Nov. 26, 1940. L. C. HOLMES 2,222,840

ROAD MACHINE

Filed June 20, 1938 2 Sheets-Sheet 1

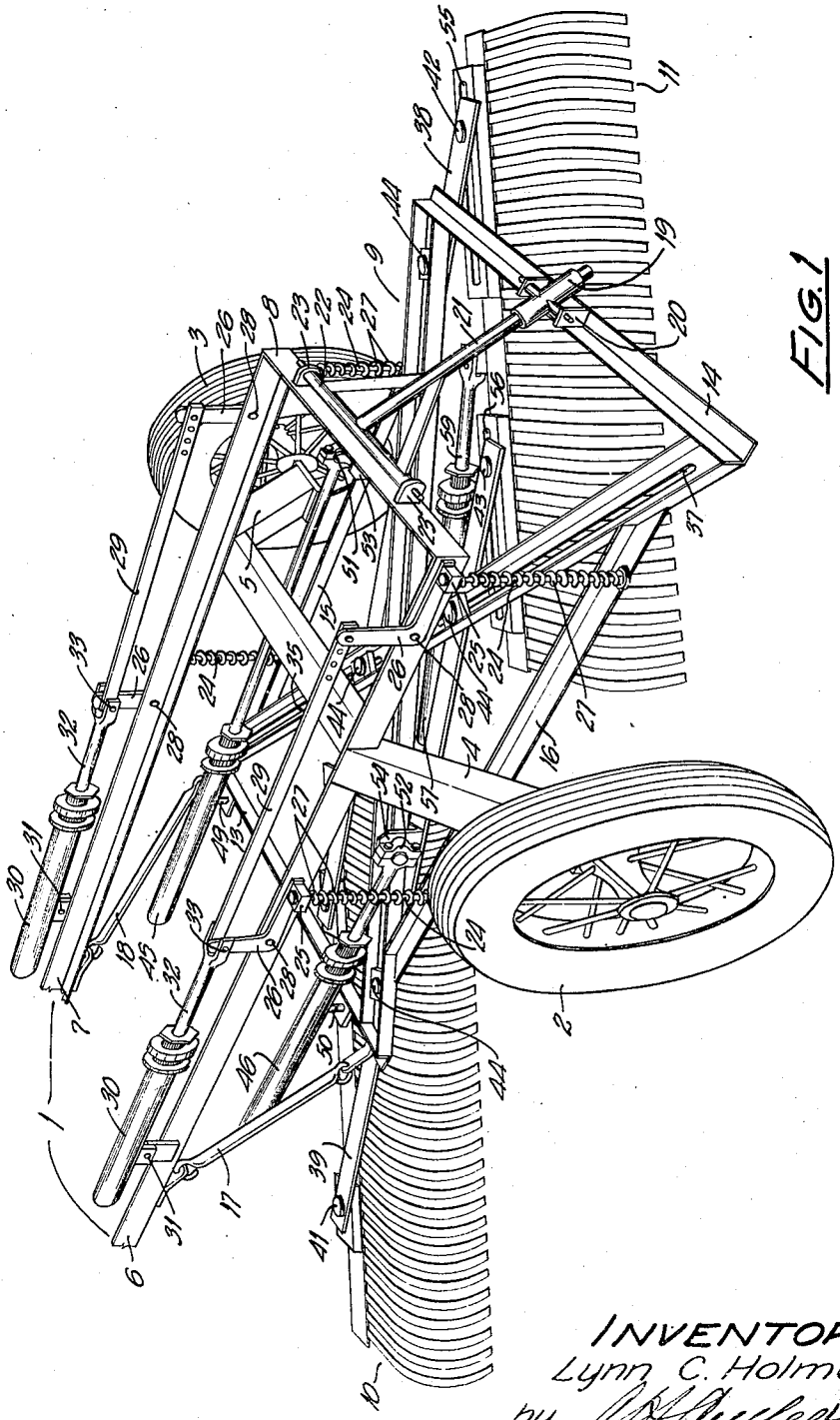


FIG. 1

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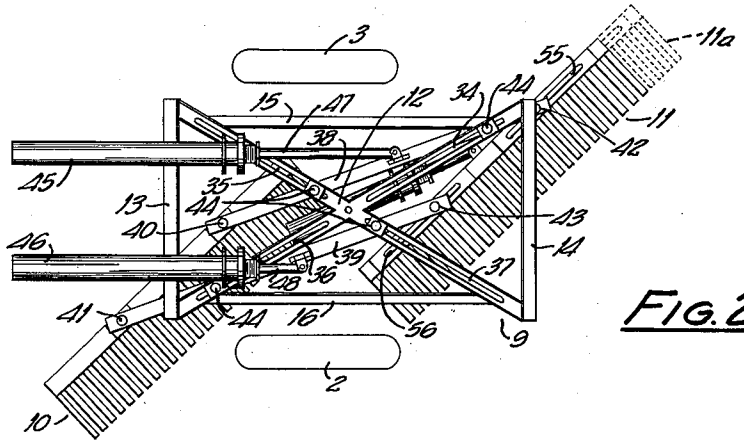


FIG. 2

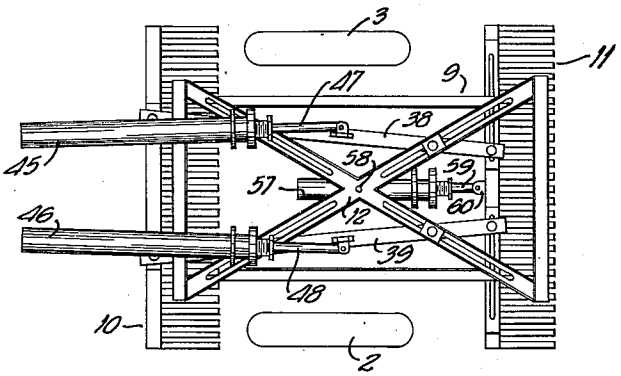


FIG. 3

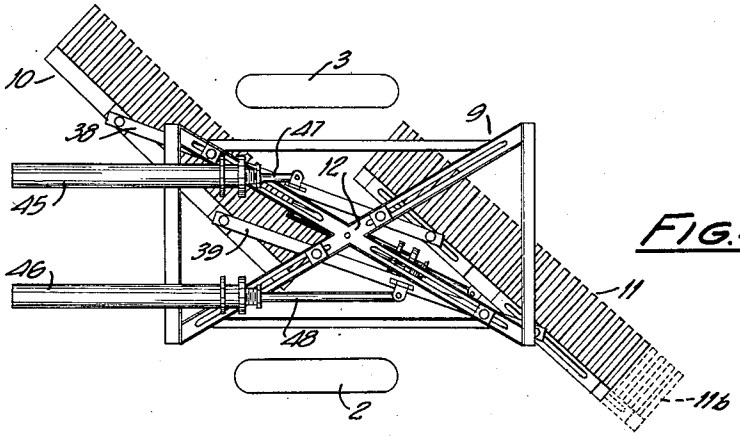


FIG. 4

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UNITED STATES PATENT OFFICE

2,222,840

ROAD MACHINE

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9 Claims. (Cl. 37—176)

My invention relates generally to road machines which comprise a scarifier, a blade element or hone and a raking device and my invention particularly relates to a raking device for a machine of this character in combination with means for supporting it upon the frame of the machine, which means is so arranged that said raking device may be moved to predetermined positions relative to said frame whereby to rake and cast materials to either side of the machine.

In the usual construction of road machines, the elements above noted, viz., the scarifier, blade and rake, are arranged in the order recited along the longitudinal axis of the machine and from front to rear thereof so that, in the operation of the machine, the scarifier may first break up the road surface to some extent, with the blade thereafter moving the material crosswise of the road and, finally, the raking device likewise distributing the material over the road surface and causing the coarser material to be moved to one side. In road machines heretofore developed, the rake has been fixed at an angle to the longitudinal axis of the machine frame and so arranged that material will be raked and caused to move to only one side of the machine. Inasmuch as it is desirable to deposit materials which are cast off from the rake along the shoulders of the road or in the ditch, it is always necessary to operate such types of road machines in the same direction when working on one side of the road.

In view of this latter fact, therefore, it is necessary when designing such machines to take into consideration the available power, developed by the prime mover or motor employed, in operating the machine over a road surface. A relatively small motor may develop sufficient pulling power to operate a road machine of a given working capacity over a substantially level terrain but would be wholly insufficient to operate the same machine up an appreciable grade.

