April 14, 1959 R. J. KONWAY 2,881,683

CURB AND PAVEMENT FINISHING MACHINE

Filed Nov. 26, 1954 4 Sheets-Sheet 1

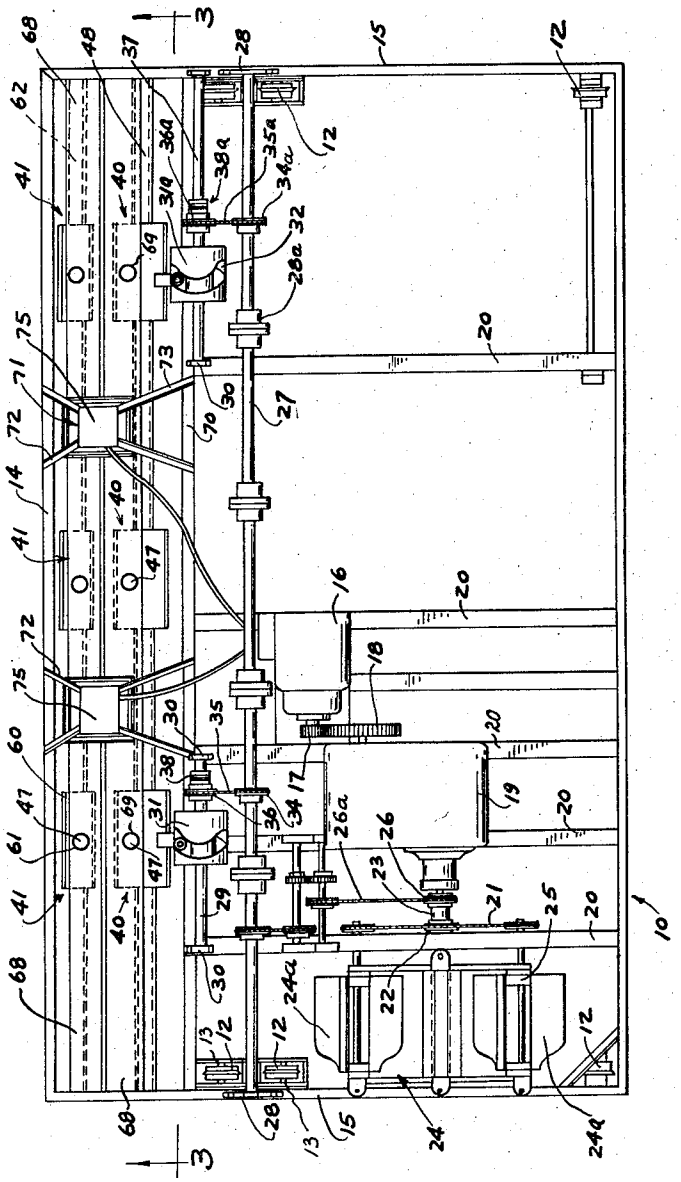


FIG. 1

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CURB AND PAVEMENT FINISHING MACHINE

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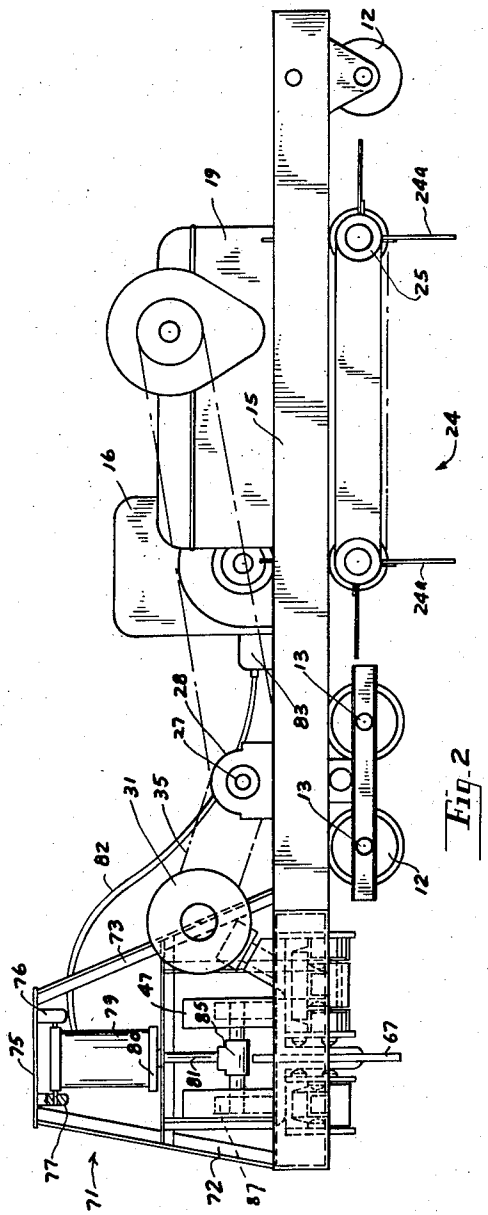


