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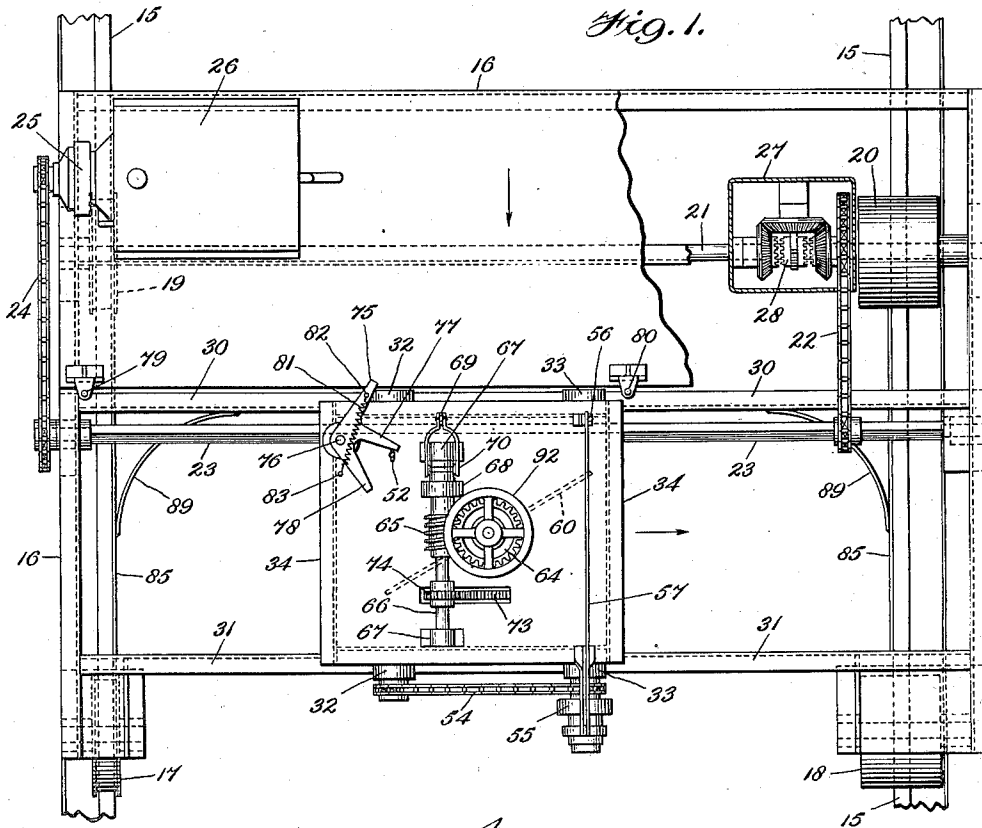
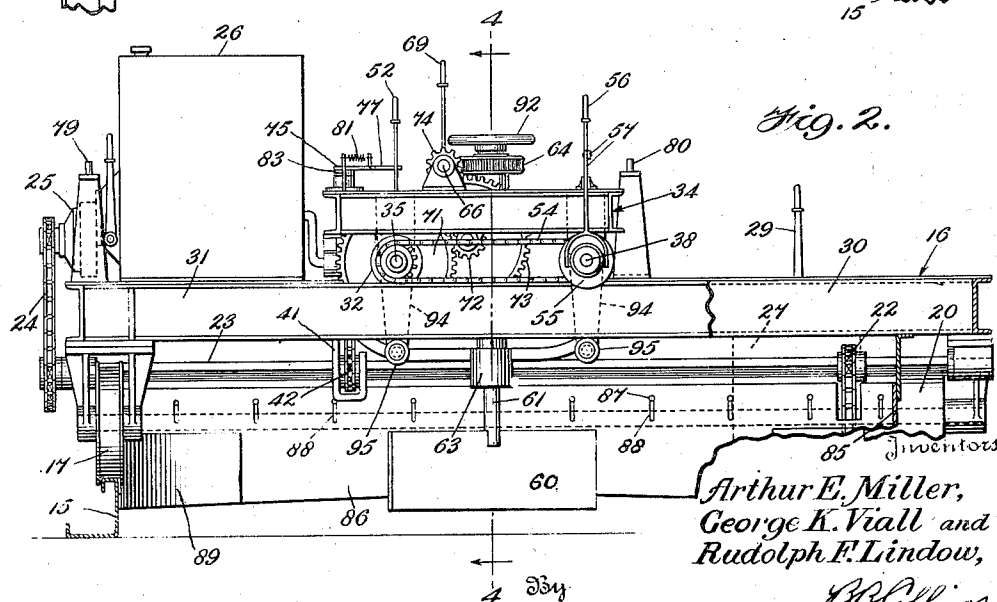
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2,449,710