It is, therefore, a first object of my invention to provide in a road machine a raking device which is supported at an angle to the longitudinal axis of the machine whereby to cause material to move to one side of said machine but which raking device may be moved relative to the machine and to an extent sufficient to cause material to be moved to the other side of the machine. With this construction, a road machine, which may be powered sufficiently to operate along the level when the elements thereof are disposed in operative relation to a road surface but insufficiently powered to operate in ascending a grade, may be arranged to work a given road surface on either side thereof and while descending a grade therein.

Another element to be considered in the design of road machines lies in the disposition of the rake relative to the vehicle frame, which the machines comprise, and particularly with respect to its length. In the event the various elements, such as the scarifier, blade and rake, are arranged between the front and rear pair of wheels of the vehicle, the wheel base of the vehicle must be of such length that the vehicle is too cumbersome for most purposes. That is to say, it cannot be turned easily nor on a desirably, relatively short radius. On the other hand, when the raking device is mounted in back of the rear wheels, there is too much overhang. It is, therefore, a second object of my invention to provide a road machine comprising a vehicle wherein a movable raking device of the movable character above pointed out is mounted to extend substantially between the rear pair of wheels thereof.

Another object of my invention resides in the provision of a raking device comprising a plurality of movably mounted rakes which may be arranged cooperatively to cause material to move to either side of the machine. Another object resides in the provision of a plurality of rakes arranged to work a road surface in the foregoing manner and which rakes may be relatively moved whereby to increase or decrease the width of the swath covered thereby.

A still further object lies in providing hydraulically operated means for moving the raking device to desired positions relative to the vehicle frame of a road machine whereby adjustments thereof to desired, working positions may be easily effected at the will of the operator.

With these and other objects in view, my invention includes the novel elements and the combinations and arrangements thereof described below and illustrated in the accompanying drawings, in which—

Fig. 1 is a fragmentary perspective view of the vehicle frame of a road machine and illustrating a raking device supported thereon according to the preferred construction of my invention;

Fig. 2 is a somewhat schematic plan view of a preferred form of means for supporting the rake elements and moving the same to desired positions relative thereto and to the frame of the road machine;

Fig. 3 is a view similar to Fig. 2 and illustrating

the rake elements in an intermediate position; and

Fig. 4 is a view similar to Figs. 2 and 3 but showing the rakes in alternative positions and opposite to the positions thereof illustrated in Fig. 2.

In the drawings, I have merely shown those elements of a road machine which are deemed necessary for descriptive purposes and therein the vehicle frame of a road machine is indicated generally at 1 which frame may be provided with supporting wheels both at the front and rear thereof or only one pair of wheels may be employed. Only the rear pair of wheels 2 and 3, however, are illustrated and, in the embodiment shown, they are mounted on brackets 4 and 5, respectively, which are secured to the frame 1 in depending relation thereto. The frame 1 may be formed of substantially parallelly arranged side bars such as angle irons 6 and 7 which are connected together at the rear ends thereof with an angle iron or end bar 8 extending transversely therebetween. Beneath the vehicle frame 1 is suspended a second frame indicated generally at 9 which is adapted to support the rakes 10 and 11 in operative relation to a road surface and permit predesigned movements of said rakes relative thereto and to the frame of the vehicle. The frame 9 preferably comprises an X-shaped channel member 12, to the radiating legs of which are secured structural elements such as angle irons 13 and 14, forming the ends of the frame, and angle irons 15 and 16 forming the sides thereof whereby to provide a rigid construction.

In the embodiment illustrated, frame 9 at its front end, is supported from the vehicle frame by links 17 and 18, opposite ends of which are pivotally connected to the frame 1 and the forward end of frame 9. The rear end of frame 9 is provided with a pivotally mounted sleeve 19 which is journaled in a bearing 20 mounted on the end angle iron 14 of said frame. A shaft 21, slidably disposed within the sleeve 19, is secured at its upper end to a shaft 22 which extends transversely of the vehicle frame 1 and is pivotally mounted in spaced brackets 23 mounted on the end bar 8 of frame 1. To the frame 9 are also connected, preferably four, upstanding rods 24, the lower ends of which pass through openings in the angle irons 15 and 16, said openings being appreciably larger in diameter than the rods so as to permit a desired amount of play between the frame and rods whereby the frame may be raised or lowered to a greater extent on one side than on the other. The upper ends of each of rods 24 pass through and are preferably loosely fitted, respectively, within blocks 25 in substantially the same manner as above pointed out relative to the rods and frame 9. The blocks 25 are preferably pivotally mounted on bell cranks 26 and the upper ends of rods 24 are provided with heads or nuts to prevent withdrawal of the rods from the blocks 25. Furthermore, helical springs 27 are preferably interposed between the blocks 25 and the angle irons 15 and 16 of frame 9 and about the rods 24 whereby relative vertical movement between the frame 9 and frame 1 of the vehicle may occur when, for example, obstructions or other causes tend to elevate the rakes. The bell cranks 26, illustrated as four in number, one for each rod 24, are pivotally secured as at 28 to the side bars 6 and 7 of the vehicle frame and the two bell cranks on each side of the vehicle are respectively interconnected by means of adjustable links 29.

