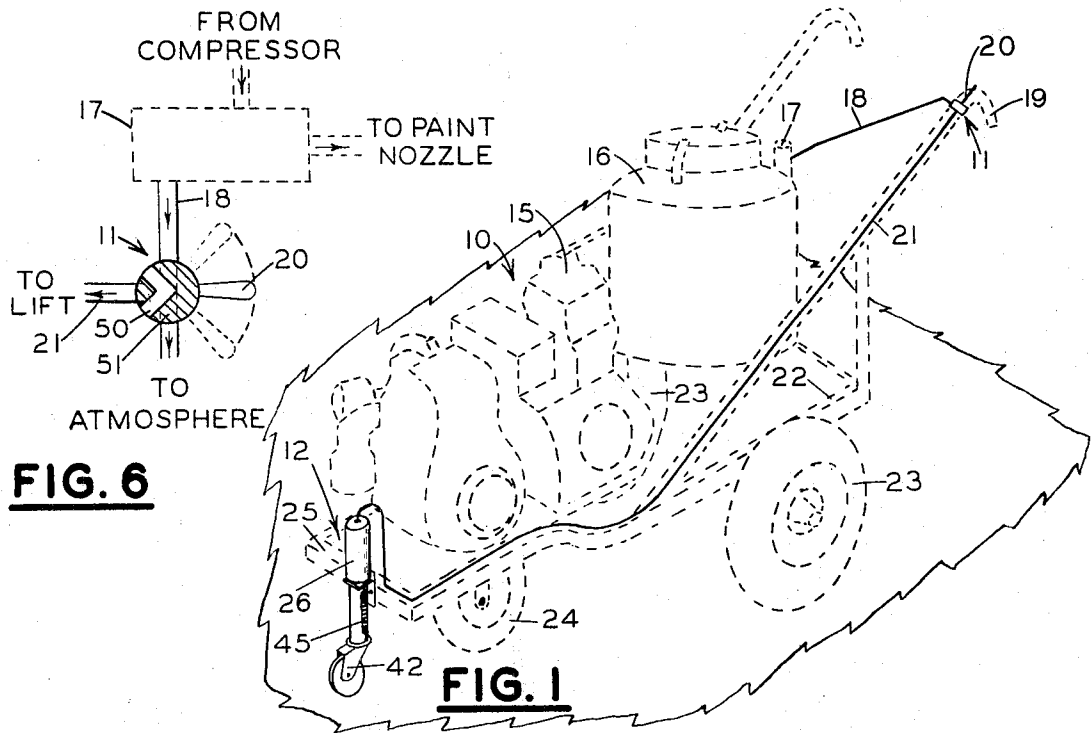
Primary Examiner—Robert B. Reeves

Assistant Examiner—David A. Scherbel

Attorney—Ralph R. Pittman

ABSTRACT: A hand operated paint striping machine having wheels journaled for rotation in coextensive parallel planes and utilizing compressed air for paint application has a pneumatic lift secured at its forward end. The lift has a swivelled caster at its lower end to facilitate manipulation of the machine, controlled from a valve on the handle of the machine.





INVENTOR
 Andrew J. Clingan
 BY *Ralph R. Pittman*
 Agent

FIXEDLY DIRECTED HAND OPERATED STRIPING MACHINE WITH ATTACHMENT FOR FACILITATING MANEUVERABILITY

BACKGROUND OF THE INVENTION

This invention relates generally to machines for painting boundary lines on pavements, and more specifically to the incorporation of means for facilitating turning of fixedly directed striping machines.

Pavement line marking is predominately a matter of rectilinear movement, and for this reason the wheels of striping machines rotate on nonturnable axles. If it is desired to turn the machine, it is necessary to manipulate it on its rear wheels while manually holding the front end of the machine, including the front wheel, in a raised position above the pavement.

Because of the fact that front wheel contact with the surface is depended upon to fix the direction of the machine, it is essential that adequate weight be normally carried by the front wheel to so function. It is this weight which must be lifted by an operator of a hand operated machine to effect a change in direction. In marking parking lots, for example, the requirement is usually for laying down a large number of short, spaced parallel lines of paint, each line requiring two 180° turns per line.

An object of the invention is the modification of a rectilinearly directed hand operated striping machine for the purpose of facilitating its maneuverability, particularly in short radius turning.

Another object of the invention is the addition of a pneumatic lift attachment to a striping machine which is operable from the compressed air equipment required for use in painting.

A further object is the association of a pneumatic lift with the forward end of a paint striping machine, the lift having a single wheel caster for bearing on the surface and being so mounted that its longitudinal axis moves from an off-vertical to a vertical position when the lift is operated to raise the forward end of the machine.

