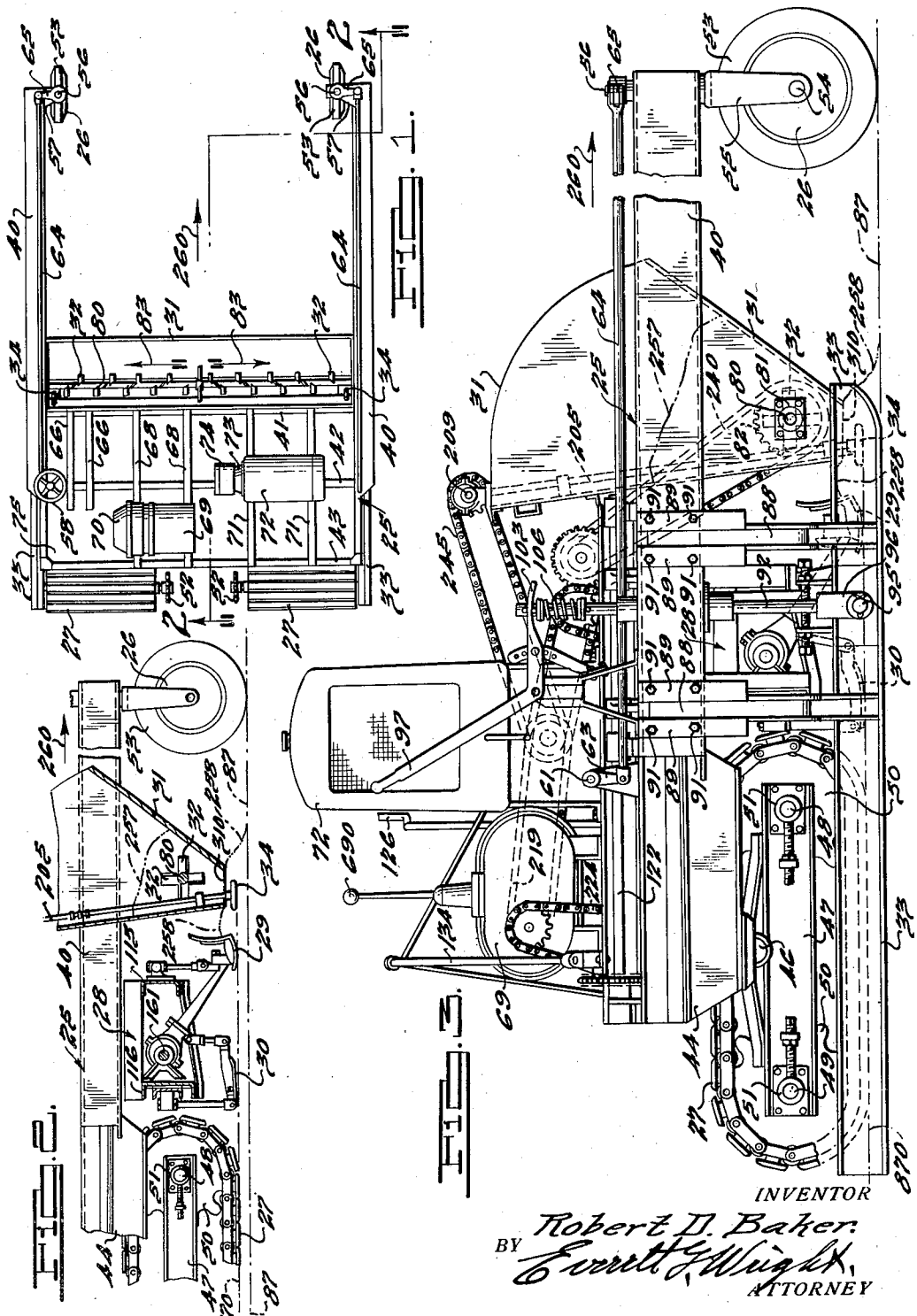
June 10, 1941. R. D. BAKER 2,245,426

PAVING MACHINE

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PAVING MACHINE