The bell cranks 26 are designed, through the medium of the rods 24, to raise and lower the frame 9 together with the rakes supported thereon into and out of operative relation to a road surface while the sliding connection between the rods and bell cranks permit the frame to be forced upwardly to compress springs 27 when sufficient force is transmitted thereto from the rakes.

For operating the bell cranks in raising and lowering the frame 9, I preferably employ hydraulically operated means such as the cylinder and piston arrangements illustrated generally at 30 which, preferably, are of the double acting type. Two such hydraulic cylinders are preferably employed and pivotally mounted as indicated at 31 on each side of the vehicle frame and the piston rods 32 thereof, respectively, are pivotally connected as at 33 to one pair of linked bell cranks 26. In operation, fluid is supplied to the cylinders 30 under pressure in the well known manner and, by means of suitable controls, not illustrated, the pistons fitted within said cylinders may be operated to shift the bell cranks 26 thereby raising or lowering frame 9 and associated rakes relative to the frame of the vehicle and the road surface.

I prefer to arrange the cylinders 30 and associated controls so that the cylinders may be independently operated whereby the operator may raise or lower one side or the other of the frame 9 to adjust the rakes, for example, to meet existing conditions.

The rakes 10 and 11, in accordance with my invention, are so supported on the frame 9 that they may be moved relative thereto and to the frame of the vehicle whereby to move material to either side of the vehicle or in either direction transversely of the road being worked. To this end, each of the four legs of the X-shaped channel 12 are provided with a slot as indicated at 34, 35, 36 and 37 which extend longitudinally of and through the web portions of the channel. A pair of links 38 and 39 are pivotally connected at their respective ends to the rakes 10 and 11. In the preferred embodiment illustrated, the links 38 and 39 are pivotally connected as at 40 and 41, respectively, at spaced points to the rake 10 and the other ends of these links are slidably and pivotally connected to the rake 11 as indicated at 42 and 43. Intermediate the lengths thereof, the links are slidably and pivotally supported on the X-shaped channel 12 by connecting means indicated generally at 44. This may be accomplished by passing a pair of bolts in spaced relation through each link and, respectively, through one of the slots in the X-shaped channel, the bolts being retained within their respective slots by slides or nuts which bear upon the web of the channel. With this construction, the links 38 and 39 are slidably and pivotally supported upon the frame 9 and the rakes 10 and 11 are pivotally supported, in turn, upon said links. The connecting means between link 38 and frame 9 pass through slots 34 and 35, respectively, whereas the connecting means associated with the link 39 pass respectively through the slots 36 and 37.

Hence, it will be seen that the rakes 10 and 11 may be arranged relative to the frame 9 and the frame of the vehicle in the manner illustrated in Fig. 2 and by applying forces which tend, respectively, to urge link 38 generally toward the left as viewed in Fig. 2 and link 39 toward the right, the rakes may then be moved to occupy the positions illustrated in Fig. 3. Thereafter, and upon a further actuation of said links, the rakes may be

moved to occupy the positions illustrated in Fig. 4. In their positions illustrated in Fig. 2, the rakes are designed cooperatively to cause material to move generally transversely of the machine and to one side thereof. In Fig. 4, the positions of the rakes have been reversed and material will therefore be moved to the opposite side of the vehicle.

