Feb. 2, 1971 P. LOCKWOOD 3,560,050

MACHINES FOR REMOVING WORN ROAD SURFACES

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FIG. 1

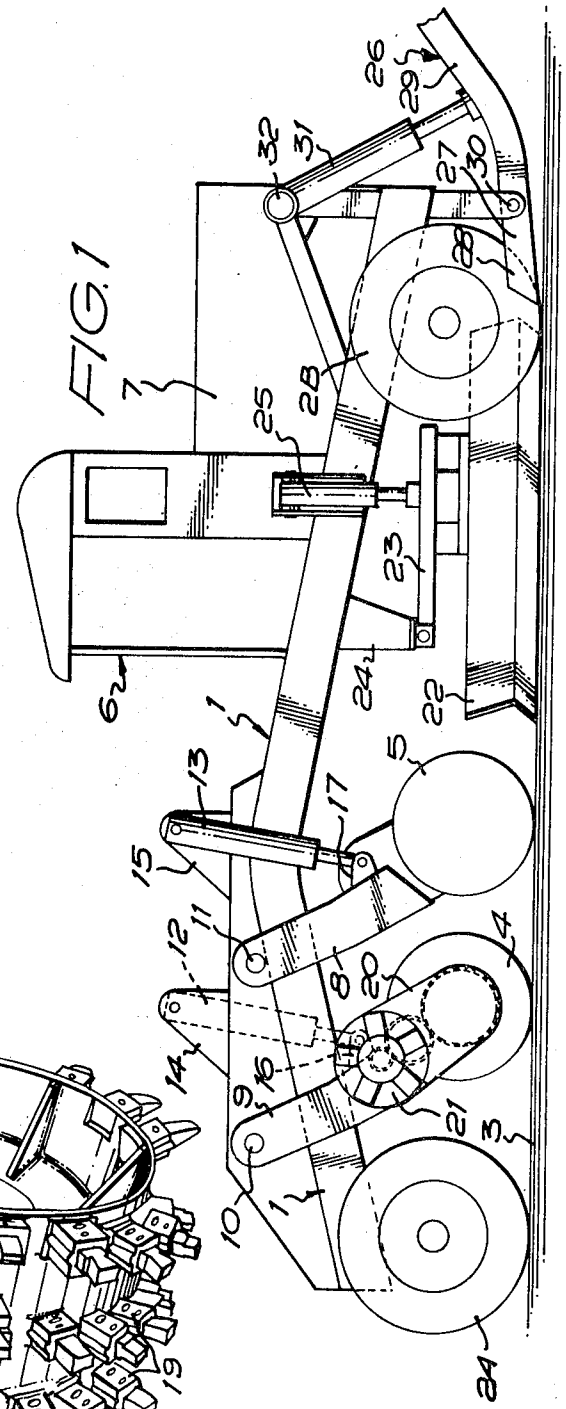
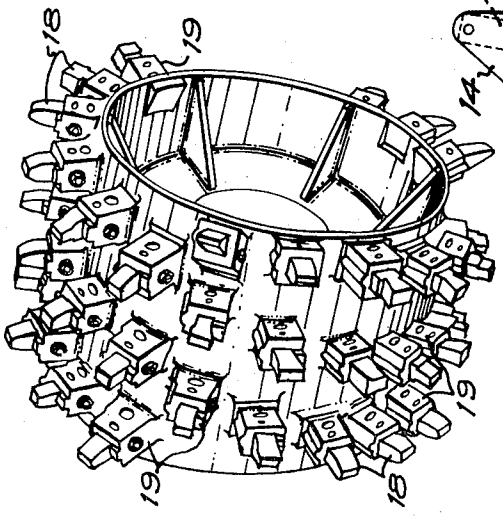