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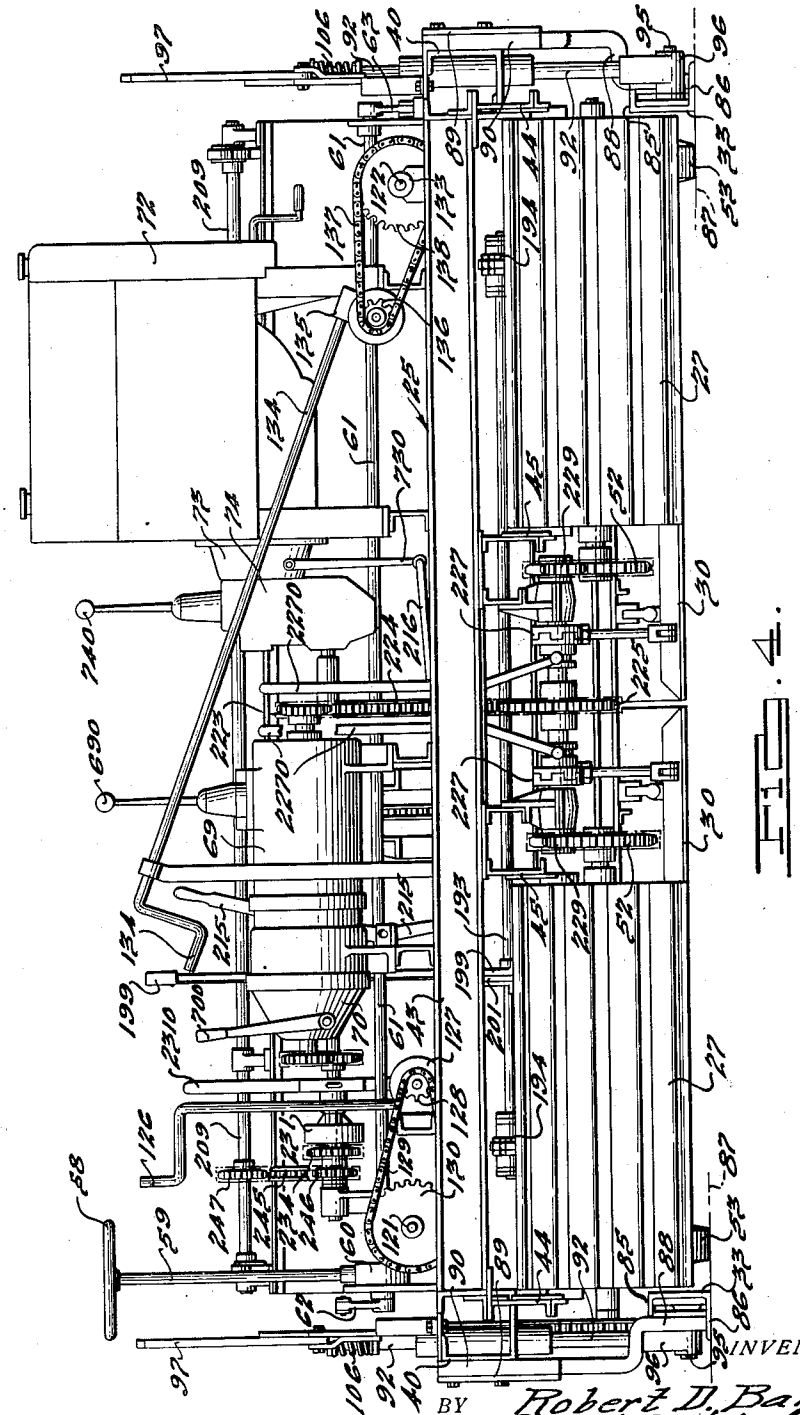


Fig. 4.

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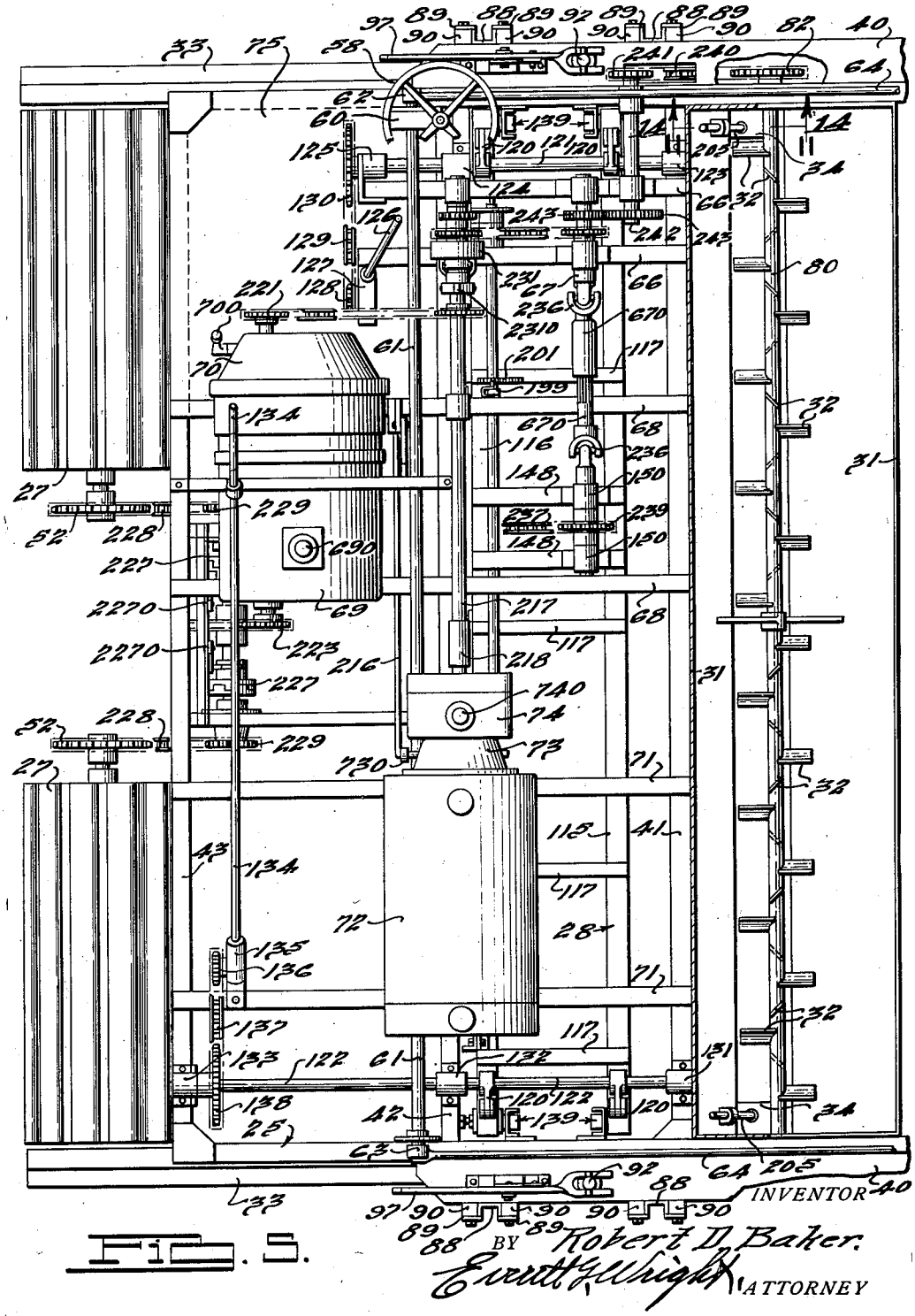