For actuating the links 38 and 39 in the above described manner, I prefer to employ hydraulically operated means comprising hydraulic cylinders and suitable, manually operable controls, not illustrated, for effecting a desired operation thereof. Furthermore, these cylinders also are preferably of the double acting type which afford a power actuation of the piston therein in both directions. As illustrated, I prefer to employ two hydraulic cylinders 45 and 46 of the double acting type, the piston rods 47 and 48 of which are respectively connected with the links 38 and 39. These cylinders are preferably pivotally mounted on the frame 9 as indicated at 49 and 50 so that they may swing substantially in a horizontal plane and the piston rods thereof are preferably connected by means of ball and socket joints as indicated generally at 51 and 52 to upstanding brackets 53 and 54 which are secured to the links 38 and 39, respectively. Simple pin connections may be employed for this purpose, however, which provide substantially vertical axes about which the piston rods may pivot. The mounting for the hydraulic cylinders and the interconnection of the piston rods thereof with the links 38 and 39 in the manner above described affords a flexible arrangement whereby the axes of the pistons and cylinders are shifted to permit the links to be moved in a turning and sliding manner transversely of the frame 9.

As hereinbefore indicated, it is also desirable to so arrange the raking device that it may be adjusted to cover a wider or narrower swath as occasion may demand. For this purpose, I have provided means whereby the rakes may be relatively moved to provide a relatively long or short effective rake length and, in the embodiment illustrated, the rear rake 11 is so arranged that it may be moved relative to the other rake and the frame of the vehicle to accomplish this result.

The rake 11 is provided with two slots 55 and 56 extending longitudinally thereof. The pivotal connections 42 and 43 between said rake and the links 38 and 39 are designed respectively to engage and slidably fit within said slots 55 and 56 so that the rake 11 may be initially adjusted by means of the links 38 and 39 and thereafter moved relative to said links. An hydraulic cylinder 57 which is pivotally mounted as indicated at 58 upon X-shaped member 12 is preferably located centrally thereof and its piston rod 59 is pivotally connected to a bracket 60 which, in turn, is secured to the rake 11. This cylinder also is preferably of the double acting type. When the rakes are arranged to lie as, for example, in the positions illustrated in Figs. 2 and 4, the piston of the hydraulic cylinder 57 may be operated to extend or retract the rake 11 thereby increasing or decreasing the width of the swath covered by the rakes. For example, rake 11 may be extended to the dotted line positions illustrated at 11*a* and 11*b* (Figs. 2 and 4, respectively) and this operation may be effected without varying the angular relationship of the rakes with respect to the axis of the vehicle frame.

Briefly, the operation of a road machine embodying the above described invention is as follows. The hydraulic cylinders 30 may be independently controlled to vary the position of the rakes and, of course, may be operated together to raise the rakes 10 and 11 or to lower them into operative relationship to a road surface through the medium of the bell cranks 26 and rods 24. Likewise, the hydraulic cylinders 45 and 46 may be operated to move the rakes to the positions illustrated in Figs. 2 and 4 wherein respectively they serve cooperatively to cause material to move to the right or left side of the machine. Hence, the rakes may be positioned to permit operation of the road machine along one side of a road and in either direction and, for example, in a down grade direction on either side of the road whereby, in each instance, it will rake material toward the adjacent side of the road and deposit the coarser material upon the shoulders thereof, if so desired. Furthermore, the hydraulic cylinder 57 may be operated to move rake 11 relative to rake 10 and laterally of the vehicle frame of the road machine whereby to increase or decrease the swath covered by the rakes.

It should be noted that due to the novel arrangement herein illustrated the rakes may be supported upon the vehicle frame of a road machine to extend substantially between the rear pair of wheels thereof and at an oblique angle to the longitudinal axis of said frame with one rake extending forwardly and laterally beyond one wheel and with the other rake extending to the rear of and laterally beyond the other wheel. At the same time, these rakes may be shifted to like positions relative to the vehicle frame and said rear wheels and to positions wherein they will cause material to move to the other side of the road machine. There is, therefore, no necessity of providing a road machine of an undesirably long wheel base in order to mount my raking device thereon and, moreover, when the rakes are supported on a vehicle in the positions illustrated there is no objectionable overhang.

Furthermore, the rakes may be shifted to lie substantially crosswise of the machine as shown in Fig. 3 and with the rakes in this position the device may be used as a bulldozer to distribute material over a road surface.

Also, in working a road on a hillside, for example, where there exists a ditch between the road and embankment sloping upwardly therefrom, it is desirable to move material away from said ditch and entirely across the road to the other side thereof. The road machine of my invention can be operated in either direction along the side of the road adjacent said ditch with the rakes positioned to move material across the road and to the opposite side thereof and, on the return trip along said opposite side of the road with the rakes properly set, the material initially cast upon this side may be moved on across the road and deposited on the side thereof or cast off the shoulder of the road as desired. Hence, a considerable saving in time can be realized because, of course, no matter in what direction the machine traverses the road, it may be used to work the road surface and move material in the desired direction.

