United States Patent [19]

Mullen

[11] **3,880,542**

[45] **Apr. 29, 1975**

[54] **ASPHALT PAVING VEHICLES**

[76] Inventor: **Nathaniel John Mullen**, 1522 Upton Ave. North, Minneapolis, Minn. 55411

[22] Filed: **May 14, 1973**

[21] Appl. No.: **359,634**

[52] **U.S. Cl.** **404/101**

[51] **Int. Cl.** **E01c 19/12**

[58] **Field of Search** 404/101, 108, 84

[56] **References Cited**

UNITED STATES PATENTS

2,562,430	7/1951	Lutz	404/101
3,054,334	9/1962	Barber	404/108
3,250,191	5/1966	Potts	404/108
3,398,663	8/1968	Matich	404/108 X
3,453,939	7/1969	Pollitz	404/84
3,540,360	11/1970	Snow	404/84
3,543,654	12/1970	Long	404/84
3,606,827	9/1971	Miller	404/84
3,749,504	7/1973	Smith	404/84

Primary Examiner—Nile C. Byers, Jr.
Attorney, Agent, or Firm—Jacobson and Johnson

[57] **ABSTRACT**

An asphalt paving vehicle which enables an operator to lay a uniform layer of asphalt around sharp curves and inclines and to drive the asphalt paving vehicle to another job after completion of the laying of the asphalt layer.