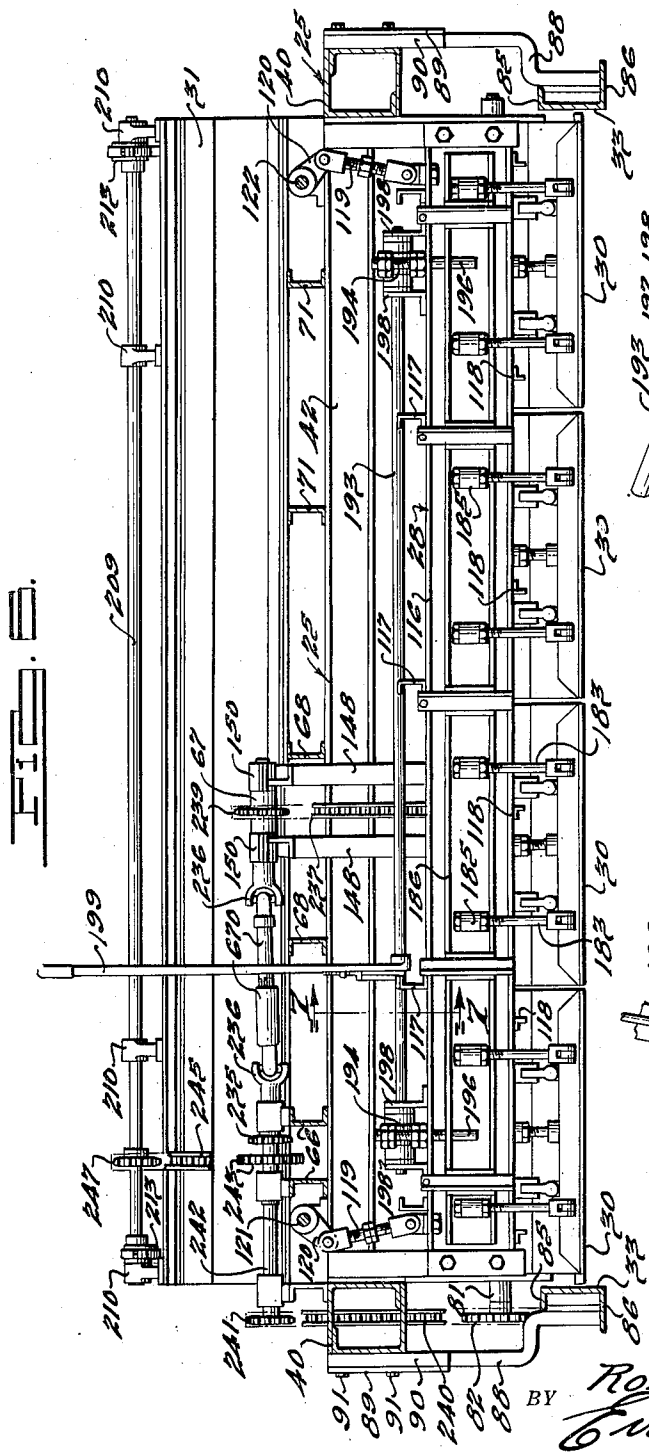
FIG. 5.

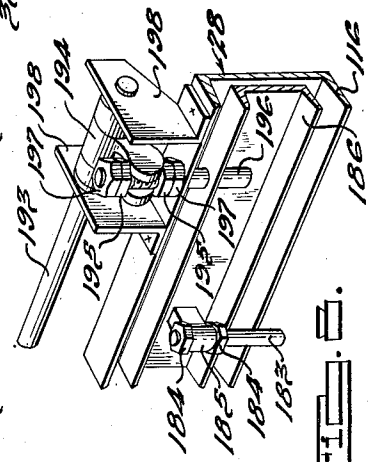
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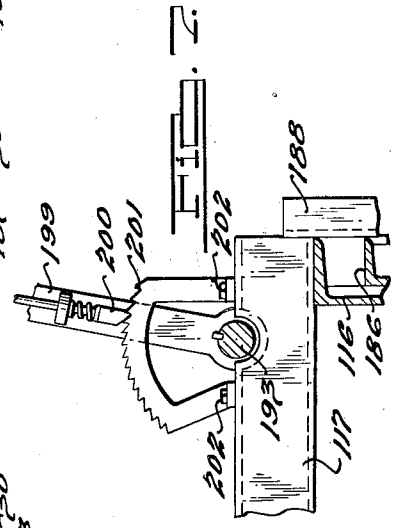
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PAVING MACHINE