FIG. 3



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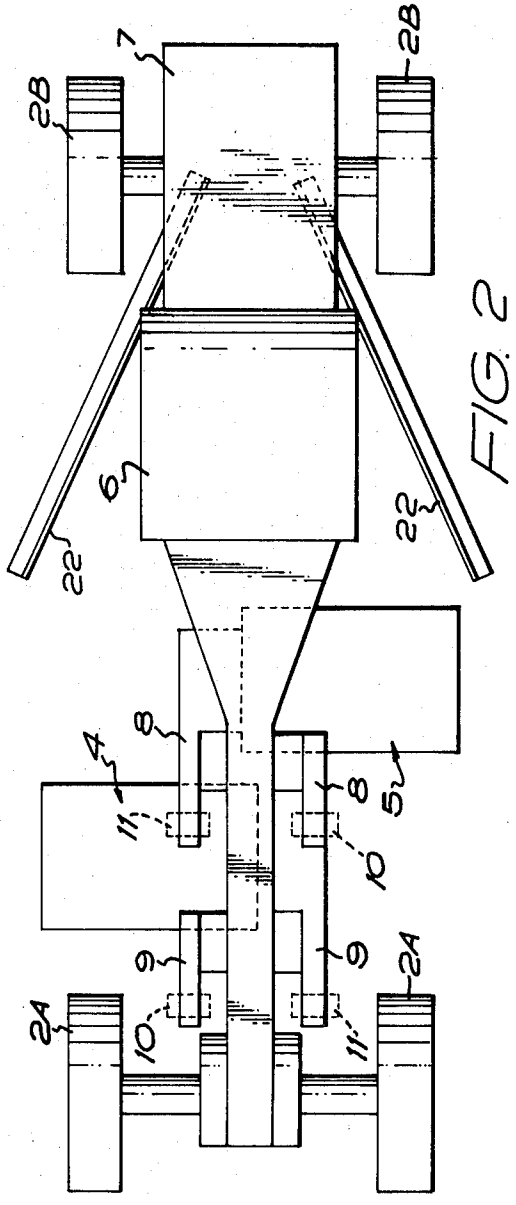


FIG. 2

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MACHINES FOR REMOVING WORN ROAD SURFACES

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Int. Cl. E01c *23/09*
U.S. Cl. 299—39 5 Claims

ABSTRACT OF THE DISCLOSURE

Apparatus for removing a worn road surface down to a predetermined depth prior to the application of a new surface, comprises a chassis support means for the chassis in the form of road wheels or tracks means to displace said chassis in a forward and/or reverse direction, a pick-carrying hydraulically driven cutting drum supported from said chassis and located within said support means thereof and rotatable in the same direction as the road wheels about a horizontal axis at an angle to the longitudinal axis of said chassis, and means to adjust said cutting device in a substantially vertical plane to determine the depth of said road surface to be removed.

This invention relates to road working machines and in particular to machines adapted to operate on the surface of a road prior to re-surfacing.

It is customary to apply heat to a road surface for removing the worn asphalt or macadam surface therefrom, before employing a means for detaching a usually three-inch thickness of the softened road material so as to ensure thereby satisfactory application of a new surface. Such apparatus is usually complex, necessitating the transport of a machine containing fuel with burners to direct heat on to the road surface ignition means, etc. Also, the heating of the surface produces undesirable odors and/or smoke as well as an ignition hazard where explosive mixtures of gas may be present (within access holes to sewers) or where inflammable material may be spilt on the road surface (petrol etc.) which is thereby ignited, during heavy removal operations involving a 3–6 inch depth. With concrete surfaces removal of the worn surface is usually effected by a plurality of individually operated pneumatic tools, which is time consuming and requires extensive labor costs plus the necessity of one or more compressors and ancillary equipment.

It is an object of the present invention to provide an improved road working machine for road surfaces which is capable of removing material at a higher rate as compared to known designs.

According to the present invention, apparatus for removing a worn road surface down to a pre-determined depth prior to the application of a new surface, comprises a chassis, support means for the chassis in the form of wheels or tracks located at the front and rear corners of the chassis, means to displace the chassis in a forward and/or reverse direction, a pick-carrying cutting device supported from the chassis and located within the support means thereof, and rotatable about a horizontal axis at an angle to the longitudinal axis of the chassis, and means to adjust the cutting device in a substantially vertical plane to determine the depth of road surface to be removed.

Preferably, the cutting device may take the form of a drum which is driven by hydraulic means and the drum may be driven in the same direction as the road wheels or tracks.