1 Claim, 4 Drawing Figures

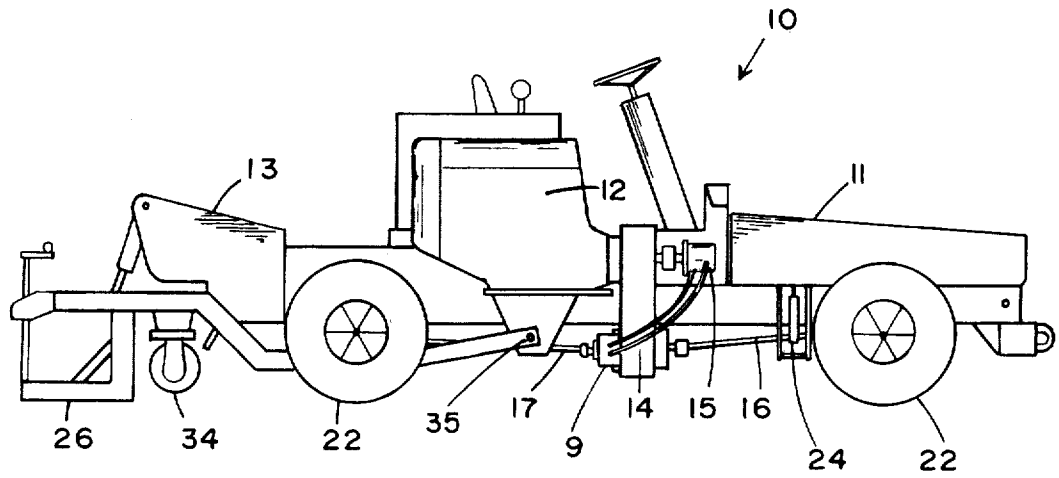


FIG. 1

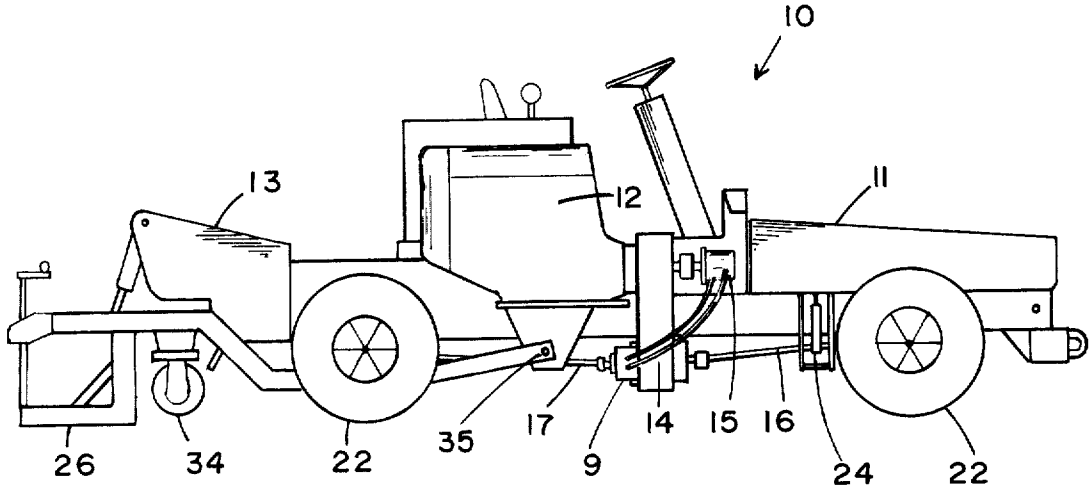


FIG. 2

