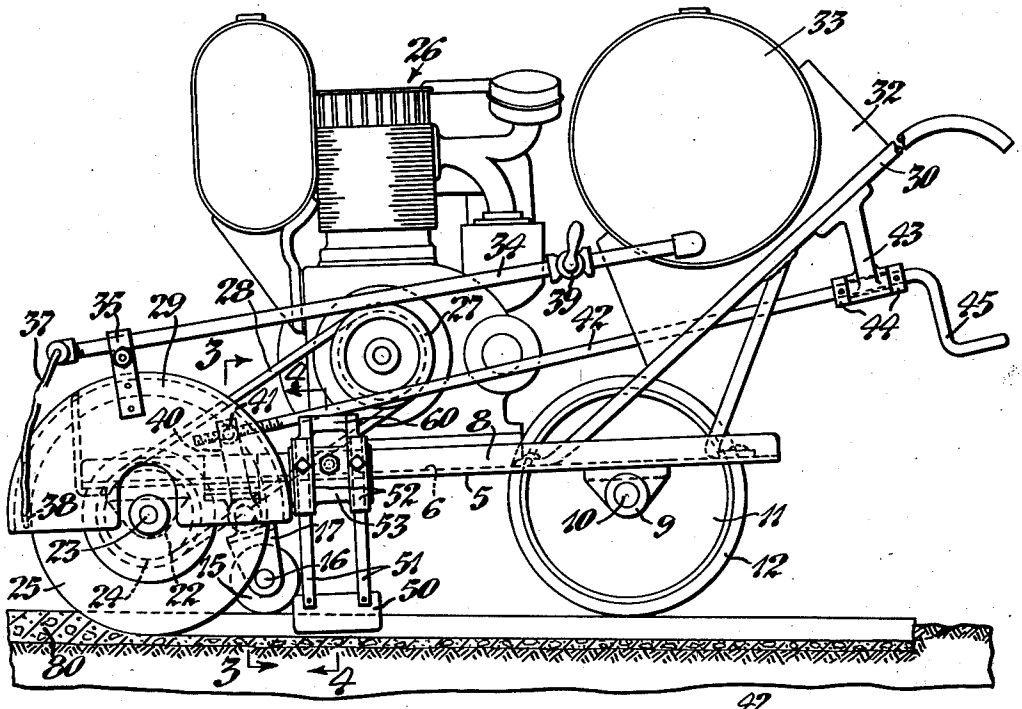
Oct. 2, 1951 W. H. LEWIS 2,569,682

MEANS FOR CUTTING PAVEMENT AND OTHER LIKE SURFACES

Filed Feb. 11, 1946

Fig. 1.



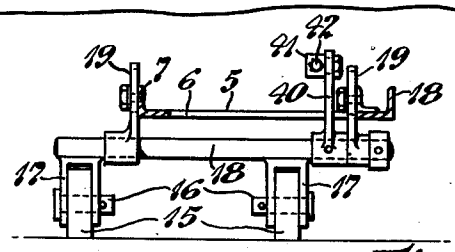


Fig. 3.

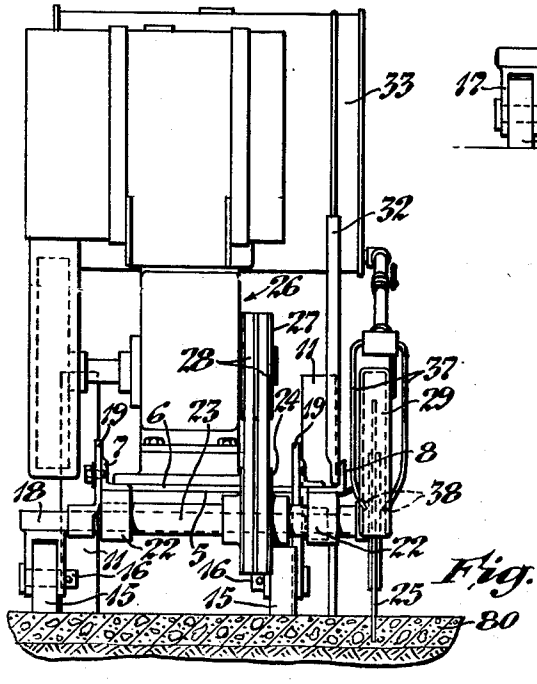


Fig. 2.