Fig. 2

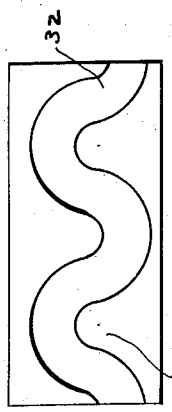


Fig. 9

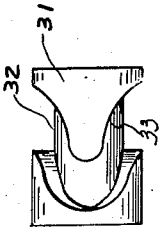


Fig. 8

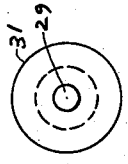


Fig. 7

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CURB AND PAVEMENT FINISHING MACHINE

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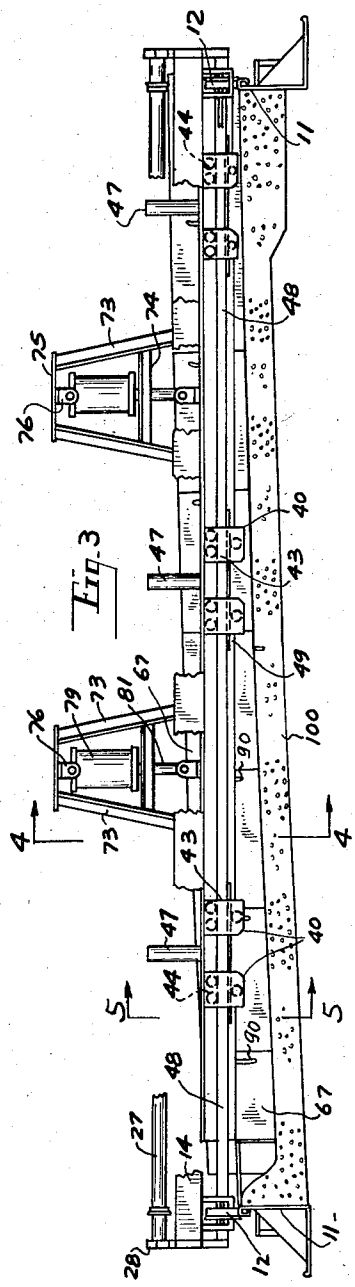