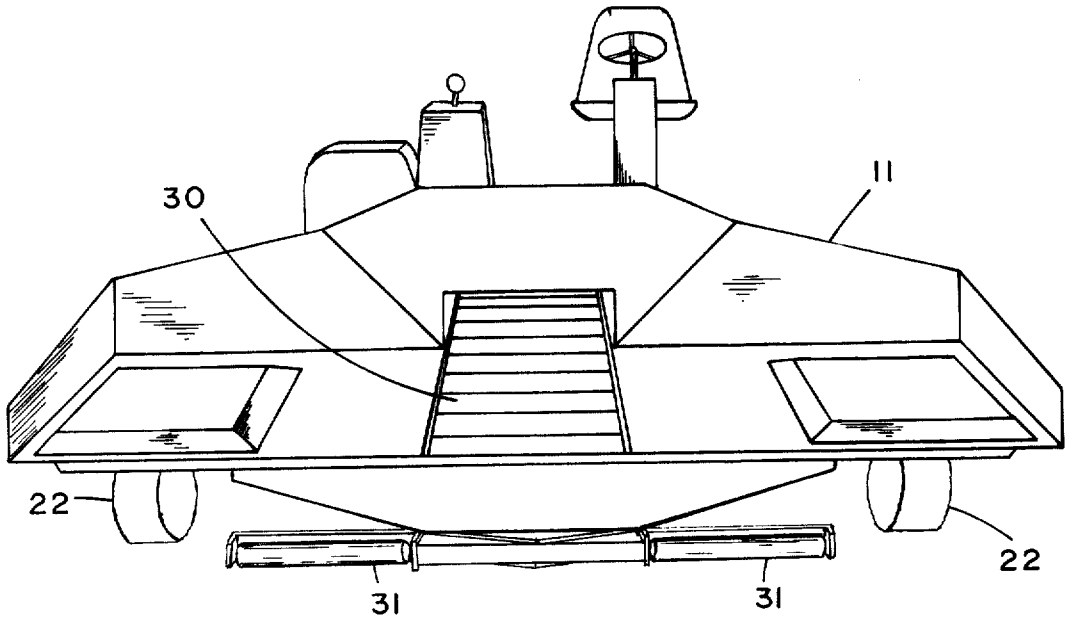


FIG. 3

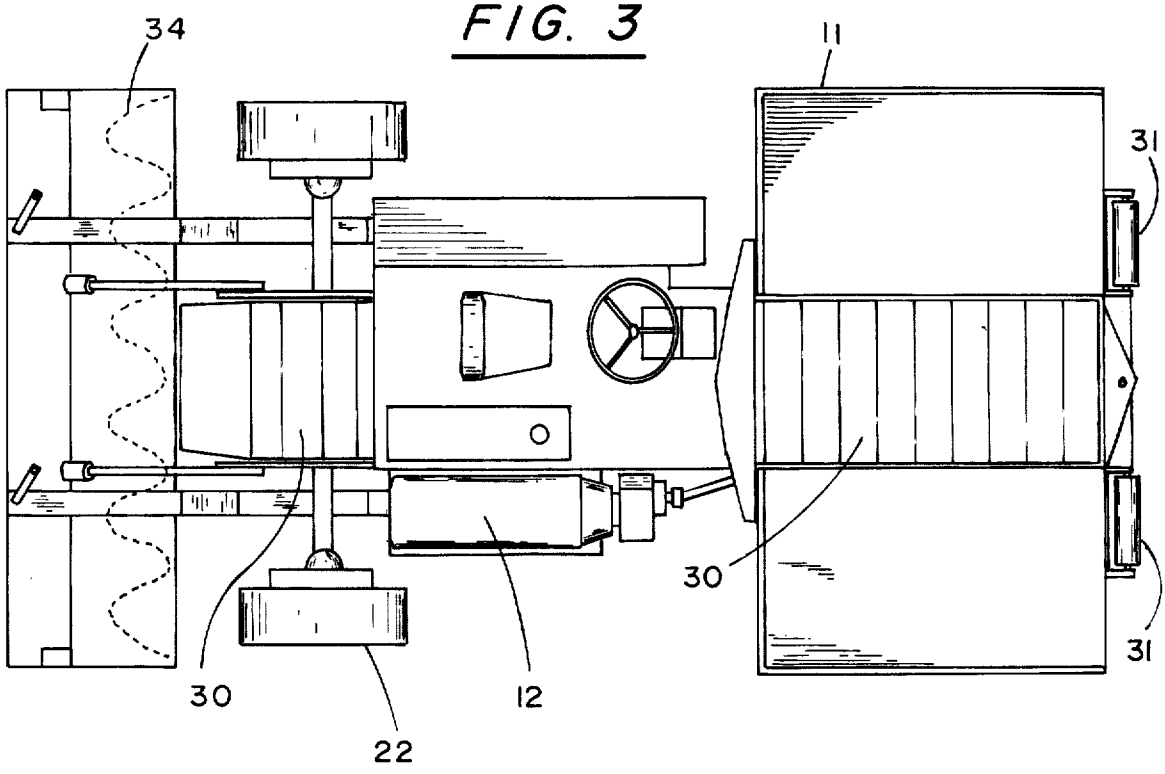
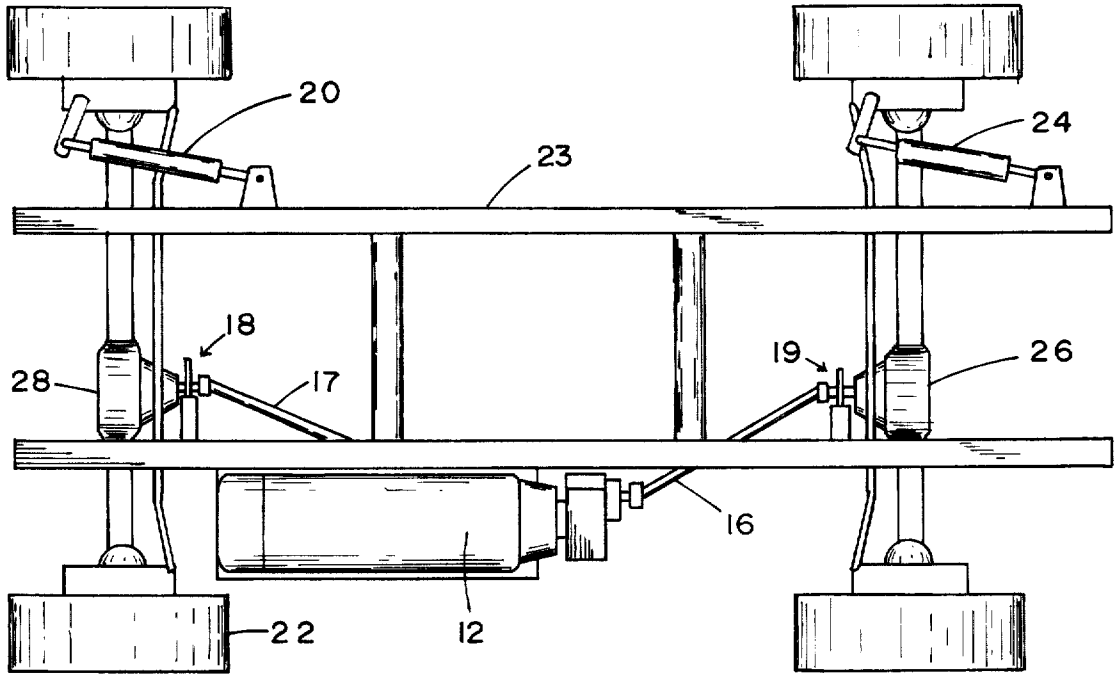


