Jan. 1, 1935. N. DE WIND ET AL 1,986,327

ROAD MATERIAL MACHINE

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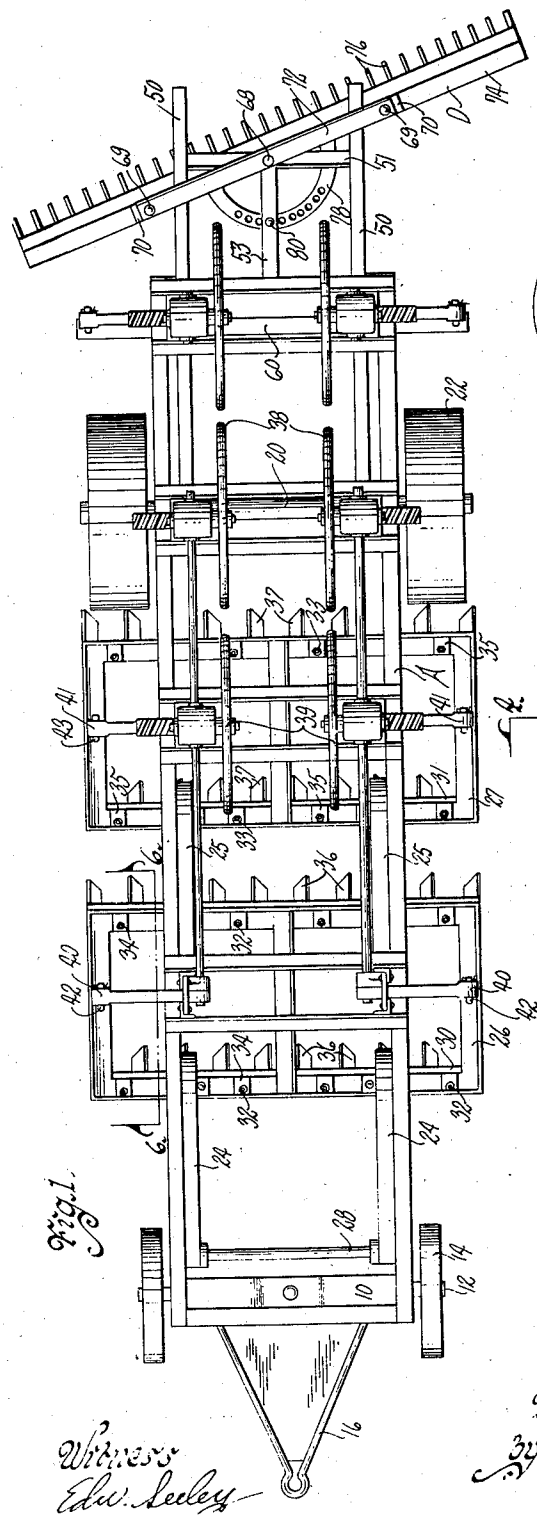


Fig. 1.