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PAVING MACHINE

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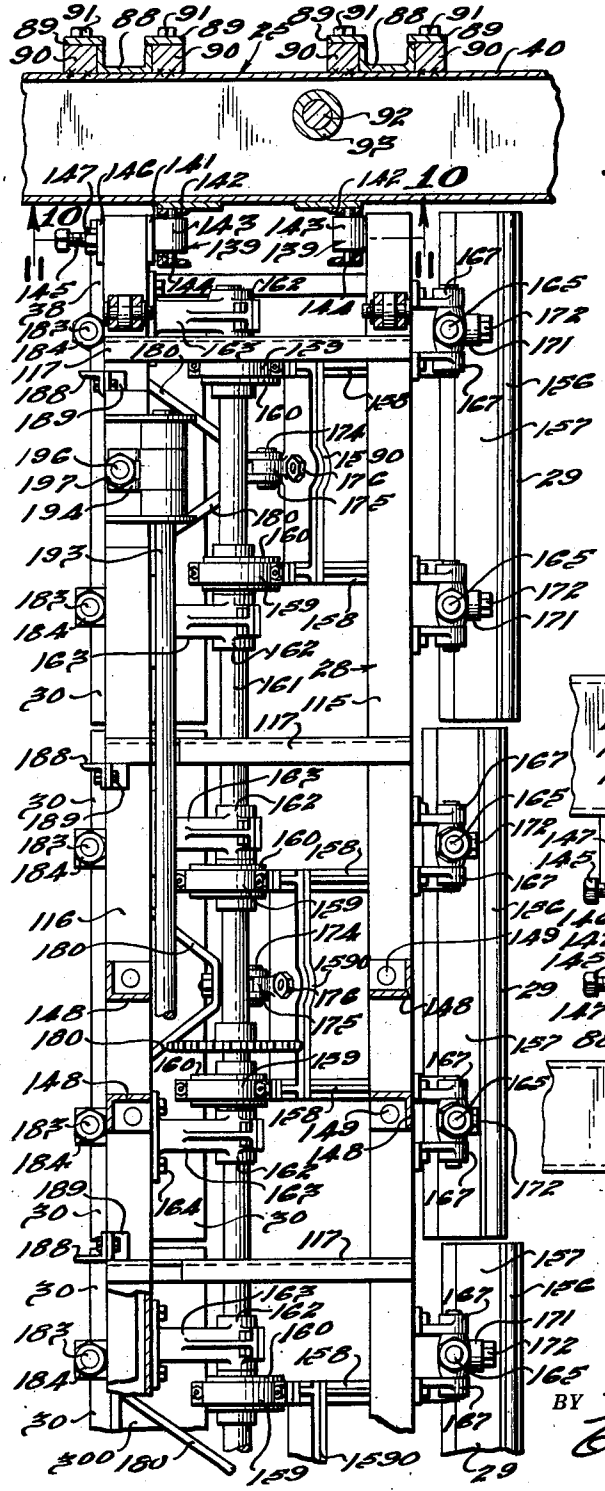


FIG. 9.

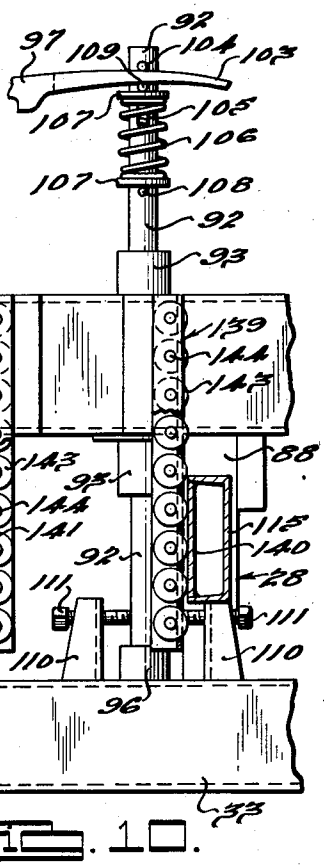


FIG. 10.

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PAVING MACHINE

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FIG. 12.