CONCRETE SPREADING APPARATUS

Filed March 15, 1945

5 Sheets-Sheet 1



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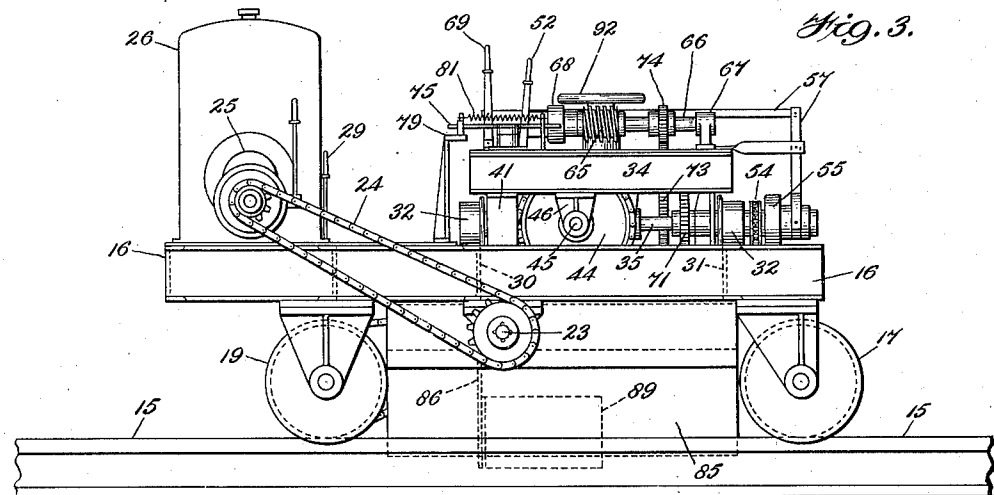
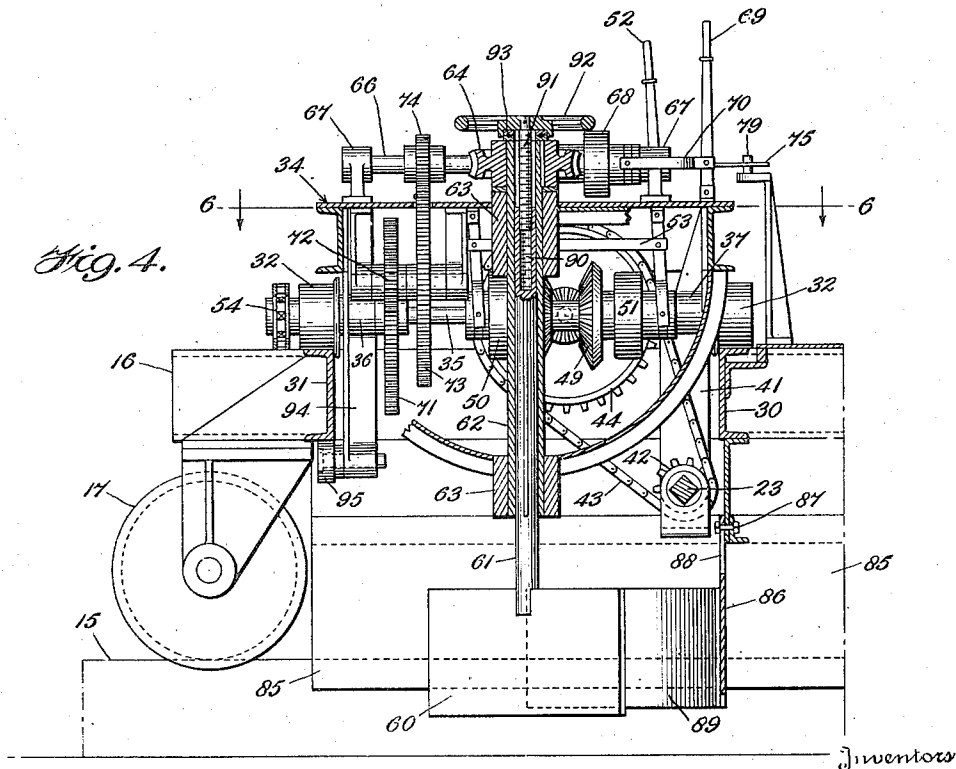
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5 Sheets-Sheet 2