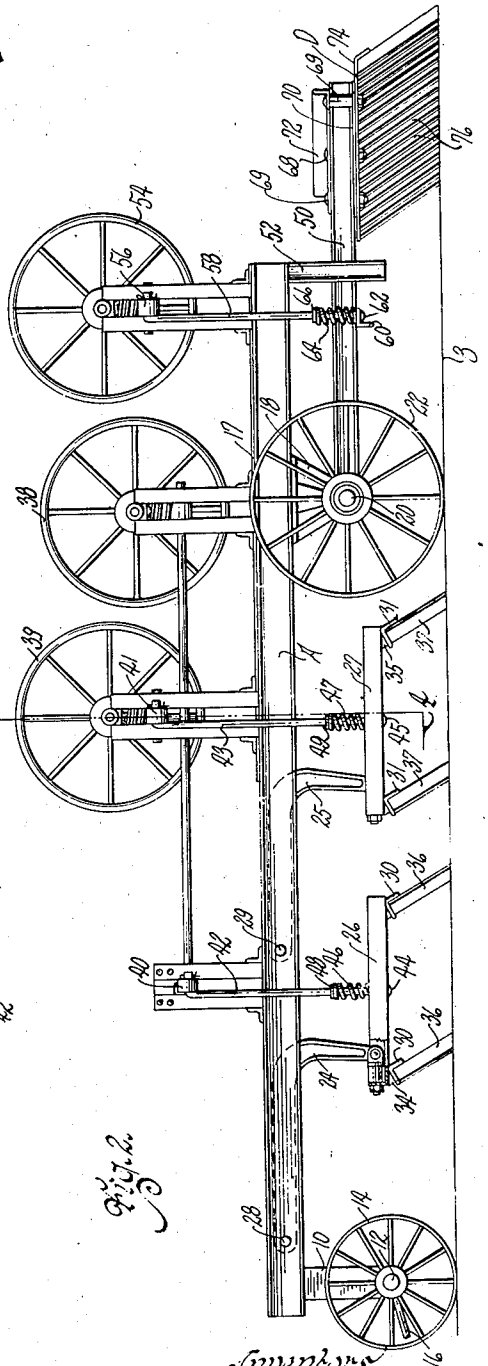


Fig. 2.

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Fig. 3.

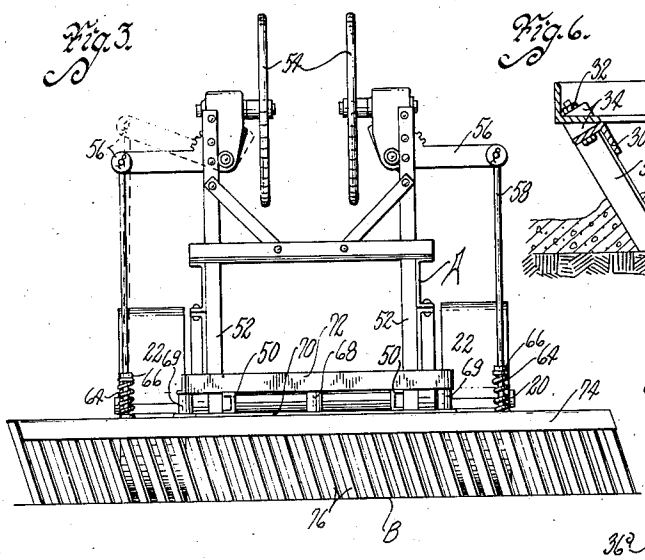


Fig. 6.

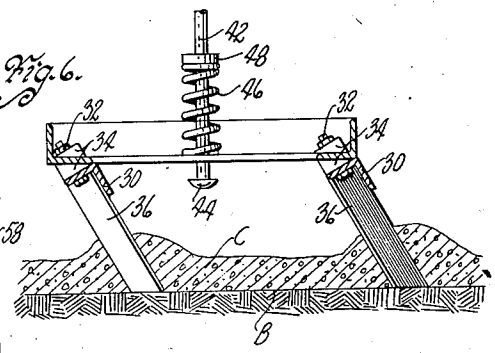


Fig. 7.

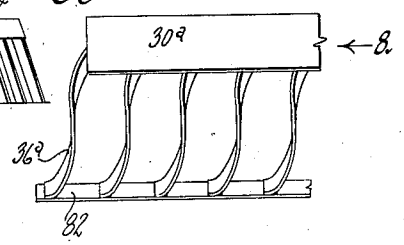


Fig. 4.

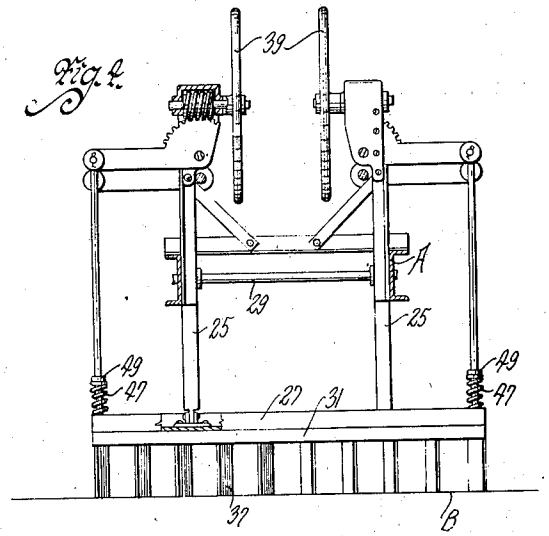


Fig. 10.

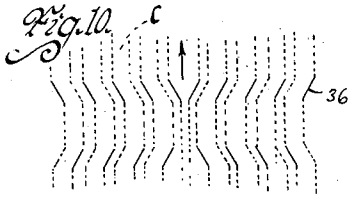


Fig. 11.