Fig. 3

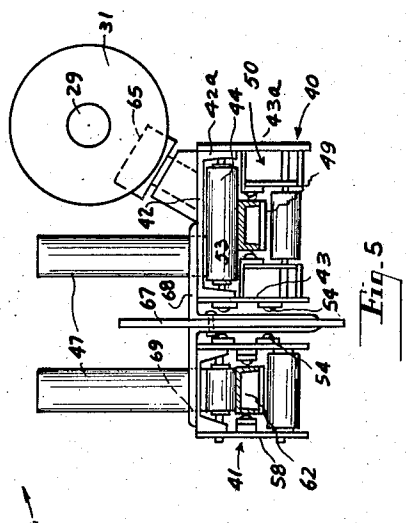


Fig. 5

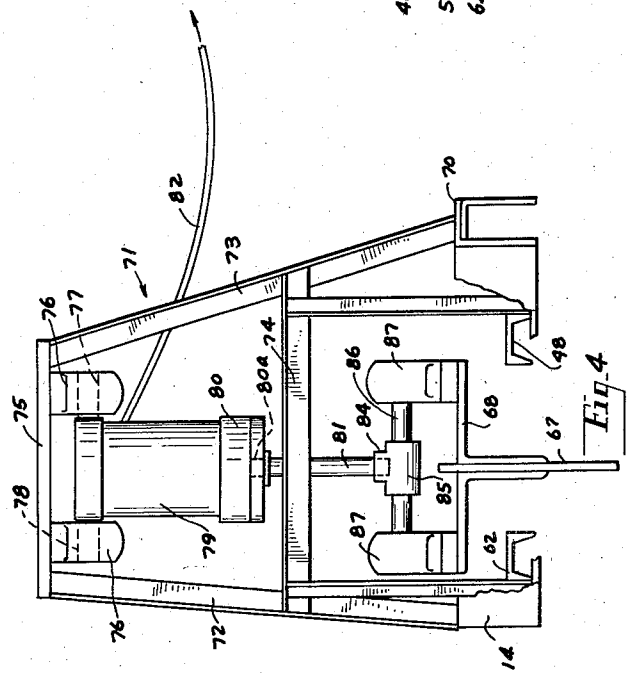


Fig. 4

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CURB AND PAVEMENT FINISHING MACHINE

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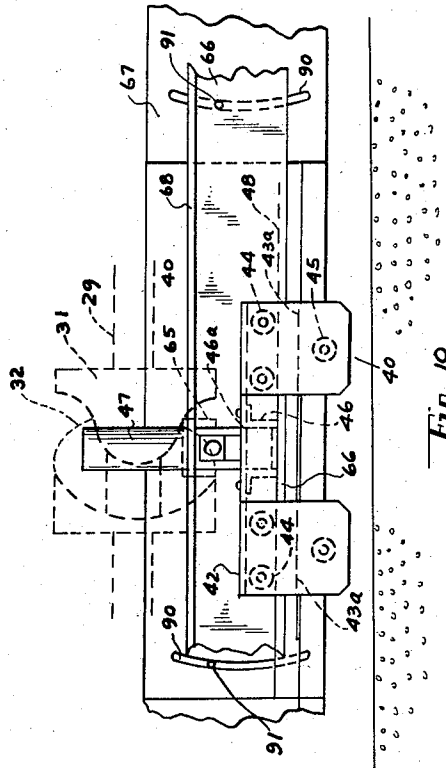


Fig. 10

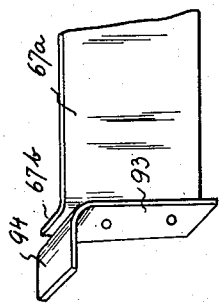


Fig. 12

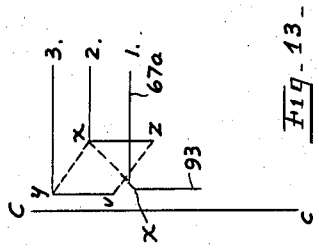


Fig. 13

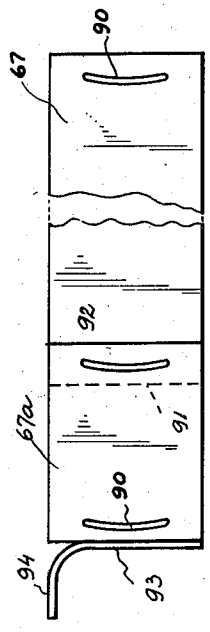


Fig. 11

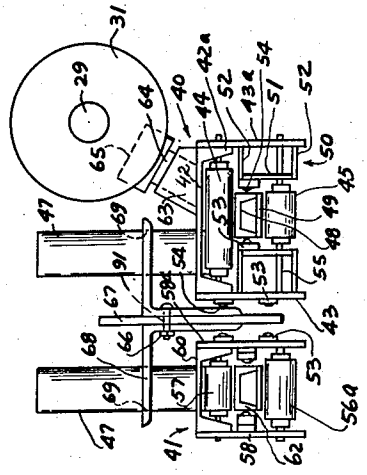


Fig. 6

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2,881,683

CURB AND PAVEMENT FINISHING MACHINE

Robert J. Konway, Inkster, Mich.

Application November 26, 1954, Serial No. 471,428

5 Claims. (Cl. 94—45)

The machine of my invention includes, as a part thereof, a machine for the shaping of curbs out of plastic concrete, as described in my Patent No. 2,831,408.

