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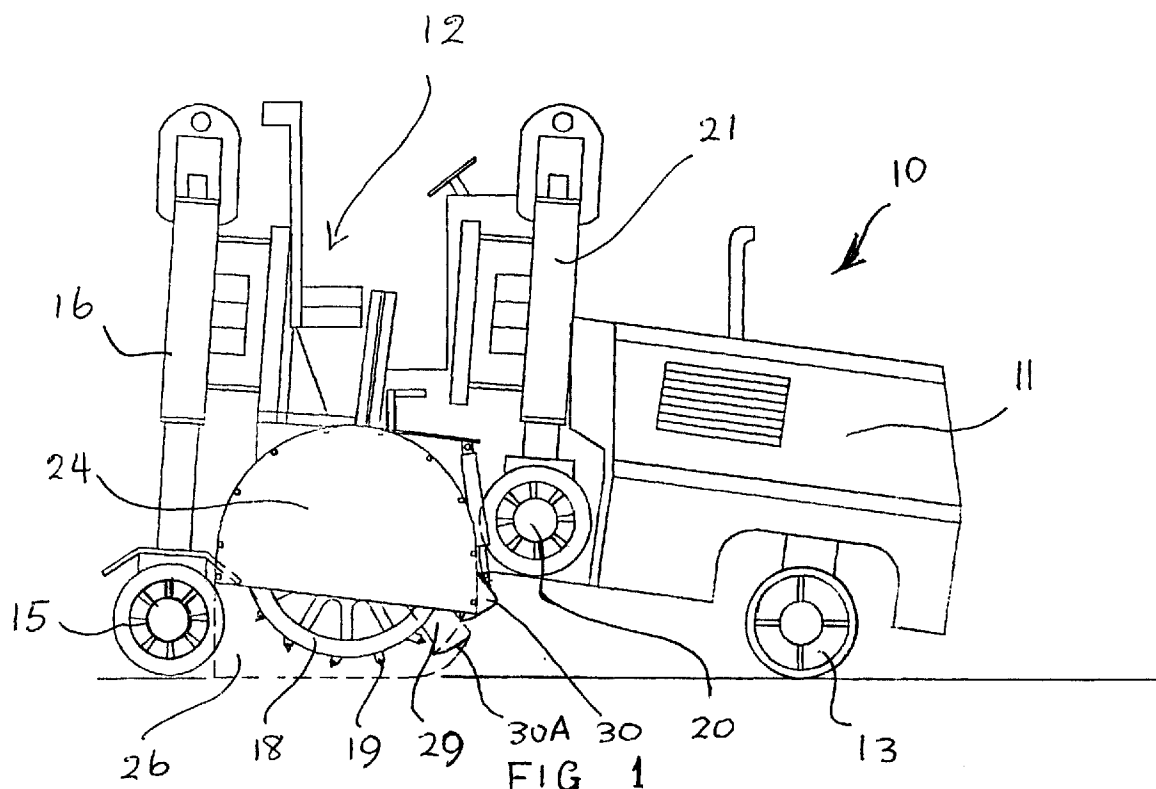
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(54) Road planing machine

(57) A road planing machine (10) which includes a planing drum (17) and a side cutting wheel (18) comprises a chassis having front roadwheels (13) for providing steering ability and main roadwheels (15,20) for

supporting the planing drum and cutting wheel, in which the main roadwheel (15) on the drum side of the machine is positioned behind the drum. The rear roadwheel is preferably steerable. A kerbstone restraint member (29) may be provided in front of the cutting wheel.



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Description

This invention relates to improvements in road planing machines, alternatively referred to as cold milling machines.

Road planing machines are used to remove the surface region of roads in preparation for laying a new surface. They work by contacting a revolving drum equipped with an array of cutter elements with the surface, which is fragmented and removed. The configuration of the array of cutter elements is generally spiral such that, as the drum rotates, fragmented surface material or "planings", is carried either to one end of the drum for removal or is concentrated in a central region, for ejection to a discharge conveyor.

The planing drum is located inboard of the chassis of the machine and is mounted off-centre so that one end of the drum extends nearly to the side of the machine; the drum is raised and lowered by alteration of the height of the rear roadwheels relative to the chassis. The rear roadwheel on the "drum" side of the machine is mounted on a pivot such that it can be positioned in front of the drum when the machine is used for planing adjacent and up to a kerb or other boundary line or beside and outboard of the drum when the machine is used for planing away from the kerb. Road planing machines may also be fitted with a side cutting wheel mounted on the drum side and outboard of the chassis beyond the planing drum, for the purpose of cutting a groove or trench at the side of the road or carriageway, or for removing kerbstones. Typically, such wheels are either of 80 mm or 300 mm in width and cut to a depth of up to 400 mm. The surface of the wheel is provided with an array of carbide-tipped cutter elements which are angled forwardly in the direction of travel of the lower part of the wheel for cutting action on the upstroke. Thus, as the machine advances, the cutter wheel rotates in the reverse direction so that the lower part of the wheel moves in the advance direction and the cutter elements cut and remove material in a scoop-like manner. However, especially with cutting wheels of 300 mm width, the cutting wheel creates a substantial drag force on the drum side of the machine, which tends to cause the machine to adopt a "crabbing" attitude as it advances. This results not only in accelerated wear to the cutter tips but also to wear on the inner edge and side of the cutting wheel itself, since it contacts the side of the trench on the downstroke; to some extent, this also has the unwelcome result that the integrity of the side of the trench is compromised.