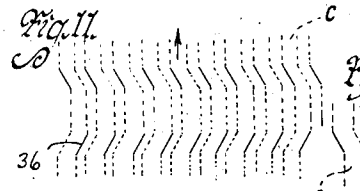


Fig. 12.



Fig. 5.

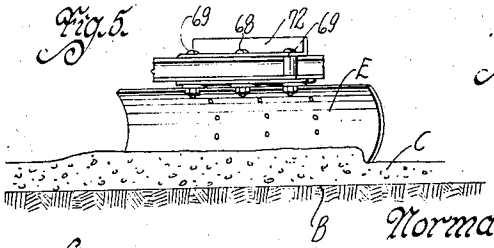


Fig. 8.

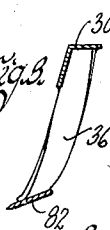
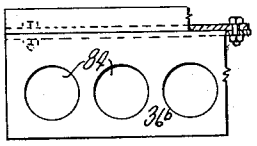


Fig. 9.



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1,986,327

ROAD MATERIAL MACHINE

Norman De Wind and Arthur F. Hayler,
Newton, Iowa

Application February 6, 1933, Serial No. 655,376

13 Claims. (Cl. 94—44)

An object of our invention is to provide a road material machine especially adapted for mixing, drying and spreading road material on a road surface, the machine itself being comparatively simple and inexpensive to produce.

A further object is to provide a road material machine comprising a wheeled frame and mixing blades supported thereon, the mixing blades being arranged in gangs and transversely spaced relative to the machine, the blades being arranged at an angle relative to the fore-and-aft axis of the wheeled frame so as to engage the road material and shift it sidewise to thereby cause an eddy in the material which brings the lower strata thereof into the top strata thereof.

In this connection it may here be noted that the machine is particularly adapted for use on a graded road surface on which road material such as gravel and oil have been roughly spread, our machine serving the purpose as it travels over the road material of engaging the material and parting it like a series of plows and moving it sidewise and upwards, thereby causing it to surge and thoroughly intermixing it, besides exposing a new portion of it to the atmosphere to thereby hasten drying of the material which is necessary before it can be bladed down to form the final completed road surface.

A further object is to provide mixing and drying blades preferably formed of flat bar material and arranged at an angle relative to the vertical and the horizontal and relative to the fore-and-aft or longitudinal axis of the machine to effectively accomplish the mixing and drying action desired.

A further object is to provide at the rear of the machine, a rake for spreading the material and aiding in levelling the surface thereof after the mixing and drying blades have accomplished their work.

Still a further object is to provide a levelling blade interchangeable with the rake for the purpose of levelling the road material to its final surface after the necessary mixing and drying have been accomplished by one or more traverses of the machine with the rake thereon over the material, the blade being also usable to accomplish either final cross mixing or cross mixing between mixing operation with the rake.

With these and other objects in view our invention consists in the construction, arrangement and combination of the various parts of our device, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in our claims, and illustrated in the accompanying drawings, in which:

Figure 1 is a plan view of a road material machine embodying our invention, a platform for the operator being removed therefrom to better illustrate details of construction of the machine.

Figure 2 is a side elevation of the same.

Figure 3 is a rear elevation of the machine.

Figure 4 is a sectional view on the line 4—4 of Figure 2.

Figure 5 is a side elevation of the rear part of the machine showing a levelling blade substituted for the rake shown in Figures 1, 2 and 3.

Figure 6 is a sectional view on the line 6—6 of Figure 1.

Figure 7 is a front elevation of a modified form of blade.

Figure 8 is an end elevation thereof looking in the direction of the arrow 8 adjacent Figure 7.

Figure 9 is a front elevation of a single blade adapted to be substituted for the plurality of blades shown in Figures 1, 2 and 4; and

Figures 10, 11 and 12 are diagrammatic views of three different arrangements of mixing and drying blades.

On the accompanying drawings, we have used the reference character A to indicate generally a main frame. The main frame A has a front bolster 10 to which is pivoted for steering purposes, an axle 12. Front wheels 14 are journalled on the axle 12. A stub tongue 16 is associated with the axle 12 whereby the machine may be pulled behind a tractor or the like. A platform 17 is shown in Figure 2.