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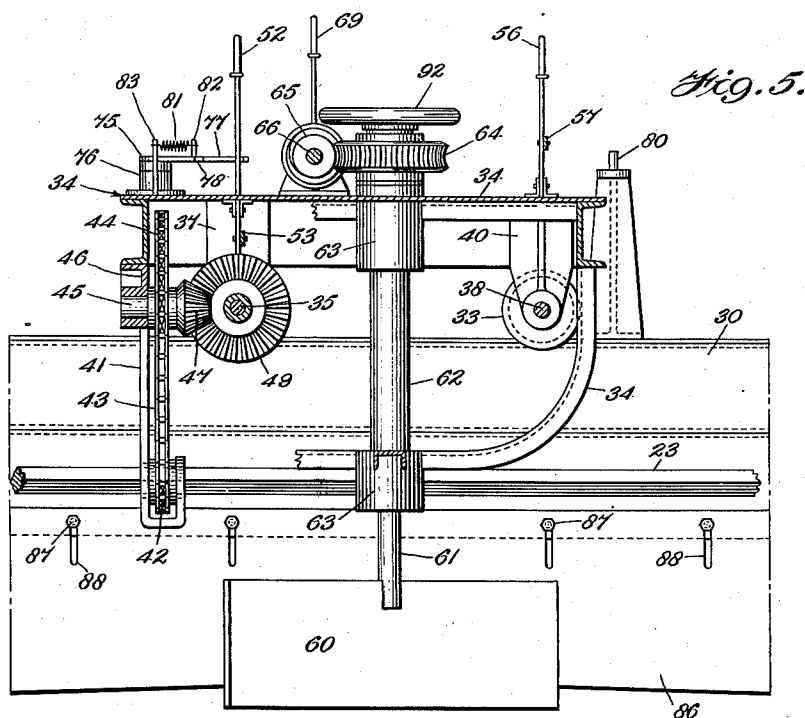
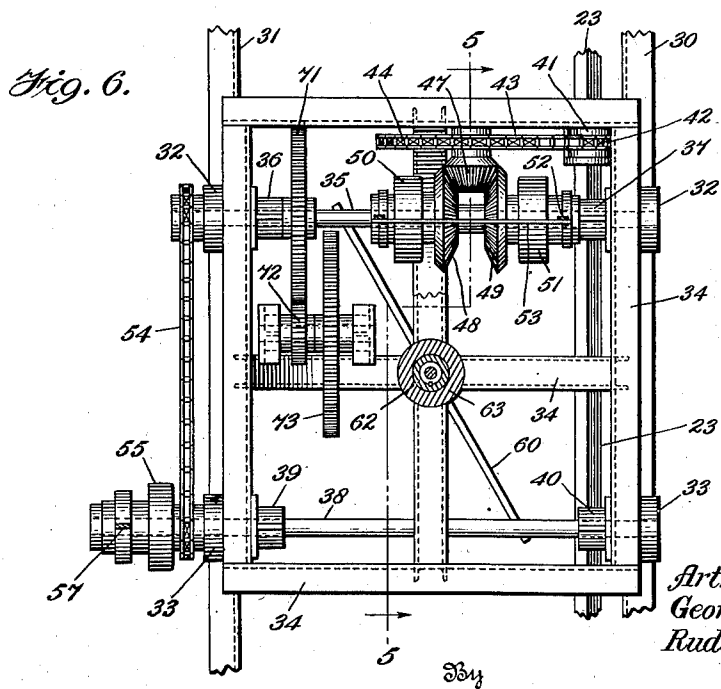
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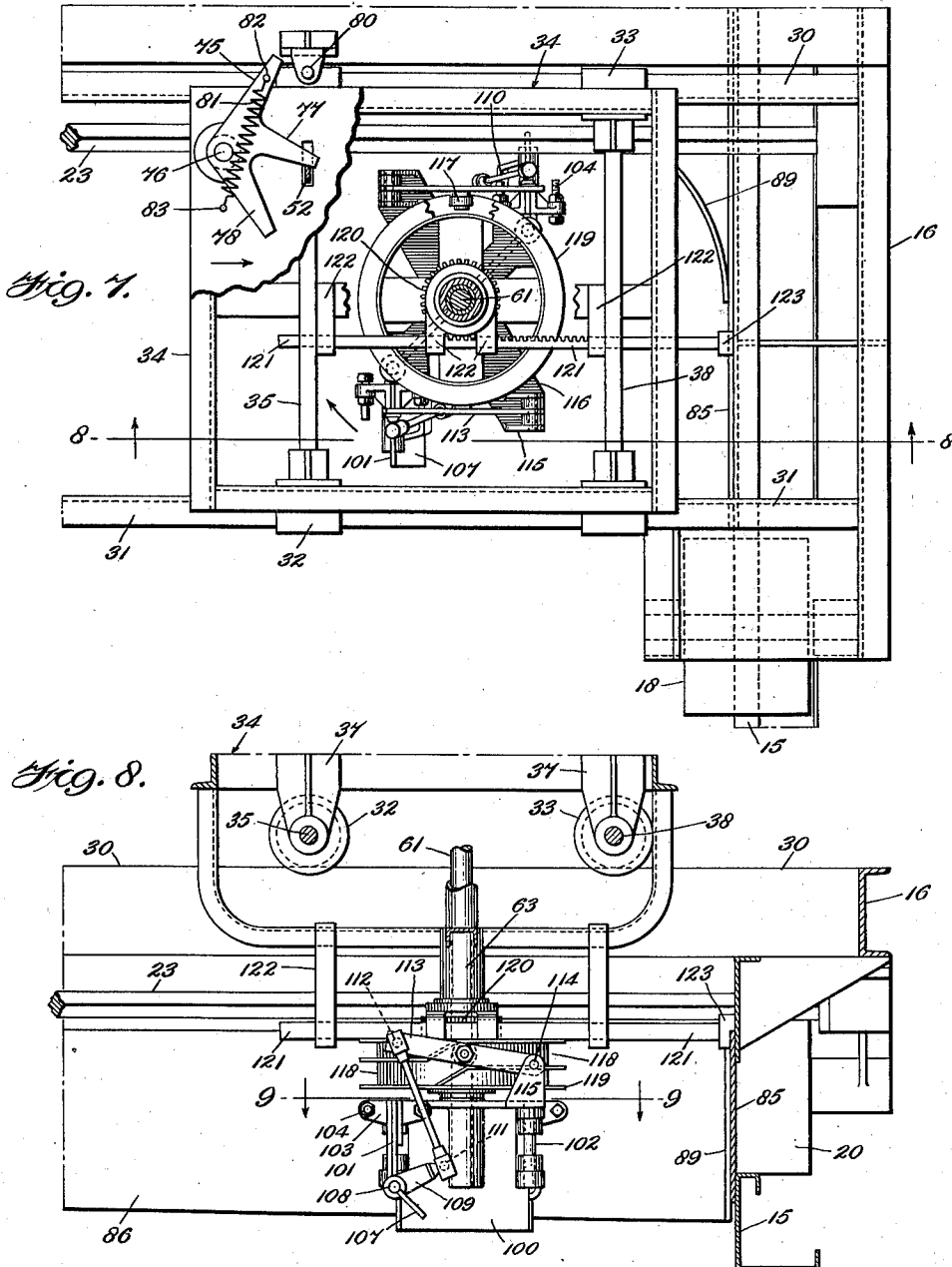
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CONCRETE SPREADING APPARATUS