It is an object of the present invention to provide a road planing machine which avoids the problem of crabbing when the side cutting wheel is in use.

According to one aspect of the invention, a road planing machine which includes a planing drum and a side cutting wheel comprises a chassis having front roadwheels for providing steering ability and main roadwheels for supporting the planing drum and cutting

wheel, in which the main roadwheel on the drum side of the machine is positioned behind the drum.

It has been found that the increased wheelbase on the drum side, achieved by the use of a main roadwheel disposed behind the planing drum according to the invention and hereinafter referred to as the rear roadwheel, itself resists the tendency to a crabbing attitude on using the cutting wheel. The rear roadwheel may be at least temporarily fixed in a fore-and-aft direction but it is preferred that the mounting for the rear roadwheel includes means selectively to alter the angle of the roadwheel on either side of a vertical plane parallel with the longitudinal axis of the machine, whereby the driver can "steer" the rear of the machine to provide an additional resistance or counteraction to the crabbing tendency.

When using the machine according to the invention to cut a groove or trench with the side cutting wheel, the drum is used without the planing cutter elements and the minimum height of the chassis is selected, such that the surface of the drum just contacts the road surface and the cutting wheel can operate to the maximum depth according to its diameter. The rear roadwheel may be vertically adjustable relative to the chassis of the machine to provide for height adjustment of the chassis and hence adjustment to the cutting depth of the cutting wheel. The main roadwheel in front of the planing drum may either be removed altogether or vertically retracted away from contact with the ground when the cutting wheel is in use.

When the cutting wheel is used to remove kerbstones, they or at least significant portions of them have a tendency to be raised bodily by the cutter elements, rather than being completely reduced to fragments. Thus, typically, the rear end of a kerbstone will be reduced to fragments by the cutting wheel but a significant part of the front end will often be raised away from its seating by the lifting action of the cutter elements, following which the kerbstone part will either be urged inboard of the machine, where it may foul the planing drum as the machine advances, or outboard of the machine, where it may present a hazard to workmen or passersby.

Therefore, according to another aspect of the invention, a road planing machine which includes a planing drum and a side cutting wheel also includes a kerbstone restraint member mounted in front of the cutting wheel.

The kerbstone restraint member preferably comprises a raisable and lowerable leg which includes a bottom plate or pad against which a lifting kerbstone or part thereof will engage and will be held or restrained against the lifting action of the cutter elements of the cutting wheel, whereby the section of kerbstone between the rear end thereof and the restraint member will be reduced to fragments as the machine advances.

In relation to roads which have been re-surfaced, or indeed with new roads, it is a recognised problem that carriageways without kerbs or other well-defined edge boundaries suffer from traffic overrun and deteriorate as a result of water run-off. The edges of marginal regions

of such roads require patching with bituminous materials prior to being surface dressed. It is an object of another aspect of the invention to provide an improved method for stabilizing the edge regions of such roads.

According to yet another aspect of the invention, therefore, a method for stabilizing the edge regions of unkerbed roads comprises providing a trench along the edge of the road, back-filling the trench with spoil material supplemented if necessary by road planings, adding a settable material to the trench filling, compacting the materials in the trench and allowing them to set.

The settable material may be applied before or after the trench is filled. If the settable material is applied before filling of the trench, the settable material may be intimately mixed with spoil removed as the trench is formed and may only require to be scraped or brushed off the road surface back into the trench before compaction takes place.

In the method of the invention, the side cutting wheel of the road planing machine as hereinbefore described may be used to cut the trench, the dimensions of which should be approximately 300 mm in width and between 100 and 200 mm in depth.

The choice of settable material will depend on the nature of the soil. Thus, cement may be used for a sandy base material and lime may be used for clay. Ground granulated blast furnace slag may be used as a partial or total substitute for cement. The settable material will generally be added to a concentration of between 1.5 and 6% by volume, based on the spoil.

After compaction, for example with narrow vibrating rollers, and setting, the resulting stabilized edge may be top-dressed, following any necessary sealing of peripheral gaps or cracks at the interfacial zone between the stabilized edge and the remainder of the carriageway.

The method of the invention includes the use of automated metering of the settable material to the trench spoil, prior to compaction.

A road planing machine according to the invention will now be described, by way of example only, with reference to the accompanying drawings of which:

Figure 1 is a side elevation of a machine in the raised portion prior to trench-cutting;

Figure 2 is a plan view of the machine of Figure 1; and

Figure 3 is a front elevation of the planing drum and cutting wheel assembly of the machine of Figure 1.