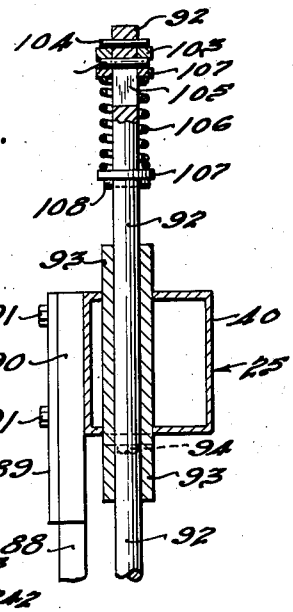
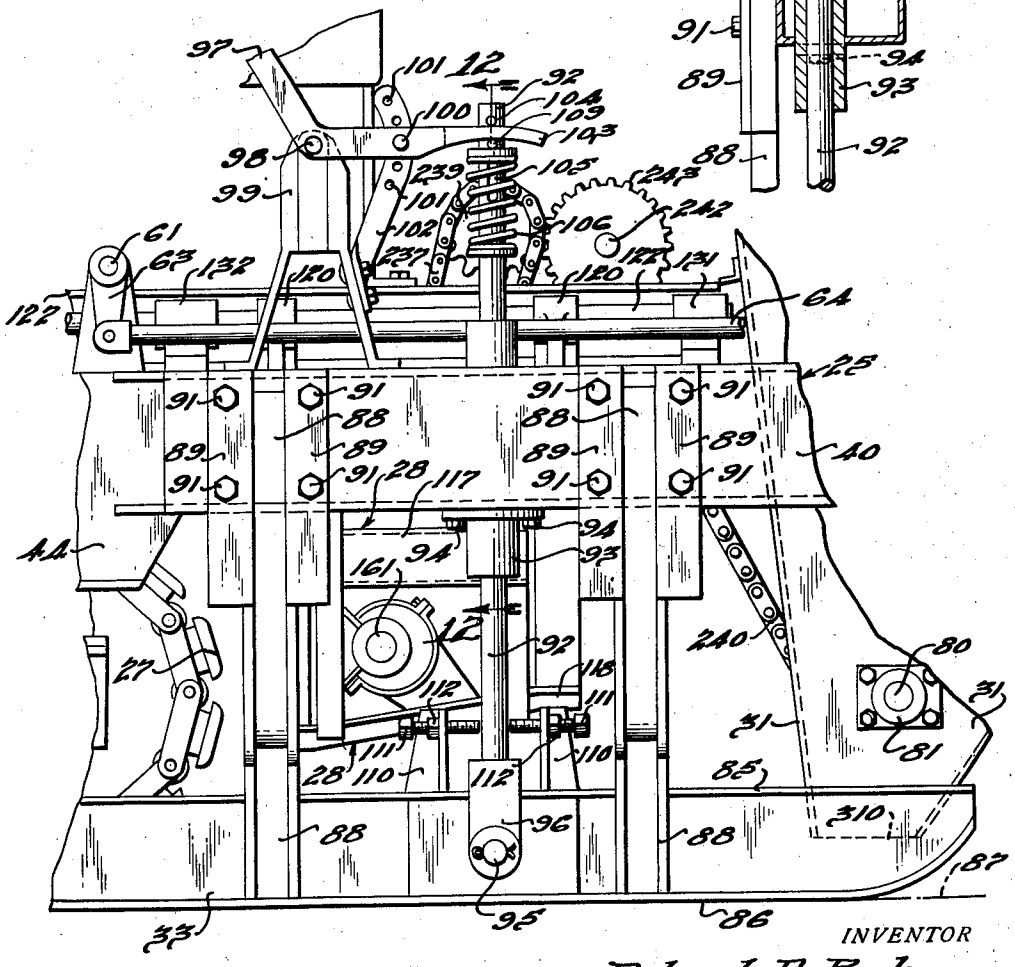


FIG. 11.



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Fig. 14.