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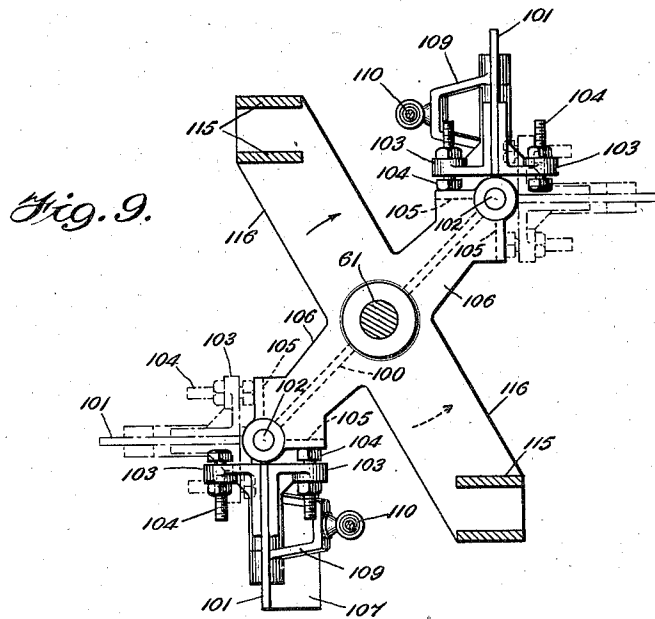
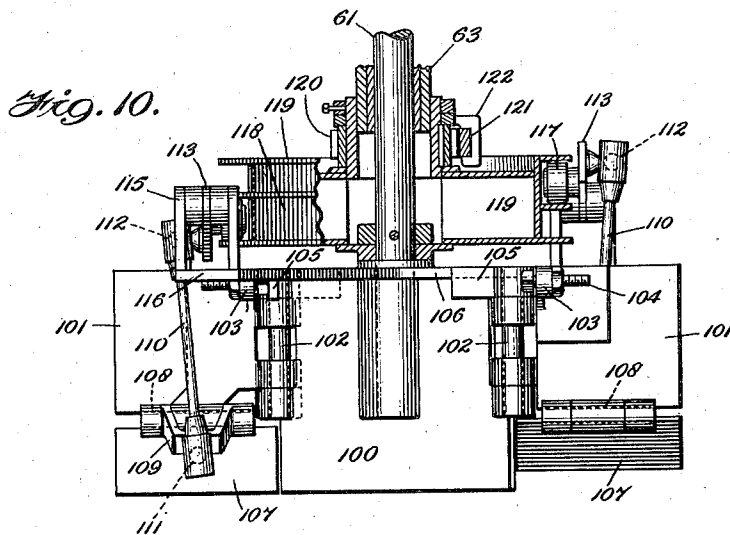
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CONCRETE SPREADING APPARATUS

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5 Sheets-Sheet 5



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UNITED STATES PATENT OFFICE

2,449,710

CONCRETE SPREADING APPARATUS

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Application March 15, 1945, Serial No. 582,862

20 Claims. (Cl. 94-44)

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The invention relates to apparatus for spreading plastic concrete mixtures and the like, and has for its principal object the provision of an improved machine intended primarily for use in the construction of concrete roads and pavements to secure substantially uniform distribution of concrete deposited unevenly or in piles upon a prepared bed or sub-grade.

In the building of concrete roads by present day methods, it is the common practice to prepare a bed or sub-grade of the desired width extending along the right-of-way, and to stake or otherwise secure metal rails or forms along each side of the sub-grade which serve to laterally confine concrete deposited upon the latter and thus define the lateral limits of the resulting slab. The concrete is usually furnished by a paving mixer which advances along the bed between the forms and deposits successive batches of mixed concrete upon the bed by means of a bucket which is reciprocable upon a horizontally swingable boom, whereby the bucket may be positioned to discharge the concrete at substantially any place on the sub-grade.

In most instances a certain amount of distribution of the concrete over the sub-grade is accomplished by traversing the bucket along the boom during discharge, but this only roughly approximates the desired uniformity of the concrete layer, and it is therefore necessary to complete the operation by hand shovels manipulated by workers stationed directly behind the paver. In some cases no attempt is made to traverse the paver bucket during discharge, the concrete being merely deposited upon the sub-grade in spaced piles which are then hand-spread by the workmen.

The machine of the present invention is intended to economically effect proper spreading of concrete deposited upon a road bed in either of the above manners, or in any other manner which does not secure the desired distribution of the mixture, whereby a concrete layer of the desired thickness may be secured, extending completely across the bed from form to form, and having a substantially uniform top surface adapted for further finishing by hand or machine in any appropriate manner.

A preferred form of the apparatus, and a slight modification of one feature thereof, are illustrated in the accompanying drawings forming a part of this specification, in which like reference characters designate like parts throughout the views, and in which:

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Figure 1 is a top plan view of the machine, partly broken away and in section;

Fig. 2 is a front elevational view of the machine shown in Fig. 1, also partly broken away and in section;

Fig. 3 is a side elevational view, as seen from the left of Fig. 2;

Fig. 4 is a partial vertical sectional view, on a somewhat larger scale, on approximately the plane indicated by the line 4-4 of Fig. 2, looking in the direction of the arrows;

Fig. 5 is a partial vertical sectional view at right angles to Fig. 4, and taken approximately on the planes indicated by the line 5-5 of Fig. 6;

Fig. 6 is a partial sectional-plan view, on approximately the plane indicated by the line 6-6 of Fig. 4, looking down;

Fig. 7 is a partial plan view, partly broken away and in section, showing a modified form of spreading mechanism;

Fig. 8 is a sectional view on approximately the plane indicated by the line 8-8 of Fig. 7, looking in the direction of the arrows;

Fig. 9 is a horizontal sectional view, on an enlarged scale, on approximately the plane indicated by the line 9-9 of Fig. 8, looking down; and

Fig. 10 is an enlarged elevational view, partly broken away and in section of the modified spreader mechanism as seen from the left of Fig. 8.