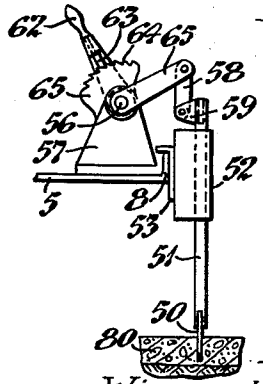


Fig. 4.

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MEANS FOR CUTTING PAVEMENT AND OTHER LIKE SURFACES

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5 Claims. (Cl. 262—20)

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This invention relates to means for cutting various substances, such as concrete, asphalt, and other road surfacing materials.

In the construction of roads, driveways, and the like, it is customary to lay the concrete, or other paving material, in slabs with clearance openings provided between the slabs to compensate for longitudinal and transverse expansion and contraction of the material. Such clearance openings are usually formed during construction by separator strips interposed between the slabs and removed after or before the material hardens. The placing of the separator strips during the application of the paving material to the road-bed and their subsequent removal requires considerable time, effort, danger to cracking of the laid road surface, and disrupts the continuous operation of the road surfacing machine. It is often necessary to smooth the edges of the expansion opening or groove after the insert has been removed. Furthermore, the handling and transportation of a large number of the separator strips entails considerable expense, and these strips are subject to damage and must be replaced. Deep grooves, approximately one and one-half (1½) inches to two (2) inches in depth, are often made in the pavement, or other surface, in either transverse, longitudinal, or other directions, to provide "weakened" portions, or "weakened planes" whereby the surface will crack, if at all, along such grooved portions. Such grooves have heretofore also been made by separator strips during construction of the surface.

To avoid the use of separator strips in the construction of roads, my invention contemplates the provision of a mobile apparatus capable of cutting the paving material after the pavement has hardened or "set." Through the use of this apparatus, relatively narrow longitudinal and transverse slots or kerfs may be cut in the pavement, thereby providing the expansion openings, or other grooves, heretofore made during the building of the roadway. It is also within the concept of my invention to provide such a cutting apparatus which may be employed as a means for cutting out areas of a pavement when it is desired to excavate therebeneath for the purpose of installing manholes, conduits, drains, or the like. In addition the cutting apparatus may be used as a means for trimming off irregular edges of roads, driveways, and other pavements.

One object of my invention is to provide a mobile pavement-cutting apparatus capable of cutting kerfs in a pavement to divide the pavement into slabs having expansion slots therebetween or to provide weakened positions in the pavement to cause the latter to crack, if at all, along such weakened portions or planes.

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Another object is to provide an apparatus of the type referred to having a plurality of cutting discs for cutting kerfs or grooves in the pavement and power means for rotating the discs at high speed.

Another object is to provide an apparatus of the type indicated having means for vertically adjusting the height of the cutter discs whereby to vary the depth of the grooves cut in the pavement.

Another object is to provide an apparatus of the type specified having means for guiding the cutting disc in a straight course thereby avoiding the necessity of manually steering the apparatus, and the hazard of jamming or damaging the saws, said guiding means consisting of a plate-like member carried by the vehicle and engageable in a portion of the kerf previously cut by said cutter disc.

Another object is to provide an apparatus which is semi-automatic in operation, it being only necessary to manually propel the vehicle in the general direction in which the groove is to be cut.

Another object is to provide an apparatus of the type referred to which is comparatively simple in construction, inexpensive to manufacture, and one which is highly efficient in performing its intended function.

Further objects of my invention are set forth in the following specification, which described two preferred forms of construction thereof, by way of example, as illustrated by the accompanying drawing. In the drawing:

Fig. 1 is a side elevational view of a pavement-cutting apparatus, constructed in accordance with my invention;

Fig. 2 is a front elevational view of the apparatus;

Fig. 3 is a cross-sectional view through the means for adjusting the height of the cutting disc, taken on line 3—3 of Fig. 1; and

Fig. 4 is a cross-sectional view through the cutter guiding means, taken on line 4—4 of Fig. 1.

My improved pavement-cutting apparatus comprises, in general, a mobile vehicle having a pair of wheels at its rearward end to adapt the vehicle to be propelled along the surface of a pavement, a rotatable cutter disc disposed adjacent the forward end of the vehicle and adapted to cut a kerf in the pavement, said cutter disc being rotated by power means carried by the vehicle, a pair of supporting wheels for supporting the forward end of the vehicle, said supporting

wheels being adjustable vertically to vary the depth of the kerf cut by said cutter disc, and a guide member on the vehicle and engageable in a portion of the kerf, previously cut by said disc, for guiding said vehicle and cutter disc in a straight path.