Rear axle brackets 18 are provided on the main frame A. A rear axle 20 is associated therewith and rear wheels 22 are journalled on the axle 20.

Supported by beams 24 and 25 are secondary frames 26 and 27. The beams 24 and 25 are pivoted to the main frame A, as indicated at 28 and 29.

Blade supporting bars 30 and 31 are secured to the frames 26 and 27 by bolts 32 and 33 (see Figure 6). Suitable spacers 34 and 35 are provided for positioning the bars 30 and 31 at an angle relative to the frames 26 and 27.

Each of the bars 30 and 31 supports blades 36 and 37. These are made of flat bar material and are welded or otherwise suitably secured to the supporting bars 30 and 31. The blades 36 and 37, due to the spacers 34, slope rearwardly as well as downwardly. As shown in Figure 1 and diagrammatically in Figures 10 and 11, the blades are arranged at an angle relative to the fore-and-aft axis of the frame A.

This causes road material C, shown by dotted lines in Figures 10 and 11, to be shifted sidewise and by offsetting the blades in one row of blades relative to those in the following row, the shifted material is in line for being shifted in an opposite direction by the second row of blades, as indicated in Figures 10 and 11.

In Figure 10, it is shown how the angles of the blades may be reversed in one row—that is, made right and left hand on opposite sides of the center and likewise reversed in the second row but one blade following another being reversed relative to it. Another arrangement, as shown in Figure 11, might be provided and any combination of these arrangements is possible in order to control the flow of material.

In Figure 6, a road surface is indicated at B. The road material, as the blades 36 are dragged through it, will surge or "boil" up around the blades for thus turning the material over and aerating it as well as mixing it. After the blades have past, new portions of the material are exposed to the atmosphere for drying. All this is important because the road material must have a minimum amount of moisture before it is ready to be bladed down for the travel of vehicles thereon.

The secondary frames 26 and 27 are vertically adjustable relative to the main frame A by means of adjusting wheels 38 and 39. The wheels 38 and 39 are operatively associated with arms 40 and 41 which are connected by links 42 and 43 with the secondary frames 26 and 27.

The links 42 and 43 extend loosely through the frames 26 and 27 and have heads 44 and 45 on their lower ends. Springs 46 and 47 are interposed between collars 48 and 49 on the links 42 and 43. The connection between the wheels 38 and 39 and the arms 40 and 41 is of the worm and worm gear type, as shown at the upper left side of Figure 4.

It will be obvious that the wheels 38 and 39 can be manipulated for spacing the lower ends of the blades 36 and 37 above the road surface B any desired distance for mixing the road material C either deeply or shallowly, or for scraping the road surface B, as shown in Figure 6, if desired. The tension of the springs 46 and 47 can be added to the weight of the frames 26 and 27 and the blades 36 and 37, if desired, by adjusting the parts to the position shown in Figure 6.

At the rear end of the frame A, we provide beams 50 having their forward ends pivoted for instance on the rear axle 20. Guides 52 prevent lateral swaying of the beams. The beams are vertically adjustable by a hand wheel 54, an arm 56 and a link 58. The link 58 extends loosely through a cross bar 60 secured to the beams 50 and has a head 62 on its lower end. A spring 64 is interposed between the upper surface of the bar 60 and a collar 66. Pivoted on a bolt 68 carried by a cross bar 51 of the beams 50, is a rake D. The rake D comprises bars 70 and 72 below and above the beams 50, a supporting bar 74 and teeth 76.

The bar 74 is detachable relative to the bolt 68 and relative to bolts 69. The teeth 76 are flat bars secured to the supporting bar 74 by welding or the like, the bar 74 being an obtuse angle in cross section so that the teeth 76 slope rearwardly.

The rake D, it will be noted, can be swung to a position other than transverse relative to the main frame A. A perforated sector 78 is secured to the bar 70 and by means of a pin 80 through a bar 53, it may be locked at any desired angle. When in an angular position, it will be noted that the teeth 76 are likewise at an angle and thus serve to spread the material which has been mixed by the blades 36 and 37.

As shown in Figures 7 and 8, blades 36*a* may be twisted instead of being straight as in the previous figures. The blades 36*a* are welded to supporting bars 30*a* and a scraper bar 82 is welded to the lower ends of the blades. Blades of this character have a tendency for the scraper bar 82 to lift the material and the twisted blades 36*a* to better turn it over for bringing the lower strata of the material C into the top strata for more efficient mixing and drying action.