As will be readily understood from the drawings, the machine is designed to travel upon the forms 15, and to this end its frame 16 is provided with wheels 17, 18, 19 and 20 for engagement with such forms. The wheels 17 and 19 at one side of the frame are preferably relatively narrow and flanged at each end, whereby they may guide the machine along the forms, while the wheels 18 and 20 at the other side of the frame are preferably wider and may be unflanged, whereby to accommodate the slight inequalities in the lateral spacing of the forms commonly encountered in this class of work.

The rear wheels 19 and 20 are mounted upon an axle 21 which is driven by a chain and sprocket drive 22 from a transverse shaft 23 journaled on the frame 16, which shaft in turn is driven by a chain and sprocket drive 24 and a conventional reduction gear and clutch mechanism 25 from an internal combustion engine or other suitable motor mounted within a housing 26 on the rear portion of the frame. The drive from the chain and sprocket mechanism 22 to the wheel axle 21 is preferably through a conventional reversing-

gear transmission 27 whereby the machine may be traversed upon the forms in either direction at will, as will be readily understood. The clutch element 28 of the said transmission is controlled by a shifting lever 29, and has a neutral position (shown in Fig. 1) in which the wheel drive is broken and the machine may remain stationary on the forms while other of its instrumentalities to be later described continue to function.

The forward portion of the frame 16 includes a pair of spaced transversely extending beams or frame members 30 and 31 which serve as tracks for the supporting wheels 32 and 33 of a carriage 34, which is thus mounted on the said frame 16 for reciprocating movements from side to side thereof. The wheels 32 are loosely mounted on an axle or shaft 35 journaled in bearing brackets 36 and 37 carried by the frame of the carriage 34, while the wheels 33 are rigidly mounted on an axle 38 journaled in similar brackets 39 and 40; and the carriage is moved back and forth on the track members 30 and 31 by power transmitted from the shaft 23 to the axle 38 and wheels 33 by mechanism best shown in Figs. 4, 5 and 6.

As will be clear from these figures, the carriage 34 is mounted to travel above and longitudinally of the shaft 23, which may be splined, or of square cross section as shown. The carriage frame is provided with a depending stirrup 41, the arms of which embrace a sprocket 42 which is slidably mounted on the shaft 23. Through a chain 43 the said sprocket drives a sprocket wheel 44 carried by a stub shaft 45 journaled in a bearing bracket 46 carried by the carriage frame 34. The said stub shaft also carries a bevel pinion 47 which meshes with a pair of bevel gears 48 and 49 which are loosely mounted on the shaft or axle 35. As will be readily understood from the drawings, the said gears 48 and 49 are disposed one to either side of the pinion 47 so that they will be driven in opposite directions thereby; and while loose upon the shaft 35, they may be alternatively coupled thereto by clutches 50 and 51 which are controlled by a shifting lever 52 and appropriate linkage 53. Power thus transmitted to the shaft 35 is in turn transmitted to the axle 38 and wheels 33 by means of a chain and sprocket drive 54 extending between the shafts 35 and 38, and thus the carriage 34 may be moved upon the tracks 30 and 31 in one direction or the other, depending upon which of the clutches 50 and 51 is engaged. Since the shaft 35 is employed to drive other instrumentalities of the machine, a clutch 55 is preferably provided for controlling the transmission of power from the chain and sprocket mechanism 54 to the axle 38 so that the carriage movements may be interrupted if desired, without stopping the shaft 35 and the other mechanism driven thereby. This clutch 55 may be controlled by a hand lever 56 and suitable linkage 57.

Distribution of concrete deposited on the road bed between the forms 15 is accomplished by spreading mechanism carried by the carriage 34, as a result of reciprocating traverse of the said carriage on the frame members 30 and 31, coupled with either continuous or intermittent advancement of the entire machine along the said forms. As best shown in Figs. 4, 5 and 6, the spreading mechanism comprises a blade or paddle 60 rigidly carried by the lower end of a vertical shaft 61 which is splined within a sleeve 62 journaled in bearings 63 mounted by the framework of carriage 34. The upper end of the sleeve 62 has a worm wheel 64 keyed thereto, with which meshes a worm 65 loosely carried by a horizontal shaft

66 which is journaled in bearings 67 mounted on the top of the carriage. The said worm 65 has a clutch 68 associated with it by means of which the worm may be coupled to the shaft 66 at will, the said clutch being operable by a hand lever 69 and shifting fork 70. The shaft 66 is driven from the shaft 35 by a spur gear train 71, 72, 73, 74.

It will be readily understood from the foregoing that the spreading blade 60 may be continuously or intermittently rotated (depending upon the period of engagement of the clutch 68) by power derived from shaft 35 and transmitted to the blade through the gears 71, 72, 73 and 74, shaft 66, clutch 68, worm 65, worm wheel 64, sleeve 62 and vertical shaft 61. For some purposes continuous rotation of the blade may be desirable, in which event the clutch 68 will be maintained in continuous engagement. In other cases it may be desirable to set and maintain the blade at an appropriate angle, such for example as that shown in the drawings, whereby a forward as well as a lateral component may be imparted to the concrete mass as the carriage travels across the road bed. In this event the clutch 68 will be engaged only long enough to bring the blade to the desired angular position, and then disengaged. The worm 65 and worm wheel 64 are preferably of such pitch that the wheel can not drive the worm and they will therefore serve to lock the blade in any set position against the tendency of the concrete to move the same. When operating in this manner, the angle of the blade should of course be reversed at the end of each carriage traverse, and this can be accomplished by engagement of the clutch 68 as the carriage approaches each side of the main frame, for a time sufficient to rotate the blade to the new position.