Referring to the drawing in detail, the mobile pavement-cutting apparatus comprises a vehicle frame or chassis 5, herein illustrated as consisting of a single channel having a base or web portion 6 and upstanding side flanges 7 and 8. Mounted on the under side of the channel, adjacent the rearward end thereof, is a pair of bearing members 9 in which an axle 10 is journaled. Carried at the ends of the axle 10 are wheels 11, which may be equipped with rubber tires 12, and which support the rearward end of the vehicle to adapt the vehicle to be moved along the surface of the pavement.

Disposed adjacent the forward end of the chassis 5 is a pair of relatively small wheels 15 for supporting the forward end of the vehicle. The wheels 15 are rotatable on pins 16 extending between the sides of yoke-like arms 17 welded to and depending from a transverse pivot shaft 18. The shaft 18 is pivotally mounted in brackets 19 adjustably secured to the channel 5, as shown best in Fig. 3. The shaft 18 is adapted to be rotated in the brackets 19, in a manner and by means to be later described, whereby to adjust the angularity of the arms 17 to vary the height of the forward end of the vehicle.

Journaled in bearings 22 attached to the under side of the channel 5 at its forward end is a transverse shaft 23 to which is secured a grooved pulley 24. One end of the shaft 23 extends laterally beyond the side of the channel 5, and secured to this end of the shaft is a rotatable cutter disc 25 adapted to cut a groove or kerf in a pavement. Since many types of cutter discs may be employed for the purpose of cutting the pavement, the disc is not herein shown or described in detail. I have determined that a cutter disc containing diamond particles is highly efficient in cutting or grooving paving materials, such as concrete and asphalt. While the cutter disc herein illustrated is relatively narrow to adapt it to cut a narrow groove, a series of simple discs may be arranged in a gang on the shaft 23 when it is desired to cut a relatively wide groove.

The cutter disc 25 is adapted to be rotated at a high rate of speed by power means, indicated generally at 26. While any suitable prime mover may be employed as the power means, I prefer to employ an internal combustion engine for this purpose. The engine 26 may be of any suitable type and is suitably mounted on the upper side of the chassis 5, substantially midway between the vehicle supporting wheels 11 and 15, and its output shaft is provided with a grooved pulley 27 which transmits rotation to the pulley 24 by means of V-belts 28. It is to be particularly noted that the cutter disc 25 is disposed laterally beyond the side of the chassis 5 and its wheels 11 and 15, to adapt it to be used for cutting grooves in close proximity to curbing and other upstanding road boundaries or obstructions. A guard 29 fastened to the channel 5 partially encloses the cutter disc 25 to prevent the flying of particles or dust removed from the pavement by the disc.

A pair of tubular handles 30 are secured to the rearward end of the channel 5, and extend upwardly and rearward in position to be grasped in the hands of an operator when the apparatus is to be propelled along the surface of a pavement.

Supported in holders 32 mounted on the handles 30 is a storage tank 33 for containing a supply of coolant liquid, such as water. Connected to the tank 33 is a supply pipe 34, which extends forwardly with its end held in a bracket 35 projecting upwardly from the guard 29. A pair of flexible pipes 37 connected to the end of the supply pipe 34 extend downwardly with their ends serving as nozzles 38 for directing the water onto the sides of the cutter disc 25 and against the pavement at the point of cutting or grooving to cool the disc and wash away particles of the pavement material. Flow of water through the nozzles 28 may be regulated by a valve 39 in the pipe 34.

It has been stated that the cutter disc 25 is adapted to be adjusted vertically to vary the depth of the groove or kerf cut in the pavement. The disc 25 is adjusted by pivoting the shaft 18, together with the wheels 15, in either direction, the shaft 18 being pivoted through means to be next described. A lever-arm 40 is secured to the shaft 18 and extends upwardly therefrom. An element 41, in the form of a screw-threaded nut, is pivotally mounted at the upper end of the lever-arm 40 and is adapted to receive the forward threaded end of a rod 42. The rearward end of the rod 42 is journaled in a bearing bracket 43 attached to the handles 30 and collars 44 on the rod abut the sides of the bracket to prevent axial movement of the rod. A crank 45 is provided on the rearward end of the rod 42 to adapt the rod to be manually rotated. When the rod 42 is rotated, the lever-arm 40 is moved about its pivot and the shaft 18, arms 17, and wheels 15 are thus pivoted, the direction of pivotal movement depending upon the direction of rotation of the adjusting rod 42. Through this means, the forward end of the chassis 5 may be raised and lowered with respect to the surface of the pavement, and since the cutter disc 25 is mounted on the chassis it will also be adjusted vertically to vary the depth of the groove or kerf cut in the pavement.