The object of the machine is to spread plastic concrete in the course of its being applied to the surface of a road and to shape the curb portion of the road.

I shall now describe my improvement with reference to the accompanying drawings in which:

Fig. 1 is a top elevational view of the machine;

Fig. 2 is an enlarged side elevational view of the machine;

Fig. 3 is a sectional view on line 3—3 of Fig. 1;

Fig. 4 is a side view of the structure supporting pneumatic means for raising blade means adapted to shape the surface of the pavement;

Figs. 5 and 6 are enlarged side elevational views, taken on line 5—5 of Fig. 3, of laterally-movable carriages and a blade supported thereby, the views disclosing the same blade in different operative positions;

Fig. 7 is an end view of a cam serving as an operative element of the machine;

Fig. 8 is a side elevational view of the cam;

Fig. 9 is a flat projection of the groove of the cam;

Fig. 10 is a rear elevational view of the elements guided by said cam in their operative movements as viewed in the direction of the arrow in Fig. 6;

Fig. 11 is a side elevational view of a blade employed in said machine;

Fig. 12 is a perspective view of a pusher element at the end of said blade;

Fig. 13 is a diagrammatic presentation of the function of a concrete-moving element of my machine.

Similar numerals refer to similar parts throughout the several views.

The machine includes a rectangular frame, generally indicated by numeral **10**. The frame is mounted on wheels adapted to run on rails **11**. A pair of such wheels, **12**, on individual axles **13** disposed parallel to each other and to the front member **14** of the frame, are shown under each side member **15** of the frame in a spaced relation to said member **14**, while a single wheel **12** under each side member **15** supports the rear portion of said frame.

The main portion of the frame carries means for the formation of the street curbs out of concrete in its plastic stage, which means have already been described by me in my said Patent No. 2,831,408. In view thereof, the description of said means in the present specification will be brief, but sufficient enough to the disclosure of the operative connection of said means with the inventive features first presented in this application.

The means include a motor **16** which, by means of cog wheels **17** and **18**, is connected to a train of reduction gears (not shown) in a housing **19**. The motor, the gear housing, and other elements to be described herein are mounted on cross-beams of the frame **10**, the beams being generally marked **20**. Driven by means of a chain **21** from a sprocket **22** which is mounted on a

shaft **23** projecting from said gear housing **19**, are two curb-shaping members, generally marked **24**, each of them including a plurality of blades **24***a* radially projecting from the hub structure **25** of the respective curb-shaping member **24**. It is these blades which at their operative ends have an outline designed to impart to the curb the desired profile.

Power for the forward movement of the machine is delivered from the same motor **16** through the reduction gears in housing **19**. Specifically, a sprocket wheel **26**, driven by the shaft **23** projecting from the housing **19**, is connected by a train of sprocket wheels and chains, including chain **26***a*, to a horizontally-disposed shaft **27**. The shaft is supported for rotation about its axis by two standards **28**, one upon each side member **15** of the frame **10**. Sprocket wheel and chain means driven by said shaft impart a rotary movement to two pairs of wheels **12** at the front portion of the frame so that the wheels may serve as traction wheels for the purpose of propelling said frame forwardly upon said rails **11**, as shown in Fig. 3.

It is the same shaft **27** which serves as a means for transmission of power from the motor for the operation of the mechanism which I shall now describe and which is new.

The shaft is composed of a number of short component parts in end-to-end relation, the parts being connected by knuckle joints **28***a*. Disposed in a parallel relation to the shaft **27**, close to one side **15** of the frame **10**, is a shaft **29**. The shaft is supported at its ends, for rotation about its axis, in pillow blocks **30**, said blocks being mounted on respective cross-rails **20**. Keyed to the shaft for rotation therewith is a cylindrical member **31**, the member being provided with a continuous sinuous groove **32** the course of which, in flat projection, is shown in Fig. 9. The sides of the groove are in parallel relation to each other, the bottom of the groove being defined by the surface of the axial portion **33** of the cylindrical member which will be briefly referred to as a cam.