As shown in Figure 9, a blade 36*b* is provided. This is merely a vertical blade of ordinary character except that it has perforations 84 for the material to flow through for thereby causing it to surge and to enhance its mixing action over and above a blade which is not perforated.

In this connection, it may here be mentioned that at present, ordinary grader blades or motor patrols having grader blades are now used for mixing road material. They mix the material by blading it into windrows, first shifting it to one side of the path of travel and then to the other, but it is obvious that this takes considerable horse-power over a perforated blade as shown in Figure 9 and when the material is shifted into a windrow, less surface is exposed for atmospheric drying than when the material is mixed as by our mixing blades and then spread as by our rake D.

The mixing blades arranged at opposite angles, as shown in Figures 10 and 11, give much the same action to the road material C as turbine blades do to steam in a steam turbine. The scattering action of the blades over a wider surface than when a single grader blade is used is much more effective because of greater exposure area and also there are numerous turn-overs of the material due to one gang of blades following the other, while with a grader there would only be one turn-over in one traverse of the road surface.

Another advantage of our machine is that it can work on one half of the road while the other half is left open for traffic. The road material C can be spread on one half the road and can be thoroughly mixed and dried by several traverses of the machine thereover while the other half is being used for traffic.

After the mixing and drying have been completed, a mixing and levelling operation can be performed with the machine by substituting for the rake D, a levelling blade E shown in Figure 5. This is merely a vertical blade which can be bolted with the bolts 68 and 69 in place of the rake D being bolted thereon. This blade levels the material C down to the desired depth relative to the road surface B and by being arranged at an angle, it advances any surplus of the material C into a windrow either at the center or the side of the road, as desired, where it can be levelled down or otherwise disposed of.

In the process of building an oiled and gravelled road surface, the road surface B is usually primed with oil whereafter the material C is spread thereon and then oiled by a distributor or tank vehicle having a transverse perforated pipe from which the oil flows onto the gravel. Our machine can follow the distributor for mixing the oil into the gravel immediately after it is deposited thereon.

Some road builders have attempted to disk or harrow the material after the oil is applied there-

to but this has a tendency to merely furrow the material rather than actually mix it as when our machine is used.

A series of blades interspersed by open spaces or a blade, as shown in Figure 9, having perforations in it does not require as much horse-power for operation as a grader blade and consequently there is a considerable economy, both from the standpoint of taking less horse-power to operate the machine as well as thoroughly stirring the road material and keeping it spread out so that atmospheric drying is facilitated and fewer traverses of the material in order to mix and dry it are required.

Various arrangements of the blades 36 and 37 are possible. We have already referred to the arrangements in Figures 10 and 11. In Figure 10, the material is shifted toward the center of the machine and then toward the outside edges again. In Figure 11, it is shifted toward the right and then toward the left. In Figure 12, we have shown an arrangement in which both the front and back blades slant in the same directions so as to all shift the material toward the right. Blades with settings of this character are desirable when the contractor wants to work the material from the outside edge to the center, or from the center to the outside edge of the road instead of keeping it all at the center or at one edge, in which case blades arranged as in Figures 10 or 11 would be used. Both the front and rear blades can also be arranged to shift the material toward the center of the machine or away from the center instead of first toward and then away from it as shown in Figure 10.

The arrangements just enumerated and many others can be used, depending on the particular method desired for shifting the road material during the mixing and drying process.

In all arrangements we have found that the back sloping and the angles of the blades to cause them to shift the material are important features regardless of the arrangement of the slant of the blades relative to each other as illustrated in Figures 10, 11 and 12.

Some changes may be made in the construction and arrangement of the parts of our device without departing from the real spirit and purpose of our invention, and it is our intention to cover by our claims, any modified forms of structure or use of mechanical equivalents which may be reasonably included within their scope.

We claim as our invention:

1. In a road material machine of the class described, a wheeled frame, rows of depending blades, each row comprising a plurality of transversely spaced blades relatively narrow from side to side and means for mounting said blades on said frame for selective positioning vertically relative thereto, said blades, in transverse cross section, being arranged at an angle relative to a transverse horizontal line through said frame, the angle of said blades of one row of blades being reversed relative to the angle of the blades of the following row of blades.