It is to be understood that by the terms "rake, rakes or raking device" as herein employed in the description and claims, I intend to include blades, hones and similar devices which may be used in treating road surfaces.

While I have described my invention in its preferred embodiments, it is to be understood that

the words which I have used are words of description and not of limitation and that changes within the purview of the appended claims may be made without departing from the true scope and spirit of my invention in its broader aspects.

What I claim is:

1. In a road machine comprising a vehicle, a raking device, means on said vehicle for supporting said raking device in operative relation to a road surface, and cooperable means for pivoting and moving said raking device laterally relative to said vehicle whereby it may be moved from a position to move material to one side of said vehicle to a position to move material to the other side thereof, said cooperable means operating while said raking device is moved from one position to the other to effect both a turning movement of said raking device and a lateral movement thereof relative to said vehicle.

2. A road machine comprising a vehicle, a plurality of rakes disposed one behind the other, means on said vehicle for supporting said rakes in operative relation to a road surface, and cooperable means for pivoting and moving said rakes laterally relative to said vehicle whereby they may be moved from a position to move material to one side of said vehicle to a position to move material to the other side thereof, said cooperable means operating while said rakes are moved from one position to the other to effect both a turning movement of said rakes and a lateral movement thereof relative to said vehicle.

3. In a road machine, a rake assembly comprising in combination, a pair of rakes, means pivotally connected to one of said rakes and pivotally and slidably connected to the other of said rakes for holding said rakes in spaced, substantially parallel relation, means for supporting said rakes in operative relation to a road surface, means for effecting angular movement of said rakes relative to said road machine, and means for moving at least one of said rakes in a direction longitudinally of itself.

4. In a road machine including a vehicle, a pair of rakes arranged at an oblique angle to the longitudinal axis of said vehicle whereby said rakes will move material to one side of said vehicle, means for supporting said rakes in operative relation to a road surface and means for simultaneously moving said rakes in opposite directions laterally of said vehicle and to positions oblique to said vehicle axis wherein they will move material to the opposite side of said vehicle.

5. In a road machine, a rake assembly comprising in combination, a pair of rakes, a pair of links pivotally connecting said rakes together in spaced, substantially parallel relation, an X-shaped frame having its radially extending members angularly disposed to the longitudinal axis of said road machine, and means for pivotally and slidably supporting said rakes on the members of said frame, whereby a turning movement of said rakes and a lateral movement thereof relative to said frame may be effected.

6. In a road machine including a vehicle, a frame, a pair of rakes, means pivotally connected to one of said rakes and pivotally and slidably connected to the other for supporting said rakes in spaced relation to each other on said frame, means for effecting a relative turning and lateral sliding movement of said rakes on said frame and means for moving one of said rakes relative to the other and laterally of said frame.

7. In a road machine including a vehicle and a pair of supporting wheels, one on each side thereof, a pair of rakes arranged one behind the other, means for supporting said rakes in operative relation to a road surface, means for moving said rakes laterally of said vehicle and for turning said rakes about a generally vertical axis whereby to cause them to move material to either side of said vehicle, and means for effecting relative movement of said rakes in a direction transversely of said vehicle whereby to vary the width of the swath covered by said rakes.

8. A road machine comprising a vehicle, a plurality of rakes disposed one behind the other, means on said vehicle for supporting said rakes in operative relation to a road surface, cooperable means for pivoting and moving said rakes laterally relative to said vehicle whereby they may be moved from a position to move material to one side of said vehicle to a position to move material to the other side thereof, said cooperable means operating while said rakes are moved from one position to the other to effect both a turning movement of said rakes and a lateral movement thereof relative to said vehicle, and means for moving one of said rakes in a direction longitudinally of itself whereby the width of the swath covered by said rakes may be varied.

9. A road machine comprising a vehicle, a plurality of rakes disposed one behind the other, means on said vehicle for supporting said rakes in operative relation to a road surface, and cooperable means for simultaneously pivoting and moving said rakes laterally relative to said vehicle whereby they may be moved from a position to move material to one side of said vehicle to a position to move material to the other side thereof.

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