A sprocket wheel **34** keyed to shaft **27** drives, by means of a chain **35**, a sprocket wheel **36** axially keyed to shaft **29**. A similar cam, **31***a*, is keyed to shaft **37** close to the opposite side **15** of the frame **10**, and is driven by means of a similar arrangement, that is, by a sprocket wheel **34***a* on shaft **27**, a sprocket wheel **36***a* on shaft **37**, and a chain **35***a* operatively connecting the last two named sprocket wheels. Both sprocket wheels **36** and **36***a* are controlled by manually-operated clutches which are generally marked **38** and **38***a*, respectively. As clutches in general are well known, their specific construction in this case is not shown and the respective parts of the drawings may be considered as merely of symbolic nature.

As each cam operates in the same manner, I will restrict the description of the operations of said cams to one of them, specifically, the cam **31**, and to the elements actuated thereby.

Disposed forwardly thereof are three pairs of carriages, each pair including one carriage generally identified by numeral **40** and one carriage identified by numeral **41**. Each carriage includes a horizontally-disposed channel member composed of a top plate **42** and a downwardly-extending flange **42***a* at each side thereof. Secured to one flange is a downwardly-extending side plate **43**, and secured to the other flange is another side plate **43***a*, the plates being in a spaced relation to each other. Thus, as seen from one end, the structure has the outline of an inverted letter **U**.

Located under the plate **42**, at each end thereof, is a pair of rollers **44** which at their respective ends are journalled in said flanges, and located at a lower level within said carriage is a single roller **45**. The roller is journalled, at its opposite ends, partly within said side walls

43 and 43*a* and partly within members 51 to which I shall refer again.

Disposed below the top plate 42, and secured thereto, is a U-shaped bracket 46 serving as a means for support of a vertical post 47 which rises upwardly through an aperture 46*a* in said plate 42. This is shown in Fig. 10.

The rollers 44 rest on an inverted U-shaped rail or track 48 transversely to the length of said rail which extends parallel to the front member 14 of the frame 10 from one side 15 of said frame to the other. Secured to the underside of said rail 48 is a flat plate 49 to which I shall refer again. Projecting from each side of the carriage 40, inwardly, are box-like brackets, generally identified by numeral 50, each of said brackets including a vertical panel 51 spaced from the respective side of the carriage, the panel being connected at the top and bottom to said side by transverse members 52. Each panel carries on the side facing the other panel one or more cups 53, each containing a single, anti-friction ball 54. The balls in the opposed cups bear against the sides of the rail 48, as best shown in Fig. 6. Similar cups 53 with balls 54 are employed on the opposed faces of carriages 40 and 41, respectively.

Each carriage 41 is similar in structure with carriage 40, with the exception that it is not as wide and that the upper rollers 57 therein, analogous to rollers 44, are shorter, and that it contains no box brackets 50 in its lower portion, thus permitting therein the use of a longer lower roller 56*a*. The top wall 60 of carriage 41 is provided with an opening 61 through which another guiding post extends upwardly from a supporting bracket which is not shown but which is like bracket 46 shown in Fig. 10. The bracket is disposed below said wall 60 and is suspended therefrom.

Rollers 57 within said carriage 41 rest on a horizontal rail 62 which is but a duplication of the parallel rail 48 already described, and is disposed forwardly of the same rail but at the same level.

Projecting at an angle rearwardly from said plate 42 of carriage 40, and preferably welded thereto, is a boss 63 serving as a housing for a short shaft 64 which at the top terminates with a roller 65 axially mounted on the shaft for rotation thereabout. The roller fits into the groove 32 in the cylindrical member or cam 31 already described herein, the axis of the roller being in a radial relation to the axis of the cam 31. The diameter of the roller is to be smaller than the width of the groove for a rolling contact with one side only of the groove.

It will be noted that carriage 40 of the centrally-located pair of carriages is not connected to any cam.

Vertically fitting between the carriages 40 and 41, and clamped between two angle rails 66, as shown in Figs. 5 and 6, is a blade 67. The angle rails include horizontal flanges 68 which contain apertures 69. It is through these apertures that posts 47 rise upwardly from the respective supporting brackets, the posts serving as guiding means for the assembly including said angle rails and the blade clamped therebetween. It will be noted that the sides of the angle rails are in contact with the balls 54 in holders or cups 53 already described in the course of this specification.