2. In a road material machine of the class described, a wheeled frame, a plurality of depending, transversely spaced blades, said blades being relatively narrow from side to side, means for mounting said blades on said frame for selective positioning vertically relative thereto, said blades, in transverse cross section, being arranged at an angle relative to a transverse line through said frame and a rake behind said blades comprising a transverse supporting bar and flat teeth having their planes at substantially right angles to the axis of said supporting bar, said rake being pivoted for adjustment to an angle relative to said transverse line through said frame.

3. In a road material machine of the class described, a wheeled frame, substantially flat and narrow blades thereon and a rake behind said blades having teeth arranged parallel with the fore-and-aft axis of the frame when said rake is arranged transverse thereof, said rake being pivoted to said frame for adjustment to an angle other than transverse relative thereto.

4. In a road material machine of the class described, a wheeled frame, substantially flat transversely and narrow depending blades thereon arranged to slope downwardly and backwardly from said frame and means behind said blades and carried by said frame to spread road material mixed by said blades, said means comprising a rake having teeth.

5. In a road material machine of the class described, a wheel frame, substantially flat transversely and narrow depending blades thereon arranged to slope downwardly and backwardly from said frame and means behind said blades and carried by said frame to spread road material mixed by said blades, said means comprising a vertically arranged blade.

6. A road material machine comprising a supporting frame, relatively narrow flat blades carried thereby and extending downwardly therefrom, said blades having their faces set at an angle relative to a transverse horizontal line through said frame, said blades extending rearwardly as well as downwardly whereby they slope and when travelling through a layer of road material, the top portion thereof divides to form a groove in the material and the bottom portion thereof surges up through said groove to mix with and partially overlie said top portion and means behind said blades and carried by said frame to spread road material mixed by said blades.

7. In a road material machine, a wheeled frame and a series of mixing blades carried thereby, each blade comprising an elongated flat bar of material extending lengthwise downwardly and rearwardly from said frame, the lower ends of said blades being cut at an angle relative to the length of said blades whereby to be parallel with a road surface supporting said frame and blades and the blades in cross section being arranged at an angle relative to a transverse line through said frame.

8. In a road material machine, a wheeled frame, a series of mixing blades carried thereby, each blade comprising an elongated flat bar of material extending lengthwise downwardly and rearwardly from said frame, the lower ends of said blades being cut at an angle relative to the length of said blades whereby to be parallel with a road surface supporting said frame and blades and the blades in cross section being arranged at an angle relative to a transverse line extending through said frame and means behind said blades for spreading road material mixed by said blades.

9. In a road material machine, a wheeled main frame, a secondary frame having a series of transversely spaced, relatively narrow mixing blades extending downwardly and rearwardly therefrom, means for adjusting said secondary frame relative to said main frame for adjusting the vertical position of said blades above and relative to a road surface supporting said main frame, said adjusting means including a spring for imposing tension on said blades against said road surface in addi-

tion to the weight of the blades and the secondary frame.

10. A road material machine comprising a supporting frame and relatively narrow flat blades carried thereby and extending downwardly therefrom, said blades having their faces set at an angle relative to a transverse horizontal line through said frame, said blades extending rearwardly as well as downwardly whereby they slope and when travelling through a layer of road material, the top portion thereof divides to form a groove in the material and the bottom portion thereof surges up through said groove to mix with and partially overlie said top portion and introduce air for aerating said road material.

11. In a machine of the character described, a substantially horizontal wheeled frame, a plurality of mixing blades carried thereby and each comprising a vane relatively narrow from side to side and extending therefrom in a rearward and downward direction, the lower end of said vane being cut at an angle to the transverse of the vane, said vane being slanted from side to side relative to the transverse of said frame so that said lower end is substantially parallel to said frame.

12. A machine of the kind disclosed including a series of blades, each substantially flat, downwardly and backwardly sloping and relatively narrow from side to side, the bottom edge of said blade being substantially horizontal and said blade having its face, intended to be presented to the material to be worked on, lying in a plane angular to a transverse horizontal line through said machine.

13. A machine of the kind disclosed including a series of blades, each substantially flat, downwardly and backwardly sloping and relatively narrow from side to side, said blade having its face, intended to be presented to the material to be worked on, lying in a plane angular to a transverse horizontal line through said machine.

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