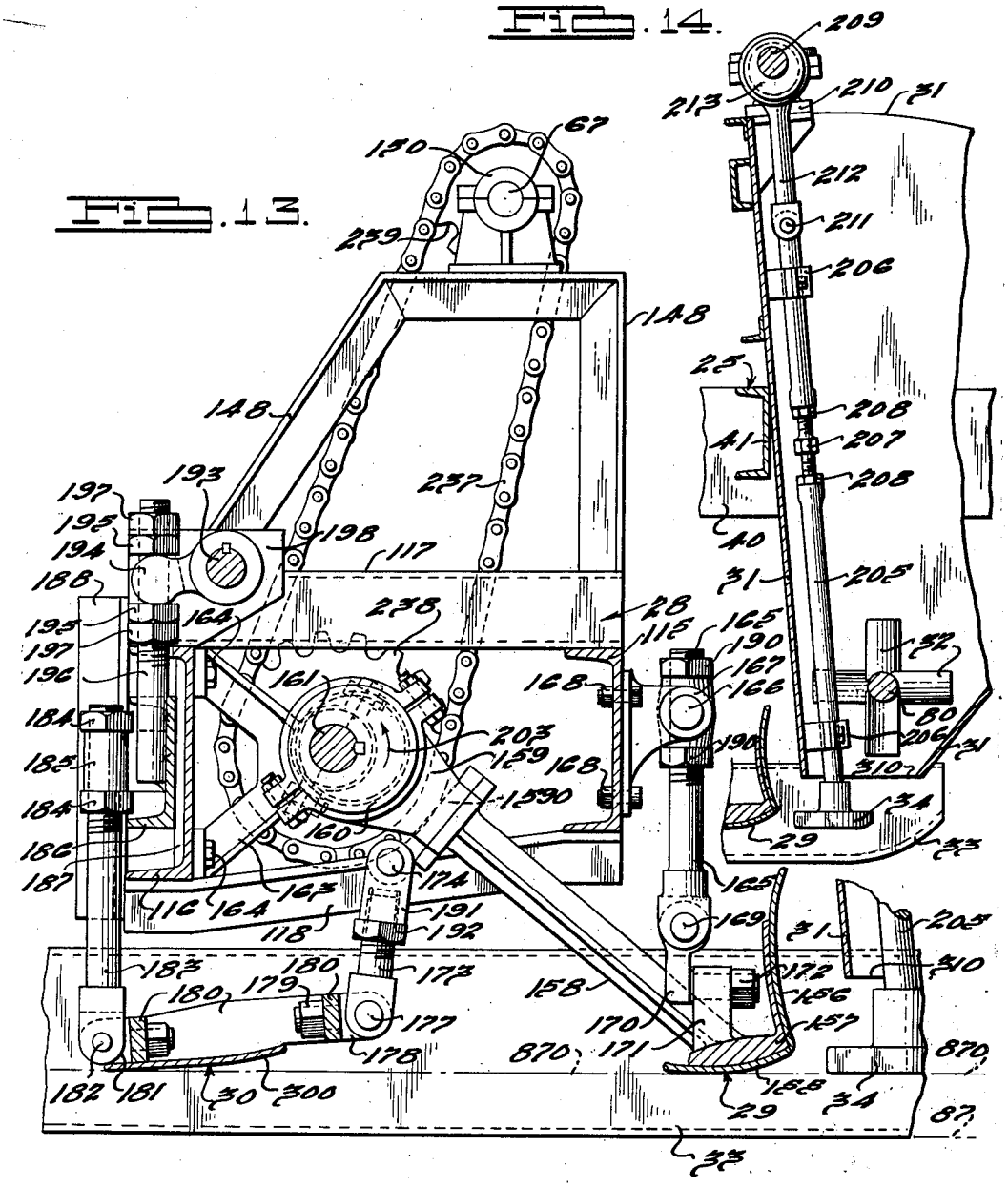


Fig. 13.

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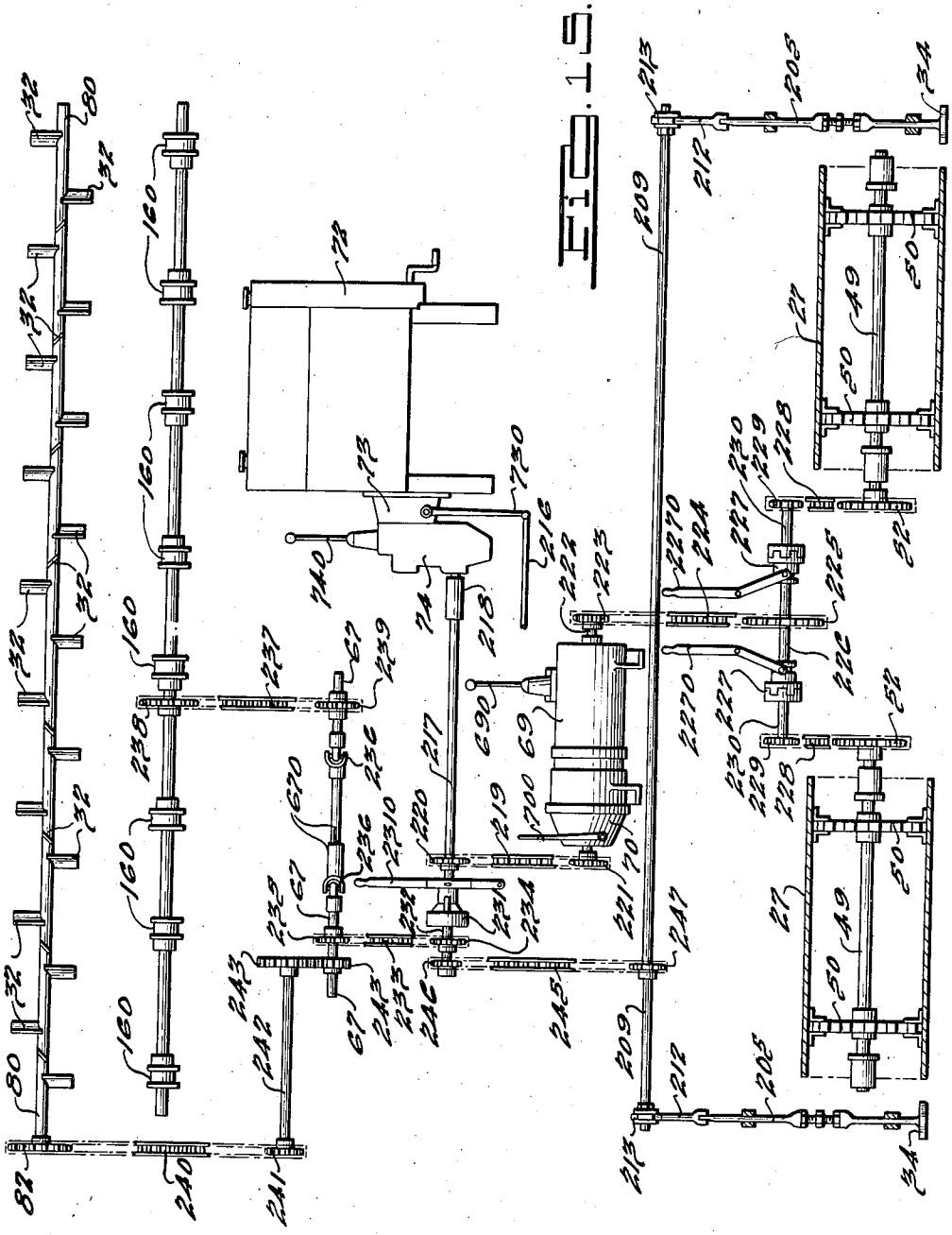
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Fig. 15.