Means are provided for guiding the rotating cutter disc 25 along a straight path, and this means consists of a plate-like guiding member 50 which is carried at the lower end of a pair of vertical rods 51. The upper ends of the rods 51 are slidable in vertical bearings 52, forming part of a bracket 53 fastened to the flange 8 of the channel 5. The means for moving the rods 51 to adjust the height of the guiding member 50 may consist of a lever-arm 55 secured to a shaft 56 rotatable in a bearing bracket 57 mounted on the channel 5. A link 58 connects the end of the lever-arm 55 to an ear 59 extending laterally from a cross strip 60, which connects the upper ends of the rods 51. A handle 62 secured to the shaft 56 serves as a means for manually turning the shaft and lever-arm 55 in either direction to raise and lower the rods 51 and guide member 50. The handle 62 may carry a spring-loaded plunger or dog 83 adapted to engage with ratchet teeth 64 on a quadrant 65 formed integral with the bearing bracket 57. The complete apparatus having been described in detail, the method of operation thereof is as next explained.

Assuming that it is desirable to cut a straight groove or kerf through a layer of concrete or other road pavement, such as shown at 80 in the drawing, the vehicle is first moved to a location where the cut is to be started, and the cutter disc 25 is then adjusted vertically to adapt it to cut a groove of proper depth. When an ex-

pansion slot is to be cut in the concrete, the cutter disc **25** will be adjusted to cause it to cut clear through the concrete, Figures 1 and 2 showing the disc adjusted to this position. It will be understood, however, that the disc may be so adjusted that it will cut only partially through the pavement. To adjust the height of the cutter disc, it is only necessary to turn the crank **45** to rotate the rod **42** and thereby pivot the wheels **15** to the proper position. During this time, the guiding member **50** is held in raised position by the pawl and ratchet means **63**, **64**.

To commence the cutting operation, the engine **26** is first started and as the cutter disc **25** is rotated thereby it immediately starts to cut a groove or kerf in the concrete. The vehicle is manually moved forwardly until a relatively short groove has been cut, after which the handle **62** is manipulated to cause the guiding member **50** to descend into the kerf **81**, as shown in Figures 1 and 4. The guiding member **50** thus engages in a portion of the kerf **81**, already cut by the disc **25**, and since this portion is straight the member will act to guide the vehicle in a straight path. It is therefore only necessary to push the vehicle forwardly along the surface of the concrete. During the cutting operation, a stream of lubricating and cooling liquid is directed by the nozzles **38** against the cutter disc adjacent the cutting area to cool the disc and carry away particles of the concrete. It has been determined in practice that the apparatus may be fed forwardly at a speed of approximately three (3) feet per minute when cutting a groove one and one-half (1½) inches deep in a concrete pavement. Should it be necessary to cut a curved or irregular groove in the concrete, the guiding member **50** may be moved upwardly to inoperative position and the vehicle guided by means of the handles **30**. When a groove has been cut, for example, transversely across the road for the purpose of providing an expansion opening, the groove may be subsequently filled with tar or other compressible material.

It will be observed from the foregoing that my invention provides a particularly simple, yet highly efficient apparatus adapted to cut grooves or kerfs in concrete, asphalt, or other road pavements. By cutting the pavement into slabs, the usual practice of using removable separator strips during the forming of the roadway to divide the pavement into separate sections or slabs is dispensed with, and the road surfacing operation greatly simplified and the cost of the roadway substantially reduced. The use of the present cutting apparatus is not limited to the cutting of pavements into sections, or to grooving pavements, since the apparatus may be advantageously employed for other uses.