Returning initially to Figure 1, the machine shown generally at 10 includes a motor cover 11, a driving portion 12 and front steerable roadwheels 13. At the rear and as shown in the position of Figure 1, the machine is supported by roadwheels 14, 15 (see also Figure 2) carried on vertically-displaceable legs to adjust the height of the rear of the machine above the ground. Only

leg 16 is shown, carrying wheel 15. The wheels are individually driven by hydraulic motors fed by a common hydraulic variable displacement pump; a selectable differential lock provides for equal traction at all wheels. A planing drum 17 is mounted off-centre for rotation about a lateral axis and a side cutting wheel 18 is demountably carried coaxially with drum 17, at the drum side of the machine. The cutting wheel carries carbide-tipped cutters 19. A further roadwheel 20 is carried on a vertically retractable leg 21 mounted on a bracket 22 hinged about a vertical axis. Roadwheel 15, as shown in Figures 1 and 2, is disposed behind the planing drum and the vertically displaceable leg 16 is pivoted to the rear of the chassis to provide a steering effect, controlled by hydraulic ram 23.

The cutting wheel 19 is provided with protective guards 24, 25 (see also Figure 3) mounted respectively to the outside of and above the wheel and by a downwardly-biased plate 26 between the wheel 18 and the planing drum 17. The plate 26 contacts the surface of the ground irrespective of the position of the machine in a vertical plane as determined by the vertically-displaceable legs and the lower edge thereof is shown in dashed outline in Figure 1. The planing drum is shielded by a cover plate 27. The drum 16 and cutting wheel 17 are driven by a belt (not shown) which engages a pulley block 28 drivingly connected to the drum via a reduction gearbox (not shown).

A leg 29 having its lower end formed as a foot 30 is carried so as to be raised or lowered with the foot 30 in front of the cutting wheel 18, controlled by hydraulic ram 31. The foot 30 is shown at the raised position; 30A indicates the lowered position.

In use for road planing only, the cutting wheel 18 is removed, the leg 21 is lowered until wheel 20 contacts the ground, and leg 16 is raised to bring wheel 15 clear of the ground. For planing to the edge of the carriageway, bracket 22 is disposed as shown in Figures 1 and 2, whereby the wheel 20 is inboard of the chassis of the machine. For planing away from the edge of the carriageway, the bracket 22 is swung rearwardly about its pivot axis such that it is disposed next to the end of the drum and outboard of the chassis, as indicated by dashed lines 20A in Figure 2. The legs for the wheels 14, 20 are height-adjusted to bring the planing drum to the desired working position in relation to the road surface.

In use for digging a trench or removing kerbstones, the leg 16 is lowered to raise the rear end of the machine, leg 21 is raised to the position shown in Figure 1, and the cutting wheel 18 is attached. Leg 16 (and also the leg supporting wheel 14) is then raised to lower the rear of the machine while the cutting wheel rotates, digging into the ground until the desired cutting depth is attained; the legs are then held at this position and the machine advances. If removing kerbstones, the leg 29 is lowered until the sole of the foot 30 is at or marginally above the upper surface of the kerbstones, whereby any

kerbstones or parts thereof dislodged by the cutting wheel and urged upwardly are restrained by the foot and the exposed kerbstone end between the foot and the cutting wheel is reduced to small fragments as the machine advances.

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10. A method according to any of claims 6 to 9, in which the settable material comprises cement and/or ground granulated blast furnace slag for sandy soils or lime for clay soils.

Claims

1. A road planing machine which includes a planing drum and a side cutting wheel, the machine comprising a chassis having front roadwheels for providing steering ability and main roadwheels for supporting the planing drum and cutting wheel, in which the main roadwheel on the drum side of the machine is positioned behind the drum. 10
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2. A road planing machine according to claim 1, in which the mounting for the rear roadwheel includes means selectivity to steer the rear of the machine. 20
3. A road planing machine according to claim 1 or claim 2, in which the rear roadwheel is vertically adjustable relative to the chassis of the machine. 25
4. A road planing machine which includes a planing drum and a side cutting wheel, the machine comprising a chassis having front roadwheels for providing steering ability and main roadwheels for supporting the planing drum and cutting wheel, in which a kerbstone restraint member is mounted in front of the cutting wheel. 30
5. A road planing machine according to claim 4, in which the kerbstone restraint member comprises a raisable and lowerable leg which includes a bottom plate or pad. 35
6. A method for stabilizing the edge regions of unkerbed roads, the method comprising providing a trench along the edge of the road, back-filling the trench with spoil material supplemented if necessary by road planings, adding a settable material to the trench filling, compacting the materials in the trench and allowing them to set. 40
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7. A method according to claim 6, in which the settable material is applied before filling of the trench and is intimately mixed with spoil removed as the trench is formed. 50
8. A method according to claim 6 or claim 7, in which the trench is formed by use of a road planning machine according to any of claims 1 to 5. 55
9. A method according to any of claims 6 to 8, in which the dimensions of the trench are approximately 300 mm in width and between 100 and 200 mm in depth.