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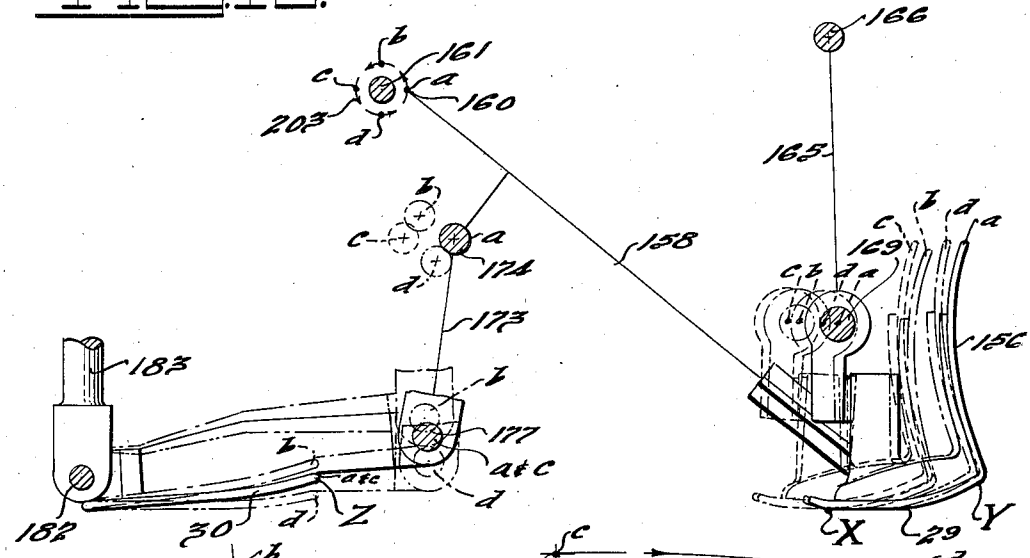
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PAVING MACHINE

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FIG. 15.



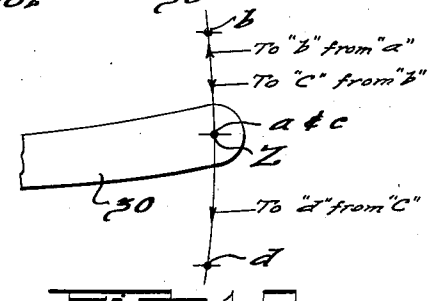


FIG. 16.

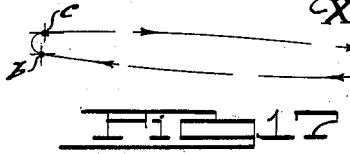


FIG. 17

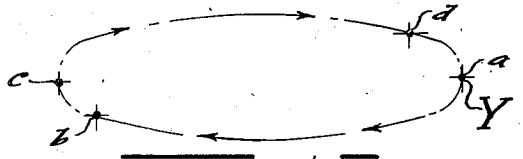


FIG. 18.

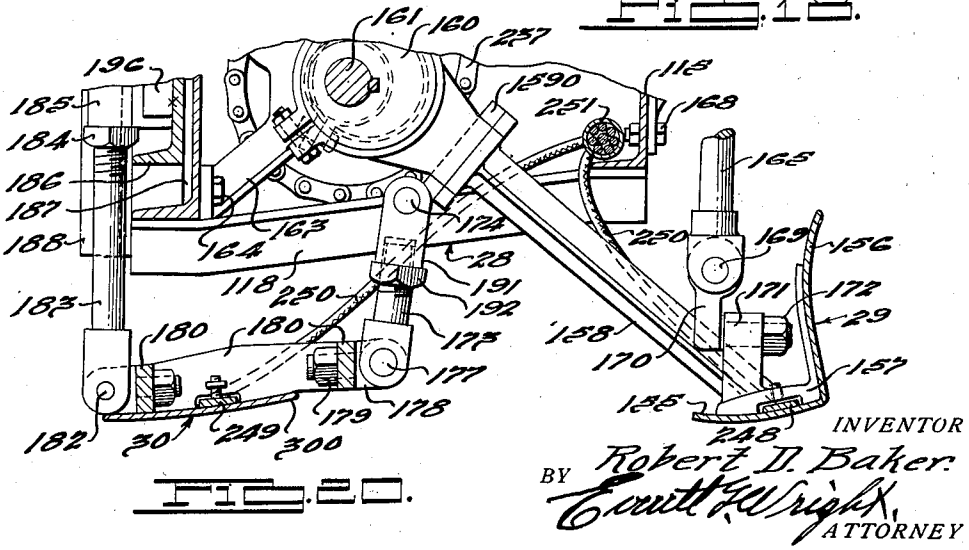


FIG. 20.