The blade 67 is disposed in a vertical plane and extends from a point spaced from one side 15 of the frame to a point spaced from the other side 15 of said frame, the spacing at each end being such as to permit said blade to be moved edgewise to the extent by the cam in its operative action.

In order that the position of the blade may be adjusted with respect to said angle rails 66, the blade is provided with arcuate slots 90 extending transversely to the width of the blade. Bolts 91, passing through apertures in angle rails and said slots, keep the blade at a desired height above the level of the pavement on which the blade is to operate. The slots are curved to permit the blade to be moved vertically at one end higher or lower than at the other end.

Mounted upon the frame 10 of the machine, at the front portion thereof, specifically, upon the front member 14 and upon a parallel rail 70 spaced therefrom, are two derrick-like rectangular stands, generally marked 71. The framework of each stand comprises two pairs of stanchions, 72 and 73, respectively, the first pair being mounted on said member 14 and the second pair being mounted on said rail 70, all the stanchions converging towards each other at their upper portions. The stanchions are reinforced by horizontal ties 74 and serve to support a horizontal platform 75.

Secured to the underside of the platform, by any suitable means, are two pillow blocks 76, and pivotally suspended therefrom, by means of a pin 77 fitting into bearings 78 in said blocks, is a cylinder 79. The cylinder is closed at the top and is provided at its lower end with a cap 80 containing an axial aperture 80*a* for reception of a rod 81. The latter is connected at its upper end to a reciprocating piston inside the cylinder, which piston is adapted to be moved up or down by fluid means under pressure, such as air or a liquid. This piston will be of a double action, floating type, to allow for movement when the blade is in contact with the pavement.

As the structures of this type are well known, the component parts of the cylinder and the piston are not shown in the drawings. The fluid medium is delivered to the cylinder by means of a flexible hose 82 from a source of supply, shown at 83 in Fig. 2, and returned by means of a similar hose, which is not shown.

The rod 81 fits into the central stem 84 of a T-joint 85, said stem being disposed at right angle to the main portion of the joint which holds a horizontal rod 86. The latter is journalled at its ends in a pair of pillow blocks 87 which are secured to the horizontal flanges 68 of the angle rails 66. The rails, as stated above, serve as means for clamping the blade 67 therebetween.

The blade may be composed of a number of shorter blades which are joined endwise in an overlapping relation to each other, as shown in Fig. 11 where the dotted line 91 indicates the end of one short blade, while the solid line 92 indicates the end of another short blade 67*a*. The area between the two lines shows the extent of the overlapping relation of said shorter blades.

It will be further noted that the blade defined at one end by line 92 is provided at its opposite end with a flange 67*b* disposed at right angle thereto, and that it is secured, by means of said flange, to a transverse member or pusher 93. The latter is made of a plate which at its upper end includes a portion 94 bent to a horizontal plane, as best shown in Fig. 11.

I shall now describe the operation of the machine.

First, it will be assumed that the machine is mounted on rails 11 for movement forwardly. As the vertical blade 67 is designed to operate upon the paving material in plastic stage, in order to spread it at a certain level or to a certain height above the bed of the road, the blade has to be adjusted vertically till the lower rim of the blade is at the desired height. This may be accomplished by means of the cylinders 79. A fluid medium delivered under pressure to each of the cylinders by a hose 82 will operate, by means of a piston in each cylinder, a respective rod 81 and the clamping members 68 to vertically move the blade 67 which is clamped between said members. It will be understood that the pivoted suspension of the cylinder 79 from pillow blocks 76 in the respective stand 71 will permit a limited pendulum like movement of the cylinder 79 with its piston rod 81. The blade 67, as described above, is connected to said rod 81. This is effected by means of a short cross rod 86 at the lower end of said piston 51. The cross rod 86 is journalled in pillow blocks 87 on top of the angle rails which carry the pavement shaping blade 67. As the blade 67 is moved edgewise, the cylinder will be moved in a

limited pendulum like movement. The piston rod **81** will move with it as it is drawn by the respective carriage which supports the blade. In the course of said movement of the rod **81**, the short rod **86** will turn slightly about its axis, leaving the carriages with the blade in their substantially horizontal position.