Reversal of the direction of carriage travel at the end of each traverse may be accomplished by manual operation of the clutch lever 52, but in order to relieve the operator of this duty, means are preferably provided for effecting automatic reversal of the travel. One form of such means is here shown, comprising a lever 75 pivotally mounted on the carriage as at 76 and having a pair of fork arms 77 and 78 straddling the clutch shifting lever 52. Stops 79 and 80 are mounted upon the main frame 16 of the machine, in the path of travel of the lever 75, said stops being so positioned as to be alternately engaged by the said lever as the carriage approaches the respective sides of the said main frame. The lever will thus be arcuately moved about its pivot 76 and through the engagement of one or the other of its fork arms 77 or 78 with the clutch shifting lever 52, the appropriate clutch 50 or 51 controlled thereby will be disengaged and the other one engaged, as will be readily understood.

The automatic reversing lever 75 is preferably provided with a snap-action and detent spring 81, one end of which is secured to the lever as at 82, while its other end is anchored on the carriage as at 83. As will be clear from Fig. 1, this spring tends to retain the lever in the position shown until the lever engages the stop 80, whereupon the spring yields to permit counterclockwise movement of the lever. When this movement brings the spring anchor 82 to the left of a plane passing through the axes of the lever pivot 76 and the spring anchor 83, the spring's force then tends to move the lever counterclockwise and the shifting of the clutch lever 52 is thus completed with a snap-action. The spring of course then tends to hold the lever in its new position.

Obviously too, for some purposes the blade 60

may be set and held in a desired angular position as above described, and spreading accomplished through longitudinal travel of the machine along the forms, with the clutch 55 disengaged and the carriage 34 stationary on its trackways 30 and 31.

The main frame 16 is provided with depending side plates 85 which extend downwardly just inside of the respective forms 15 to a plane somewhat below the tops of the said forms, which plates serve to prevent the blade 60 from pushing the concrete over and beyond the forms. The said main frame is also provided with a strike-off plate 86 extending transversely between the side plates 85 to the rear of the blade 60. As best seen in Figs. 4 and 5, this strike-off plate may be conveniently positioned below and supported from the transverse frame member 30 and it is preferably vertically adjustable relative to the frame 16, as by bolt and slot connections 87, 88. The ends of the strike-off plate are preferably provided with curved portions or members 89 which substantially conform to the path of travel of the ends of the blade 60 as it is rotated at the end of each carriage traverse, which portions or members prevent the concrete from banking up in the corners at the junctures of the strike-off plate with the side plates 85.

Most concrete roads are now constructed with metallic reinforcing mesh incorporated in the slabs and the usual mode of laying such roads is to deposit upon the road bed a layer or course of concrete of less thickness than that of the finished slab, lay the mesh upon such course, and then deposit additional concrete over the mesh to bring the slab up to the desired thickness. The present machine is designed for use in carrying out such mode of construction, and to this end the blade 60 as well as the strike-off plate 86 are vertically adjustable. As was mentioned above, the spindle 61 of the blade is splined in the sleeve 62 so that it may slide therein, and the upper end of said spindle is bored and threaded as at 90 (see Fig. 4) for the reception of a screw 91 carried by a hand wheel 92 disposed above the worm wheel 64, preferably with a suitable thrust bearing 93 interposed between the two. Thus, by manipulating the hand wheel 92 in the proper direction the spindle 61 and blade 60 may be raised and lowered as desired.

The parts are illustrated in position for spreading an initial course of concrete of approximately one half the depth of the forms 15. After this has been done, the machine is returned to its starting point, and while the reinforcing mesh is being laid upon such course and additional concrete is being deposited upon the mesh, the strike-off plate 86 is raised and the hand wheel 92 manipulated to raise the blade 60 until its lower edge 60 is in approximately the plane of the top of the forms 15, whereupon a second run of the machine along the forms will spread and strike-off the concrete of the second course.

To prevent the carriage 34 from being displaced from the track members 30 and 31, the bearing brackets 36 which journal the forward ends of the axles 35 and 38 may be extended downwardly as indicated at 94 and provided with rollers 95 engageable with the under face of the track member 31, see Figs. 2 and 4.

In Figs. 7-10 there is illustrated a modified form of distributing or spreading blade which may be employed in lieu of the flat blade 60 shown in Figs. 1-6. This modified blade structure comprises a body member 100 to each end of which a wing 101 is pivotally connected by a hinge pin 102 for

swinging movements about a vertical axis. Each wing is provided with a pair of oppositely disposed arms 103, each of which carries an adjustable stop screw 104 the head of which is adapted to engage pads 105 carried by flanges 106 extending from the top of the body member 100. The swinging movements of the wings are thus limited to approximately 90°, as will be clear from Fig. 9, the parts occupying the full line positions of said figure when the blade is moving in a clockwise direction, and assuming the broken line positions when the blade is moved in a counterclockwise direction.

The wings 101 may be of the full depth of the body member 100, or as here shown they may be shorter than the said body member, with their lower portions provided with featherable flap members 107 which are hinged to the wing elements by pins 108 for swinging movements about horizontal axes. Means are provided whereby each of the flaps 107 is held in vertical alinement with its wing member 101 during that portion of the rotational travel of the blade structure in which such wing is biting into a pile of concrete, and then as the wing leaves the pile its flap is feathered upwardly, thereby tending to prevent adherence of the concrete to the flap.