The drum is built up from one or more drum sections with each section, e.g. being 2′ or 2′6″ long thereby permitting one to select the number of drum sections best suited for the particular requirements. Accordingly it may be desirable to mount a single drum section on the machine and to remove material e.g. up to approximately 6″ depth (or whatever greater or lesser depth is required) over the 2′ or 2′6″ width of road covered by the single drum section, or three drum sections could be mounted on the machine and material removed e.g. up to approximately 3″ in depth over the 8′ or 10′ width of road covered by the combined lengths of the drum sections. Of course, one could similarly mount two drum sections on the machine. When two or more drum sections are employed they may be rotatable about a common axis which may be at right angles, or at some other angle, to the longitudinal axis of the chassis. Alternatively, they may be mounted in échelon with or without slight overlap of the ends of adjacent drum sections, and again at right angles or some other angle, to the longitudinal axis of the chassis. Of course, it is not necessary for the drum sections to be of the same length.

The chassis may be self-propelled or may be constituted as a trailer or semi-trailer. With this latter arrangement the cutting device may be operable and dis-placeable over a road width of, for example, 9 feet in width or over a third (or one lane) of the width of the road to be re-surfaced so as to allow two thirds (or two lanes each 9′ wide) of the road to remain open for carrying traffic, or one lane 9′ wide where the road is two lanes wide.

The hydraulic means for driving the cutting device may take the form of one or more hydraulic motors which may be driven at variable speed and supplied with pressure fluid from a chassis mounted pump driven by a main power source, which also serve to motivate the chassis.

With only a single drum section mounted on the chassis to give a deep cut, the chassis is advanced over the length of road surface, or portion thereof, which is to be removed. Then, if both picks and hydraulic means permit, the chassis may be moved laterally 2′ or 2′6″ and the cutting head driven in the reverse direction for a return cutting run of the machine. Alternatively, the chassis may flit back, with the cutting device inoperative, to its original starting position ready for a second cut.

It is possible, therefore, for the cutting device to project slightly laterally beyond the chassis so that material may be removed over a width greater than that of the chassis.

Preferably, each drum section has its peripheral picks mounted in a single or multi-start helical form, such that the picks of the single or each of helix will cut in sequence. Adjacent picks may be so spaced laterally that their edges overlap one another for insuring attainment of a smooth finished surface. Alternatively the lateral spacing of adjacent picks may be increased slightly so as not to overlap one another but to be slightly spaced from one another to produce a rough surface, if improved bonding of the new surface is desired.

Preferably the picks are tipped with tungsten carbide. Advantageously they have two or more cutting edges so that even if reverse operation of the cutting head is not required a pick can simply be reversed or repositioned

to present a fresh face when one of its cutting edges becomes worn.

Preferably conveyor means is associated with the chassis to remove the material detached by the picks, with loading means such as rotary paddles also being provided to load the conveyor. If a front and rear steer chassis is employed the detached material must pass under the rear of the chassis, whereas with four-wheel steer chassis, the latter may advance crabwise so that detached material does not pass under the rear of the chassis.

One suitable loading means consists of two inclined and horizontal ploughs one at each side of the chassis and adapted to direct material to the centre of the chassis wtih the distance of each plough from the road being surface controllable. Any smaller material which passes under the ploughs may be swept to the centre of the chassis by a brush rotatable about a horizontal axis parallel to and behind each plough.

The conveyor means preferably consists of a conveyor itself mounted on the chassis. Thus, a short conveyor of flat V form in side elevation may have one arm of the V extending under the chassis to a pick-up nose, and the other arm extending upwardly away from the chassis and conveyor being pivoted to the rear of the chassis at the apex of the V with one or a pair of hydraulic piston and cylinder units pivoted to the chassis and the other arm of the V so as to enable adjustment of the nose of the one arm to be adjusted with respect of the road surface.

To take account of camber of the road surface the chassis may be tilted by elevating one side thereof. This may be effected by providing pairs of wheels at each side of the front and/or rear of the chassis which are moveable relative to one another in a vertical sense, whereby one of the wheels of the pair may remain in contact with the road surface, while the other wheel is raised therefrom, thus elevating the chassis at that point.

The invention will now be described in greater detail, by way of examples, shown in the accompany drawings, in which:

FIG. 1 is a side elevation of a machine according to the invention provided with two cutting drums and showing conveying apparatus.

FIG. 2 is a plan view of the machine of FIG. 1; and

FIG. 3 is a diagrammatic view of one of the drum sections.

In the drawings, the machine includes a chassis indicated at **1** having at the corners of the chassis, front wheels **2A** and rear wheels **2B** resting on a road **3**, at least two of which wheels are drivable and steerable and between which are supported two pick-carrying cutting devices **4, 5**, one disposed towards each side of the chassis. The machine has a driver's cab **6** and a power unit **7**.