It will be further assumed that a quantity of the paving material, in plastic stage, has been deposited in front of the machine and possibly roughly spread over the road bed. Should the motor now be started, the power developed thereby will be applied to move the machine forwardly. This will be accomplished by means of the traction wheels **12** resting on rails **11**. The wheels are driven by a chain and sprocket mechanism. The mechanism is not shown, but is operated in the customary manner from shaft **27** which, by intermediate means, is driven by said motor.

Simultaneously, the same shaft will drive, by means of a chain, the above-said cam **31**. The latter is in engagement with a roller carried by a member **63** which is mounted on a carriage **40**. As the cam is set rotating about its axis, the carriage, in co-action with a complementary carriage **40**, will move the vertical blade **67** reciprocally back and forth, edgewise, over the road, to spread the plastic paving material to a desired contour of the surface and to push the excess of said material forwardly. The pusher plate **93**, secured transversely to one end of the blade **67**, and extending rearwardly therefrom, will serve, with every movement of the blade towards said rail **11**, to shove a quantity of said paving material towards the curb-shaping rotary blades **24***a* operating alongside said rail and shaping a curb along the pavement.

The operative function of the pusher plate **93** is shown in Fig. 13 where the plate is shown in three consecutive stages of its operation. Line C—C indicates the relative position of the curb with respect to the pusher plate **93** which is shown in its relative position to the pavement-shaping plate **67***a*.

As the plate **67***a* is reciprocated with respect to the curb line C—C, while the whole machine moves forwardly, said plate will first move from the position marked **1** to the position marked **2**, pushing ahead of it excess plastic-paving material. As a result, the path of the pusher plate **93**, at the junction with plate **67***a*, will follow a diagonal path indicated by line X—X.

On the next move of the plate, to position **3**, that is, diagonally towards the curb line C—C, the whole face of the pusher plate **93** will bear against surplus paving material diagonally towards the curb, over an area *y, x, z,* and *v*, thus pushing said material towards the rotary curb-shaping means.

It may be mentioned here that according to the accepted practice the surface of the pavement, when made, defines a slight parabolic curve, dipping towards the curb. To impart to it the above form, the end portion of plate **67***a* close to the curb would sink deeper into the plastic mass than at points further remote from the curb. As the pusher plate is connected to that end of plate **67***a* which adjoins the curb, it also sinks correspondingly deeply into the plastic concrete and is capable of moving substantial quantities of said concrete towards the rotary curb-shaping means.

After having described my machine, what I wish to claim is as follows:

1. A curb and road pavement shaping machine for operation on pavement material in plastic stage, the machine comprising a framework mounted on wheels, including traction wheels, adapted to travel on rails extending along the sides of the road, rotary curb-shaping means along at least one side of the framework and adapted to adjoin said rails, the means including a horizontal shaft disposed at right angle to said side and a plurality of flat blades radially projecting from the shaft, each blade having a contoured operative edge defining the outline of the curb to be shaped, a vertical blade suspended within the frame ahead of said rotary curb shaping means and extending transversely to the road, means to adjust the position of the blade vertically for engagement of the lower edge of the plate with said material to form the surface of the road, a transverse plate affixed to the corresponding end of the vertical blade and adapted to push a part of said material towards the curb-shaping blades, clamping means adapted to hold the vertical blade therebetween, rotary cam means in engagement with said clamping means, and power-supplying means mounted on said frame to drive the traction wheels to move the frame forwardly and, at the same time, to drive the cam means to impart a reciprocating, lateral movement to the vertical blade and the pusher and to rotate the curb-shaping means.