The feathering means comprise an arm 109 extending from each flap, to which the lower end of a drag link 110 is connected as by a ball and socket joint 111. The upper end of said link is connected by a ball and socket joint 112 to a lever 113 which is pivotally mounted at 114 in ears 115 carried on arm 116 rigid with the blade member 100. The levers 113 carry rollers 117 which are disposed in the groove 118 of a cam 119 which is journaled on the lower end of the lower bearing 63 of the carriage 34. The cam 119 has a gear 120 secured to it, and a rack 121 mounted in suitable guides 122 meshes with the gear. The said cam remains stationary during the major portion of each traverse of the carriage so that if the blade structure be rotated by the shaft 61 the flaps 107 will be alternately feathered upwardly and returned to vertical alinement with the wings 101 as the rollers 117 of their levers 113 successively traverse the high and low portions of the cam groove 118. These portions are each substantially 180° in length and since the rollers 117 are located in the groove 118 at substantially diametrically opposite points, the one flap will be raised when the other is lowered and vice versa.

As the carriage 34 approaches each end of its travel on the rails 30 and 31, an end of the rack 121 will engage a stop 123 on the frame 16 whereby travel of the rack will be arrested while carriage travel continues for a short distance. This relative movement between the carriage and rack will cause the gear 120 to roll upon the rack, thereby rotating the cam 119 on its journal through an angle of 180°, thus reversing the positions of the high and low portions of the cam groove. Thus the proper timing of the raising and lowering of the flaps 107 will be preserved when the carriage motion is reversed.

In some cases the wings 101 may be omitted and the flaps 107 mounted directly on the body member 100, which then of course would be somewhat longer than shown in Figs. 7-10.

What is claimed is:

1. In apparatus for spreading concrete deposited upon a road bed, a main frame traversable longitudinally along the road bed; a carriage mounted on said frame for movements transversely of the bed; means for reciprocating said

carriage upon the frame; a spreading blade mounted by the carriage for movements about a vertical axis; means operable to rotate the blade about said axis during said transverse movements of the carriage; and means for controlling said rotating means whereby at the volition of the operator the blade may be either rotated or maintained in any determined angular relation to the carriage during the transverse movements of the latter.

2. In apparatus for spreading concrete deposited upon a road bed, a main frame traversable longitudinally along the road bed; a carriage mounted on said frame for movements transversely of the bed; means for reciprocating said carriage upon the frame; a spreading blade mounted by the carriage for movements about a vertical axis; means operable from said carriage reciprocating means to rotate the blade about said axis during said transverse movements of the carriage; means for controlling said blade rotating means whereby during said carriage movements the blade may be either rotated or maintained in any determined angular relation to the carriage, as desired; and means for controlling a portion of said carriage reciprocating means whereby movements of the carriage may be interrupted at will without affecting rotational movement of the blade.

3. In apparatus for spreading concrete deposited upon a road bed, a main frame traversable longitudinally of the road bed; a carriage mounted on said frame for movements transversely of the bed; reversible means for reciprocating said carriage upon the frame; a spreading blade mounted by the carriage for rotation about a vertical axis; means operable from said carriage reciprocating means to rotate said blade relative to the carriage during said transverse movements of the latter; and means for automatically reversing said carriage reciprocating means as the carriage approaches each side of the main frame, to reverse the direction of carriage travel and the direction of rotation of said blade.

4. In apparatus for spreading concrete deposited upon a road bed, a main frame traversable longitudinally along the road bed; a carriage mounted on said frame for movements transversely of the bed; reversible means for reciprocating said carriage upon the frame; a spreading blade mounted by the carriage for rotation about a vertical axis; means operable from said carriage reciprocating means to rotate the blade relative to the carriage during said transverse movements of the latter; means for automatically reversing said carriage reciprocating means as the carriage approaches each side of the main frame, to reverse the direction of carriage travel and the direction of rotation of the blade; and means for controlling said blade rotating means whereby at the volition of the operator the blade may be either rotated or maintained in any determined angular relation to the carriage during said movements of the latter.

5. In apparatus for spreading concrete deposited upon a road bed, a main frame traversable longitudinally along the road bed; a carriage mounted on said frame for movements transversely of the bed; reversible means for reciprocating said carriage upon the frame; a spreading blade mounted by the carriage for rotation about a vertical axis; means operable from said carriage reciprocating means to rotate the blade about said axis during said reciprocating movements of the carriage; means for automatically

reversing said carriage reciprocating means as the carriage approaches each side of the main frame, to reverse the direction of carriage travel and the direction of rotation of the blade; means for controlling said blade rotating means whereby during said carriage movements the blade may be either rotated or maintained in any determined angular relation to the carriage, as desired; and means for controlling a portion of said carriage reciprocating means whereby movements of the carriage may be interrupted at will without affecting rotation of the blade.

6. In apparatus for spreading concrete deposited upon a road bed, a main frame traversable longitudinally of the road bed; a carriage mounted on said frame for movements transversely thereof; reversible means for so moving said carriage; a spreading blade mounted by the carriage for movements about a vertical axis; means for so moving said blade; and means for causing rotational movement of the blade or maintenance thereof in any determined angular relation to the carriage during movements of the latter, at the volition of the operator, comprising means for connecting and disconnecting the blade rotating means and the carriage moving means.