FIG. 4



ASPHALT PAVING VEHICLES

BACKGROUND OF THE INVENTION

This invention relates generally to asphalt paving vehicles and, more specifically, to an asphalt paving vehicle for laying a uniform layer of asphalt on a flat road or an inclined roadbed as well as around sharp corners.

DESCRIPTION OF THE PRIOR ART

The concept of asphalt paving vehicles, particularly asphalt road pavers are known in the art. Generally, these paving vehicles deposit a layer of asphalt on top of a prepared roadbed. The asphalt paving vehicle receives the asphalt mix from a dump truck and applies it on the roadbed by means of a unit called a screed. The paving vehicle usually contains a hopper for receiving the asphalt from a dump truck, a conveyor for conveying asphalt to an auger which spreads the asphalt mix to the desired width and a screed which packs and heats the asphalt mix to form a layer of hardened asphalt on top of the roadbed. One of the problems with prior art asphalt paving vehicles is that they have not been very practical for use on loose roadbeds, i.e., those which have a rock or gravel base or an inclined roadbed. For example, the typical prior art asphalt paver has rear wheel drive and contains an extremely heavy rear end for traction. The front end of the vehicle contains a hopper and solid rubber tires which are used to support a load of asphalt mix. The solid front tires also prevent screed deflection when asphalt mix is dumped into the hopper. If the screed deflects up or down as the asphalt is dumped in the hopper, it is apparent that the road surface will be rough. While this type of paving vehicle has worked well for some applications, it has had serious drawbacks in that this type of paving vehicle has lacked maneuverability, consequently, sharp curves were required to be hand formed which increases the cost of paving. In addition, the use of the hard rubber tires to support the load of asphalt mix is disadvantageous because it is sometimes difficult to turn or drive the paving vehicle up an incline on a loose roadbed because the small, hard tires tend to plow rather than roll. Also, when the front hopper is filled with asphalt mix the heavy front load produces a tendency of the rear wheels to spin thus uprooting the roadbed under the wheels and thereby producing an uneven roadbed which produces a weak spot in the road. That is, as the rear wheels spin the rocks pile up behind the rear wheels thus preventing the roadbed from receiving a smooth, continuous layer of asphalt.

In addition, the prior art paving vehicles have had limited maneuverability and speed. Another fault of asphalt pavers is their frequent transmission breakdowns due to the varying loads they encounter. That is, oftentimes the asphalt pavers suffer damage in operation because it not only powers the asphalt paving vehicle but it must push the dump truck containing the asphalt mix. Consequently, frequent transmission breakdowns have occurred because of the severe loads that are sometimes placed on the unit.

The present invention has overcome these problems to provide an asphalt paver in which the asphalt paving vehicle is powered by four wheel drive as well as a hydrostatic motor driven transmission that can provide a virtual infinite range of paving speeds in both forward and reverse. The hydrostatic motor driven transmission

is powered directly from the engine by a hydraulic pump. The front wheels and rear wheels are driven off separate drive shafts and a separate disk brake is provided to the front and rear of the vehicle so that the vehicle can be used for high speed driving from job to job.