Other objects and advantages will be apparent from the specification and claims herein, and from the several figures of the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 illustrates the attachment in place on a common type of three wheeled striping machine, the solid lines designating the components of the attachment and the broken lines those of the machine;

FIG. 2 is a fragmentary view of the modified machine showing the elevation of the wheels when the machine is in use for straight line marking;

FIG. 3 is a similar view, showing the relative elevation of the wheels following actuation of the attachment, preliminary to a turning movement of the machine;

FIG. 4 is an elevational view of the pneumatic lift;

FIG. 5 is a generally sectional view of the pneumatic lift; and

FIG. 6 shows diagrammatically the air valve control of the lift.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1, the numeral 10 indicates generally a common type of hand operated striping machine having a metal frame 22 on which are mounted the front wheel 24 and a pair of rear wheels 23. The three wheels are mounted on stationary axles for rotation in parallel vertical planes, and in this way the direction of the machine is established.

The equipment carried by the frame 22 includes the air compressor 15 for maintaining in the air receiver 17 compressed air at a pressure adapted to apply striping paint to a surface from the paint tank 16 as the machine moves along the surface in its fixed direction. A pair of handles 19 are rigidly secured to the frame 22, extending rearwardly and upwardly

to an elevation convenient for manual manipulation of the machine. There being no steering apparatus on the machine, its direction can be changed only by bearing down on the handles 19 until the front wheel 24 is lifted above the surface, and then turning the machine on the two rear wheels 23.

To the foremost portion 25 of the striping machine frame 22 is rigidly secured, by welding or bolt type fasteners, the uprightly disposed pneumatic lift, designated generally by the numeral 12.

As shown in more detail in FIGS. 4 and 5, the pneumatic lift 12 has a hollow upper pressure cylinder 26, closed at its upper end by the threaded cap 27, through which an air inlet and exhaust connection 28 extends. A piston formed by the leather cup disk 29 and the metal washer 30 fitted therein has fastened thereto, by means of the retaining nuts 31, the upper end of the piston rod 32, the latter extending coaxially through and downwardly below the cylinder 26 through a central opening at its lower end. The periphery of the cup disk 29 contacts the inner surface of the cylinder 26 in slipfit engagement, so that the piston and piston rod are reciprocally movable along the inside of the cylinder 26, and will be driven downward upon admission of compressed air through the connection 28.

A lower guide cylinder 36 extends coaxially downward from and is rigidly joined to the lower end flange 35 of the upper cylinder, and the reciprocally movable push rod 37 is fitted for slidable movement within the lower cylinder. The downwardly projecting end of the piston rod 32 is disposed to engage the push rod 37 at the bottom of the coaxially extending opening 38 after moving in slipfit engagement therewith, this arrangement constituting a lost motion relationship between these members. To preclude angular or rotary motion of the push rod 37, a grooved keyway 39 extends inwardly from its surface and longitudinally alongside its reciprocable path of movement, and a set key 40, rigidly secured in the wall of the lower cylinder 36, projects into the groove.

The push rod 37 terminates at its lower flange 41, and the caster 42 is attached thereto, extending downwardly from its swivel joint 43, which is preferably a ball bearing joint. The caster 42, absent compressed air acting on the piston of the upper cylinder, is held in the up or retracted position by the helical spring 45, which extends between the flanges 35 and 41, and is downwardly drivable against the bias of the spring in response to the admission of compressed air above the piston in the upper cylinder.

As may be seen from FIG. 5, the attachment plate 33 is preferably inclined divergently upward with respect to the coextensive axes of the cylinders, the plate being rigidly welded thereto at the flange 35 and at a second weld 44 therebelow. The attachment plate may be rigidly secured to the foremost portion of the machine frame by bolts passing through the fastener slots 34 and the frame, or by welding, as may be best adapted to a specific machine.

FIG. 1 shows the preferred construction for enabling use of the compressed air from the receiver of the paint machine for actuating the lift. The tubing 21 extends along the frame and the associated handle to the manually operable air control valve 11, the latter being located for convenient manual access by the operator of the machine as customarily used, and the tubing 18 provides a path for the movement of compressed air from the receiver 17 to the valve 11.

The diagram, FIG. 6, shows in more detail the connection and selective positions of the air control valve. The compressor in its normal operation supplies compressed air to the receiver 17 at a pressure suitable for paint application. The valve 11 is manually operable to three alternate positions by corresponding movements of the valve core 51 with its L-shaped channel 50; namely, to (1) supply air to the lift, (2) discharge compressed air from the lift to the atmosphere or (3) complete cutoff, as shown by the solid lines of FIG. 6.

The fragmentary view, FIG. 2, of the machine with the lift attached, shows the position of the related components as they appear when the machine is being used for straight line mark-

ing. It will be seen that the caster 42 is retracted, being spaced from the supporting surface as indicated at the numeral 46, and the front wheel 24 is resting on the surface, as indicated at the numeral 49. FIG. 3 similarly shows the relative position of the wheels after actuation of the lift, the wheel of the caster having been projected to press against the surface, as at 48, and thereby lifting the front wheel 24 from the surface, as indicated at 47. The inclination of the attachment plate with respect to the coaxial longitudinal axes of the cylinders is such that these axes move from an off-vertically alignment indicated in FIG. 2 to a vertical alignment as the frame is swung upward by the lift about the rear wheels 23, as shown in FIG. 3, during which operation the wheel of the caster turns to compensate for the altered axial alignment.