Each cutting devices **4, 5** is supported from the lower ends of two links **8, 9**, the upper ends of which are pivotally mounted on the chassis **1** by pins **10, 11**. Two piston and cylinder units **12, 13** are each pivotally located respectively between brackets **14, 15** mounted on the chassis and brackets **16, 17** mounted one on each link **8**, the units **12** serving to adjust the position of each cutting device **4, 5**, with respect to the road **3**.

Each cutting device **4, 5** includes a single, or is made up of a plurality of, drum sections, provided with picks **18** (FIG. 3) in pick boxes **19** arranged in a helical manner around the drum periphery and driven through gearing housed in a casing **20** by a hydraulic motor **21** supplied with pressure fluid from a pump (not shown) driven by the power unit **7**. Conveniently, the chassis is of a conventional type basically of Y shape in plan with the two arms of the Y adjacent a rear wheel **2B**, and flat inverted V in side elevation, with the cutting devices **4, 5** located generally under the apex of the V, the location of the driver's cab **6** providing good visual control.

Two inclined (FIG. 2) and horizontal (FIG. 1) ploughs **22** one located at each side of the machine are adjustably supported from a beam **23** which is pivoted at one end on a bracket **24** depending from the chassis **1**, the other end of each beam being secured to a hydraulic piston and cylinder unit **25**.

A conveyor **26** is mounted on the chassis, and is of flat V form in side elevation having one arm **27** of the V extending under the chassis to a pick-up nose **28**, and the other arm **29** extending upwardly away from the chassis the conveyor being pivoted at **30** to the rear of the chassis with a pair of hydraulic piston and cylinder units **31** pivoted at **32** to the chassis and the arm **29** so as to enable adjustment of the nose **28** to be adjusted with respect of the road surface.

What I claim is:

1. Apparatus for removing a worn road surface down to a predetermined depth prior to the application of a new surface, comprising a chassis, rotary support means mounting the chassis to enable it to be displaced in at least one direction longitudinally thereof, a cutting drum supported by the chasses between the rotary support means and rotatable about a horizontal axis at an angle to the longitudinal axis of the chassis, means for adjusting the cutting drum in a substantially vertical plane to set the depth of the road surface to be removed, drive means for rotating the drum, the drum being provided on its periphery with a plurality of picks, each being substantially pointed at their free-end and presenting a flat cutting edge, so that, when said drum is to the road surface driving by said drive means, said cutting edges will cut away the road surface to said predetermined depth.

2. Apparatus as claimed in claim **1**, wherein the drum is adapted to be driven in the same direction of rotation as the rotary support means.

3. Apparatus as claimed in claim **2** including means to adjust the angle which the drum axis makes with the horizontal to thereby take into account the camber of the road.

4. Apparatus for removing a worn road surface down to a predetermined depth prior to the application of a new surface, comprising a chassis, rotary support means for the chassis to enable the chassis to be displaced in at least one direction longitudinally thereof, a pick-carrying cutting device supported from the chassis and located between the support means and rotatable about a horizontal axis at an angle to the longitudinal axis of the chassis, means to adjust the cutting device in a substantially vertical plane to determine the depth of the road surface to be removed, conveyor means associated with the chassis for removing material detached by the cutting device, and means for loading the conveyor means comprising a horizontal plough at each side of the chassis, the ploughs converging rearwardly so as to direct material to the center of the chassis, the distance of each plough from the road surface being controllable.

5. Apparatus for removing a worn road surface to a predetermined depth prior to the application of a new surface comprising a chassis, rotary support means for the chassis to enable the chassis to be displaced in at least one direction longitudinally thereof, at least one pick-carrying cutting device supported from the chassis and located between the support means and rotatable about a horizontal axis at an angle to the longitudinal axis of the chassis means for adjusting the cutting device in a substantially vertical plane to determine the depth of the road surface to be removed, a conveyor associated with the chassis to remove the material detached by the cutting device, and loading means to load the conveyor, said conveyor being composed of two arms which meet each other in a flat V-form when viewed in side elevation, one of said arms extending under the chassis and having a pick-up nose at its end, the other of said arms extending upwardly away from the chassis the conveyor being pivoted to the rear of the chassis ad-

jacent the apex of the V, the pick-up nose being adjustable with respect to the road surface, by a pair of hydraulic piston and cylinder units pivoted to the chassis and the other of the said arms.

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