2. A curb and road pavement shaping machine for operation on pavement material in plastic stage, the machine comprising a framework mounted on wheels, including traction wheels, adapted to travel on rails extending along the sides of the road, rotary curb-shaping means along at least one side of the framework and adapted to adjoin said rails, the means consisting of a shaft and a plurality of flat blades projecting radially therefrom, each blade being disposed in a plane passing through the axis of the shaft and having a contoured operative edge for engagement with said material, the edge defining the outline of the curb to be shaped, a plurality of pairs of opposed carriages adapted to move transversely to the length of the road, rail means within the frame forwardly of the curb-shaping means to support said carriages in their movement, the pairs being spaced from each other laterally, each carriage in a pair carrying a clamping member adapted for co-operation with a similar clamping member carried by the other carriage of the same pair, a flat vertical blade clamped between said clamping members, the lower edge of the blade being contoured to the desired shape of the upper surface of the pavement to be formed, a plurality of stands mounted upon the frame of the machine, a cylinder pivotally suspended in each stand, the cylinder containing a piston connected, by intermediate means, with the vertical blade, and means to admit to the cylinder, for the operation of the piston, a fluid medium under pressure to adjust, by means of said piston, the position of the blade vertically, a pusher plate mounted upon one end of the vertical blade transversely to its plane for co-operation with said curb-shaping means, power means coupled to the traction wheels in order to move the machine forwardly, said power means being also used to rotate the curb-shaping means and to actuate a cam to impart a laterally-reciprocating movement to the carriages and the vertical blade held by the clamping members mounted on said carriages.

3. A road pavement shaping machine for operation on pavement material in plastic stage, the machine comprising a framework mounted on wheels, including traction wheels, adapted to travel on rails extending along the sides of the road, a plurality of pairs of opposed carriages adapted to move transversely to the length of the road, transverse rail means within the frame to support said carriages in their movement, the pairs being spaced from each other laterally, each carriage in a pair carrying a clamping member adapted for co-operation with a similar clamping member carried by the other carriage of the same pair, a vertical blade clamped between said clamping members, the lower edge of the blade being contoured to the desired contour of the upper surface of the pavement to be shaped by the machine, rotary cam means in engagement with the clamping members, means to adjust the position of the blade vertically, power means to drive the traction wheels in order to move the machine forwardly and cam means operated by said power means to drive the cam means to impart a laterally-reciprocating movement to the carriages.

4. A pavement-shaping machine for operation on pavement material in plastic stage, the machine comprising a framework mounted on wheels, including traction wheels, adapted to travel on rails extending along the sides of the road, a plurality of pairs of opposed carriages adapted to move transversely to the length of the road, rail means within the frame to support said carriages in their movement, the pairs being spaced from each other laterally, each carriage in a pair carrying a clamping member adapted for co-operation with a similar clamping member carried by the other carriage of the same pair, a vertical blade clamped between said clamping members, the lower edge of the blade being contoured to the desired upper surface of the pavement to be formed by said pavement-shaping machine, a plurality of stands mounted upon the frame of the machine, a cylinder suspended in each stand, the cylinder containing a piston connected by intermediate means with the vertical blade, and means to admit to the cylinder for the operation of the piston a fluid medium under pressure to adjust by means of said piston the position of the blade vertically, power means to drive the traction wheels in order to move the machine forwardly and cam means operated by said power means to impart a laterally-reciprocating movement to the carriages with the vertical blade held by the clamping members mounted on said carriages.

5. A curb and road pavement shaping machine for operation on pavement material in a plastic stage, the machine comprising a framework mounted on wheels, including traction wheels adapted to travel on rails extending along the sides of the road, curb-shaping means along at least one side of the framework and adapted to adjoin said rails, the means including a plurality of horizontal shafts disposed parallel to each other, transversely to the respective side of said framework and supported thereby, and a plurality of flat blades projecting from each shaft radially, each blade being disposed in a plane

passing through the axis of the respective shaft and having a contoured operative edge adapted to define the outline of the curb to be shaped, each shaft being adapted to be rotated about its axis, a plurality of pairs of opposed carriages disposed forwardly of said curb-shaping means and adapted to move transversely to the length of the road, rail means within the framework to support said carriages in their movement, said pairs of carriages being spaced from each other laterally, each carriage in a pair carrying a clamping member adapted for co-operation with a similar clamping member carried by the other carriage of the same pair, a flat vertical blade clamped between said clamping members, the blade having a contoured lower edge to impart the desired shape to the upper surface of the pavement, a pusher plate mounted upon the corresponding end of the vertical blade transversely to its plane for co-operation with the curb-shaping means, power means to drive the traction wheels in order to drive the machine forwardly and to rotate the curb-shaping means, and cam means actuated by said power means to impart a lateral reciprocating movement to the carriages and the vertical blade held by the clamping members mounted on said carriages.

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