While my cutting apparatus has been herein shown and described as embodied in a preferred form of construction and applied to use in a particular manner for specific purposes, it is to be understood that various modifications may be made in the structure thereof, and in the manner in which it is applied to use, without departing from the spirit or scope of the invention. Therefore, without limiting myself in this respect, I claim:

1. A mobile apparatus for cutting pavements, comprising: a vehicle provided with wheels disposed adjacent its rearward end to adapt it to be moved along the surface of said pavement; a rotatable shaft extending transversely across said frame at the forward end thereof; a cutter disc carried by said shaft and disposed in a plane spaced laterally of said vehicle frame beyond said wheels, said disc being adapted to cut a kerf in said pavement; power means on said vehicle for rotating said shaft and cutter disc; supporting wheels on said vehicle for supporting the forward end thereof; adjusting means for vertically adjusting said supporting wheels to vary the depth of the kerf cut in said pavement by said disc; a guide plate carried by said vehicle frame and disposed in alignment with the plane of said cutter disc, said guide plate being adapted to engage in a portion of said kerf previously cut by said disc to guide said vehicle and disc in a straight path and ratchet means for vertically adjusting said guide plate.

2. A mobile apparatus for cutting pavements, comprising: a vehicle provided with wheels disposed adjacent its rearward end to adapt it to be moved along the surface of said pavement; a pair of transversely-spaced bearings at the forward end of said vehicle; a shaft rotatable in said bearings; a cutter disc carried by said shaft and disposed in a plane laterally of said vehicle beyond said wheels, said disc being adapted to cut a kerf in said pavement; power means on said vehicle for rotating said shaft and cutter disc; supporting wheels on said vehicle for supporting the forward end thereof; adjusting means for vertically adjusting said supporting wheels to vary the depth of the kerf cut in said pavement by said disc; a guide plate depending from said vehicle in close proximity to said cutter disc, said guide plate being disposed in alignment with the plane of said disc to adapt it to engage in a portion of said kerf previously cut by said disc to guide said vehicle and disc in a straight path and ratchet means for vertically adjusting said guide plate.

3. A mobile apparatus for cutting pavements, comprising: a vehicle provided with wheels disposed adjacent its rearward end to adapt it to be moved along the surface of said pavement; a rotatable cutter disc disposed adjacent the forward end of said vehicle at one side thereof, said disc being adapted to cut a kerf in said pavement; power means on said vehicle for rotating said cutter disc; supporting wheels on said vehicle for supporting the forward end thereof; adjusting means for vertically adjusting said supporting wheels to vary the depth of the kerf cut in said pavement by said disc; a guide plate carried by said vehicle and disposed in alignment with the plane of said cutter disc, said guide plate being adapted to engage in a portion of said kerf previously cut by said disc to guide said vehicle and disc in a straight path; and ratchet means for vertically adjusting said guide plate.

4. A mobile apparatus for cutting pavements, comprising: a vehicle provided with wheels disposed adjacent its rearward end to adapt it to be moved along the surface of said pavement; a rotatable cutter disc disposed adjacent the forward end of said vehicle at one side thereof, said disc being adapted to cut a kerf in said pavement; power means on said vehicle for rotating said cutter disc; supporting wheels on said vehicle for supporting the forward end thereof; adjusting means for vertically adjusting said supporting wheels to vary the depth of the kerf cut in said pavement by said disc; a bracket on said vehicle; a pair of vertical rods adjustable in said bracket; and a guide plate carried by said rods and disposed in alignment with the plane of said cutter disc, said guide plate being adapted to engage in

a portion of said kerf previously cut by said disc to guide said vehicle and disc in a straight path.

5. A mobile apparatus for cutting pavements, comprising: a vehicle provided with wheels disposed adjacent its rearward end to adapt it to be moved along the surface of said pavement; a rotatable cutter disc disposed adjacent the forward end of said vehicle at one side thereof, said disc being adapted to cut a kerf in said pavement; power means on said vehicle for rotating said cutter disc; supporting wheels on said vehicle for supporting the forward end thereof; adjusting means for vertically adjusting said supporting wheels to vary the depth of the kerf cut in said pavement by said disc; a bracket on said vehicle; a pair of vertical rods slidable in said bracket; a guide plate carried by said rods and disposed in alignment with the plane of said cutter disc, said guide plate being adapted to engage in a portion of said kerf previously cut by said disc to guide said vehicle and disc in a straight path; means for vertically adjusting said rods in said bracket; and ratchet means for retaining said rods in adjusted position.

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