The location of the lift at the foremost portion of the machine affords maximum lever arm for lifting the weight normally carried by the front wheel, thereby making possible a lift of minimum dimensions. Since the front wheel must carry a substantial weight to assure correct directional movement of the machine during the striping procedure, the raising of this weight by actuating the lift in response to a movement of the control valve handle relieves the operator of the physically exhausting practice of bearing down on the machine handles to lift this substantial weight. To further facilitate turning of the machine, the axle of the wheel of the caster is laterally offset with respect to the vertical axis of the lift, thereby providing for an easy and smooth swivelling motion of the machine about the caster.

These structural advantages contribute substantially to facile maneuvering of the machine, particularly in the common situation requiring the painting of a large number of short, parallel lines, as in parking lot areas. As a practical matter, it is only necessary to raise the front wheel sufficiently to disengage the supporting surface for easy manipulation of the machine when a change of direction is desired, and after the machine has been turned, a further movement of the control valve permits the compressed air utilized in the lifting procedure to exhaust to the atmosphere, restoring normal weight to the front guiding wheel. The previously stretched retracting spring then functions to hold the caster above the pavement, to avoid the wear which would otherwise be uselessly imposed on the lift components by continuous contact of the caster with the supporting surface.

I. claim:

1. In a hand operated paint striping machine including a frame and a front and a pair of rear supporting wheels mounted thereon for rotation on a surface along coextensive vertical planes, the frame having a portion thereof extending forwardly beyond the front wheel, paint applying means including a receiver containing compressed air carried on the frame and a pair of handles joined to the frame and extending rearwardly therefrom, the improvement which comprises the attachment of an uprightly disposed pneumatic lift to the forwardly extending portion of the frame, the pneumatic lift having a reciprocably movable caster swivelly mounted at the lower end of the lift, resilient means normally holding said caster at an elevation above the surface, and means including manually operable valve means mounted on one of said handles for connecting the air receiver to the pneumatic lift to thereby propel the caster downwardly to engagement with the surface and concurrently raise the front wheel to disengage-

ment with the surface.

2. The striping machine in accordance with claim 1, wherein said manually operable valve means includes means selectively operable to disconnect said pneumatic lift from said air receiver and connect said lift to atmosphere.

3. The striping machine according to claim 2, wherein said manually operable valve means includes means selectively operable to disconnect said pneumatic lift from both said air receiver and atmosphere.

4. The striping machine as set forth in claim 1, wherein the pneumatic lift includes an attachment plate disposed intermediate the ends thereof and inclined from its lower edge divergently with respect to the longitudinal axis of the lift, the divergence being such that the caster rolls forwardly as the front wheel of the striping machine is raised to deflect the longitudinal axis of the lift to a vertical position.

5. In a hand operated paint striping machine including a frame and a front and a pair of rear supporting wheels mounted thereon for rotation on a surface in a predetermined fixed direction, the frame having a portion extending forwardly beyond the front wheel, a receiver containing compressed air at a pressure adapted for paint application carried on the frame, and a pair of handles joined to the frame and extending upwardly and rearwardly therefrom, the improvement comprising the attachment to the forwardly extending portion of said frame of an uprightly disposed pneumatic lift, said lift comprising a serial arrangement of an upper pressure cylinder having at its upper end an air connection opening, a piston and an associated piston rod reciprocably movable in said upper cylinder and downwardly drivable in response to admission of compressed air at said pressure through said opening, means including manually operable valve means mounted on one of said handles for selectively admitting said compressed air through said air connection opening, a lower guide cylinder extending coaxially from and below the upper cylinder into which said piston rod coaxially projects, a reciprocably movable push rod in said lower cylinder downwardly drivable to project therefrom in response to a downward movement of said piston rod, resilient means normally restraining the projection of said push rod, a caster swivelly mounted on the lower end of said push rod, and a transversely extending attachment plate fastened at the juncture of the cylinders, said plate extending from said juncture upwardly along the upper cylinder and downwardly along the lower cylinder and being rigidly secured to the forwardly extending portion of said frame at an elevation normally disposing said caster above said surface and in position to bear against said surface and thereby raise the front wheel when said push rod is downwardly driven.

6. The striping machine as defined in claim 5, wherein the attachment plate of the lift inclines from its lower edge divergently with respect to the coextensive axes of the cylinders.

7. The striping machine in accordance with claim 5, wherein the push rod of the pneumatic lift has a longitudinally extending groove alongside its reciprocable path of movement and a set key extending through the wall of the lower cylinder cooperates with said groove to restrain radial movement of the push rod.

8. The striping machine as set forth in claim 5, in which the piston rod drives the push rod through a lost motion connecting construction.