7. In apparatus for spreading concrete deposited upon a road bed: a main frame traversable longitudinally along the road bed, said frame having a trackway extending transversely of the roadway; a carriage having wheels mounted upon said trackway; reversible means for driving said wheels whereby to reciprocate the carriage upon the trackway; a spreading blade mounted by the carriage for rotation about a vertical axis; means for rotating said blade; and means operable at will for controlling said rotating means.

8. In apparatus for spreading concrete deposited upon a road bed: a main frame traversable longitudinally along the road bed, said frame having a transverse trackway; a wheeled carriage mounted on said trackway for movements from side to side of the road bed; reversible means for driving the carriage wheels to so move the carriage; a spreading blade mounted by the carriage for rotation about a vertical axis; and means operable at will for rotating said blade from said carriage driving means.

9. In apparatus for spreading concrete deposited upon a road bed, a main frame traversable longitudinally of the road bed, said frame having a transverse trackway; a carriage having two sets of supporting wheels mounting it for movement on said trackway, said carriage also having a shaft loosely mounting one set of said wheels; reversible means for driving said shaft; controllable means for driving the other set of wheels from said shaft at will; a spreading blade mounted by said carriage for movement about a vertical axis; means operable by said reversible shaft for moving said blade during motion of the carriage; and means for controlling said blade moving means whereby the blade may be maintained in any determined relation to the carriage if desired.

10. In apparatus for spreading concrete deposited upon a road bed: a main frame traversable longitudinally along the road bed; a carriage mounted on said main frame for movements transversely of the road bed; a power driven shaft extending transversely of the main frame; means for traversing the carriage on the frame, comprising drive mechanism mounted by the carriage and having a slidable driving connection with said shaft; a rotatable spreading

blade mounted by the carriage; and connections controllable at will for driving said blade from said drive mechanism.

11. In apparatus for spreading concrete deposited upon a road bed: a main frame traversable longitudinally along the road bed; a carriage mounted on said main frame for movements transversely of the road bed; a power driven shaft extending transversely of the main frame; means for reciprocating said carriage on the frame, comprising reversible drive mechanism mounted by the carriage and having a slidable driving connection with said shaft; co-operating means mounted by the carriage and main frame respectively, for automatically reversing said drive mechanism as the carriage approaches the side of the road bed; a rotatable spreading blade mounted by the carriage; means including a worm and worm wheel for rotating said blade; and a clutch controlling transmission of power from the reversible drive mechanism to said worm.

12. In spreading mechanism for concrete having a rotatable shaft, a spreading blade comprising a body member mounted upon said shaft to extend transversely therefrom; and a wing element pivotally connected to an outer extremity of said body member for swinging movements relative to the latter about an axis substantially parallel to the axis of rotation of the shaft.

13. In spreading mechanism for concrete having a rotatable vertical shaft, a spreading blade comprising a body member mounted upon said shaft to extend laterally therefrom in different directions; a wing element pivotally connected to each outer extremity of said body member for swinging movements about an axis substantially parallel to the axis of rotation of the shaft; and means for limiting said swinging movements of the wings.

14. In spreading mechanism for concrete having a rotatable vertical shaft, a spreading blade comprising a body member mounted upon said shaft to extend laterally therefrom: a wing element pivotally carried by an outer extremity of said body member for swinging movements relative to the latter about a substantially vertical axis; a flap member pivotally carried by the lower portion of said wing member for swinging movements about a substantially horizontal axis; and means for controlling said movements of the flap member.

15. In spreading mechanism for concrete having a rotatable shaft, a spreading blade comprising a body member mounted upon said shaft to extend transversely therefrom, said body member being provided with a flap member mounted for swinging movements about an axis at substantially right angles to the axis of rotation of the shaft.

16. In spreading mechanism for concrete having a vertical rotatable shaft, a spreading blade comprising a body member mounted upon said shaft to extend laterally therefrom, said body member being provided with a flap member pivotally mounted for swinging movements about a substantially horizontal axis; and means for controlling such swinging movements of the flap member.

17. In spreading mechanism for concrete having a vertical rotatable shaft, a spreading blade

comprising a body member mounted upon said shaft to extend laterally therefrom, said body member being provided with a depending flap member pivotally mounted for swinging movements about a substantially horizontal axis; and means for moving said flap member alternately to and from a substantially vertical position.

18. In spreading mechanism for concrete having a vertical rotatable shaft, a spreading blade comprising a body member mounted upon said shaft to extend laterally therefrom, said body member being provided with a depending flap member pivotally mounted for swinging movements about a substantially horizontal axis; and means for swinging said flap member to and from a substantially vertical position in timed relation to the rotation of the blade structure.

19. In spreading mechanism for concrete having a vertical rotatable shaft, a spreading blade comprising a body member mounted upon said shaft to extend laterally therefrom, said body member being provided with a depending flap member pivotally mounted for swinging movements about a substantially horizontal axis; means including a cam for swinging said flap member to and from a substantially vertical position in timed relation to the rotation of the blade structure; and means for shifting said cam to vary the timing of the movements of the flap member.

20. In apparatus for spreading concrete deposited upon a road bed, having a carriage mounted for movements back and forth across the road bed: a spreading blade carried by the carriage, comprising a body member mounted for rotation about a substantially vertical axis and provided with a depending flap member pivotally mounted for swinging movements about a substantially horizontal axis; means for driving said carriage and rotating said blade; means for automatically reversing said drive means as the carriage approaches each side of the road bed, whereby to reverse the direction of carriage travel and the direction of rotation of the blade; means including a cam for swinging said flap member to and from a substantially vertical position in timed relation to the rotation of the blade; and means for automatically shifting said cam as the carriage motion and blade rotation are reversed to change the timing of the swinging movements of the flap member.

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