BRIEF SUMMARY OF THE INVENTION

Briefly, this invention comprises an asphalt paving vehicle for laying a smooth layer of asphalt on loose and inclined roadbeds which contains a hydrostatic motor driven transmission, four wheel drive, front and rear steering, flotation tires, a floating screed and a weight distributed vehicle to allow the machine to apply a smoother more consistent and uniform layer of asphalt.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a side elevation view of my asphalt paver;

FIG. **2** is a front perspective view of my asphalt paver;

FIG. **3** is a top view of my asphalt paver; and

FIG. **4** is a top skeleton view of the frame of my asphalt paver showing the drive mechanism of my invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings, FIG. **1** shows a front elevation view of my asphalt paving vehicle **10** comprising a hopper **11** for receiving the asphalt mix, a motor **12** for propelling paving vehicle **10** and a paving unit or floating screed **13** for applying the asphalt material to the roadbed.

A simultaneous reference to FIGS. **1**, **2** and **3** projects a more complete description of my asphalt paving machine. Briefly, my asphalt paving machine contains a hopper **11** which has a conveyor **30** therein to convey the asphalt mix from front hopper **11** to the rear of the machine where the asphalt falls onto the roadbed in front of an auger **34.** Auger **34** levels and distributes the asphalt mix to the proper depth. Then a compacting plate **26** heats and compacts the asphalt mix to form a uniform layer of asphalt. Compacting plate **26** smooths out the asphalt mix as well as heating the asphalt mix to cause adhesion of the particle in the asphalt mix. The heating units for heating the compacting plate **26** are not shown for simplicity in the drawing but conventionally comprise a gas heater. Compacting plate **26** is mounted on screed **13** which is pivotally mounted to the frame of the vehicle by a first pin **35** and a second pin (not shown). The pivotal mounting of screed **13** allows for deflection of the front or rear of the paving vehicle without affecting the vertical position of the screed.

Asphalt paving vehicle **10** is self-propelled and pushes a dump truck in front of the vehicle. The dump truck is pushed on its rear wheels by a pair of rollers **31** that contact the dual wheels of the dump truck to push the truck forward as asphalt mix slides into hopper **11.** The hopper **11** comprises a pair of end sections which fold or tilt inward toward a center section by use of a hydraulic mechanism **24** such as shown in FIG. **1.** The center section contains a conveyor **30** that carries the asphalt mix to the rear of the vehicle. The reason for having the sides of the hopper tilt upwards is that with a dump truck bed in the upright position, there has to be sufficient clearance between the dump truck bed

and the hopper to allow the bottom of the truck bed to clear the top of the hopper. Consequently, there cannot be any permanent tilting or sloping of the hopper toward the conveyor **30** if one is to directly dump the asphalt mix into the hopper.

Referring to FIG. **4**, my asphalt paving vehicle is shown without the body to reveal a rigid frame **23** and front and rear wheels which are powered at the front through a differential housing **26** and at the rear through a differential housing **28.** The drive train which is also partially shown in FIG. **1** comprises motor **12** and a hydraulic pump **15** which supplies hydraulic fluid to a hydraulic motor **9** through a pair of hoses. Hydraulic motor **9** transmits power to the transmission which is located in gear case **14.** The hydrostatic motor driven transmission can be obtained from Funk Manufacturers in Coffeyville, Kan. The power train is activated such that the three speed gear transmission is driven by the hydraulic motor **9.** The utilization of this feature of our transmission in conjunction with the asphalt paver is to provide an infinite number of speeds over the low ranges while at the same time provides a selected number of forward or reverse speeds over the entire vehicle's speed range.

The front power train unit contains a drive shaft **16** which connects to front differential housing **26.** Similarly, the rear power train contains a drive shaft **17** which connects to rear differential housing **28.** Located immediately in front of rear differential housing **28** and attached to drive shaft **17** is a disk brake **18.** Similarly located in front of front differential housing **26** and attached to drive shaft **17** is a disk brake **19.** The disk brakes can stop or slow the unit down to provide control of the paving vehicle as it is being operated or as it is driven from job to job. My asphalt paving vehicle also includes dual steering so that the front wheels can be steered through a power hydraulic mechanism **24** and the rear wheels can be steered through a hydraulic mechanism **20.** The purpose of the front and rear wheel steering is so that the paving vehicle can be maneuvered around extremely sharp corners thus virtually eliminating hand paving.

In order to obtain sufficient support, I utilize 16.5 inches × 128 ply rated tires. With these tires and my four wheel steering, I can turn a radius of 9 feet 5 inches with the inside wheel and 15 feet 5 inches with the outside wheel. Thus, it is possible to lay asphalt around a curve with about a 10 foot diameter. However, no limitation to said tire size is intended.

My paving vehicle is powered at both the front and the back to reduce the amount of torque applied to the rear wheels and thus prevent slipping or spinning of the wheels. My asphalt paving vehicle **10** also contains a screed **13** which is pivotally mounted at frame **35** to allow the screed to float freely. This allows the front end or the rear end of my asphalt paving vehicle to pass over bumps or to deflect without effecting the vertical position of the screed and consequently the depth of the asphalt layer. In addition, the even power to all wheels by use of four wheel drive allows my asphalt paver screed to move smoothly and surely on radius cul-de-sacs or the like.

Because of the floating screed, the utilization of high flotation tires, i.e., air inflated tires is now possible to allow my paving vehicle to be driven at higher speeds from job to job rather than being trailered.

I claim:

1. An asphalt paving vehicle for applying a uniform and smooth layer of asphalt comprising:

a frame having a front section and a rear section;

a power actuated hopper for receiving asphalt mix, said hopper located on the front of said frame, said hopper having means for directing asphalt mix into a conveyor;

a conveyor located on said frame for conveying asphalt mix from said hopper to the rear of said frame;

a front driving member mounted on said frame for supporting and steering the asphalt paving vehicle including a pair of high flotation tires mounted on said front driving member for supporting the front end of said frame and said hopper when said hopper is filled with asphalt mix, a first differential connected to said front driving member for powering said front driving member, said first differential connected to a first output shaft, said front driving member including a first brake for stopping the paving vehicle and a power actuated member for steering said front driving member;

a rear driving member mounted on said frame for supporting and steering the asphalt paving vehicle including a pair of high flotation tires mounted on said driving member for supporting the rear end of said frame, a second differential connected to said rear driving member for powering said rear driving member, said second differential connected to a second output shaft, said rear driving member including a second brake for stopping the paving vehicle and a power actuated member for steering said rear driving member; said front driving member mounted on said frame for supporting and steering the asphalt paving vehicle and said rear driving member mounted on said frame for supporting and steering the asphalt paving vehicle coacting to produce an inside turning radius of about 10 feet;

a power source for driving said first output shaft and said second output shaft including an engine, a hydrostatic motor driven transmission for powering said first driving member through said first output shaft and said second driving member through said second output shaft; a hydraulic pump driven by said engine; said power source including a hydraulic motor operable for being driven by said hydraulic pump, said hydraulic motor operable for powering said vehicle through said hydrostatic motor driven transmission;

a floating screed located on the rear of said frame distributing and compacting the asphalt mix to produce a smooth roadbed, said screed pivotally mounted to said frame to thereby prevent deflection of said screed when said front driving member or said rear driving member pass over bumps without affecting the vertical position of said screed; and

a pair of rollers mounted to said front section of said frame, said pair of rollers operable for pushing a dump truck ahead of said asphalt paving vehicle.

* * * * *