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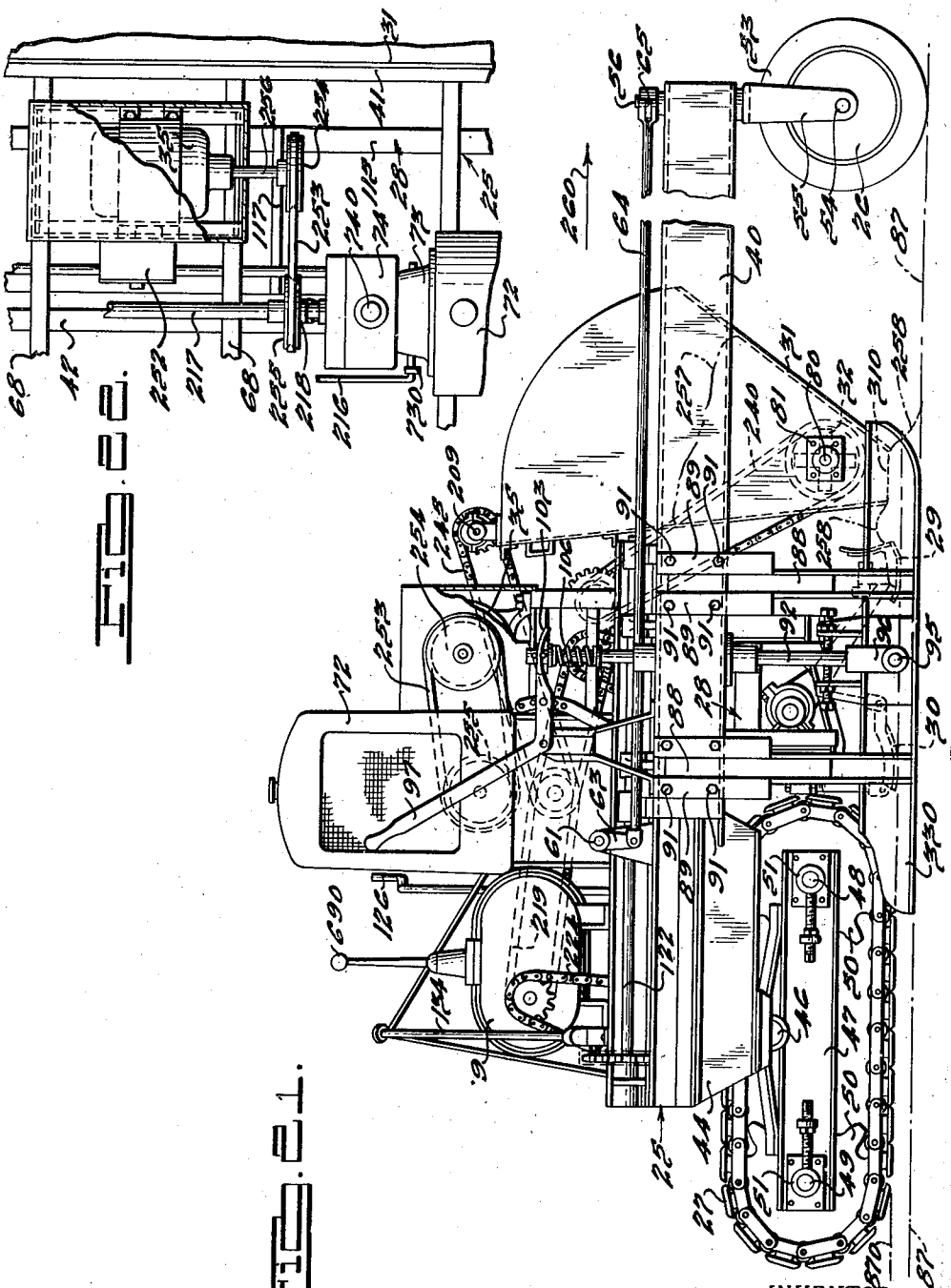


Fig. 2.

Fig. 1.

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Patented June 10, 1941 2,245,426

UNITED STATES PATENT OFFICE

2,245,426

PAVING MACHINE

Robert D. Baker, Birmingham, Mich.

Application December 19, 1938, Serial No. 246,589

14 Claims. (Cl. 94—46)

This invention relates to paving machines and in particular to pavers adapted to lay concrete or asphalt pavements.

One object of the invention is to provide a paver adapted to spread, compact and tamp concrete or asphalt mixes to their maximum degree of density whereby to provide a concrete or asphalt pavement having substantially no voids therein.

Another object of the invention is to provide a paver adapted to spread low slump concrete mixes and compact the mixes after spreading to a sufficient degree of density to assure maximum strength of the finished roadway.

Another object of the invention is to provide a paver adapted to lay concrete or asphalt mixes to a desired line and grade without the use of pre-laid road forms or other trackage.

Another object of the invention is to provide a paver adapted to spread low slump concrete mixes and compact the same to a density which will enable the traction members of the machine to run on the finished concrete surface immediately after compaction without any material displacement thereof.

Another object of the invention is to provide a paver adapted to spread concrete or asphalt mixes between forms carried by the said paver, compact the mix to a desired grade and then tamp the said compacted mix to its maximum possible density whereby to admit of the traction members of the said paving machine traveling over the completed pavement prior to the setting of the concrete or hardening of the asphalt without damage thereto or material displacement thereof.

Another object of the invention is to provide a paving machine adapted to spread concrete or asphalt mixes to a depth considerably deeper than the finished pavement to be laid thereby, and then compact the concrete or asphalt mix by means of compaction members having a combined generally elliptical and rocking movement in a path parallel to the direction of travel of the said paving machine which both compacts and smooths the material fed thereunder by the spreading mechanism to the desired depth and to a maximum density.

Another object of the invention is to provide a paving machine adapted to spread concrete or asphalt mixes to a depth considerably deeper than the finished pavement to be laid thereby, and then compact sufficient of the said spread concrete or asphalt mix to assure a pavement of maximum density by means of compaction members having a combined generally elliptical and rocking movement which advances surplus material thereahead.

Another object of the invention is to provide a paver adapted to spread concrete or asphalt mixes to a thickness greater than the depth of the finished pavement being laid thereby, compact the said mix after spreading with a rapid combined compressing and smoothing action into a pavement of the desired thickness, and then tamp the said compacted pavement by a rapid treadle action, all progressively as the paver moves forward over the surface to be paved thereby.

Other objects of the invention will become apparent by reference to the following detailed description taken in connection with the accompanying drawings, in which:

Fig. 1 is a more or less diagrammatic plan view of a paving machine embodying the invention.

Fig. 2 is an enlarged fragmentary more or less diagrammatic sectional view taken on the line 2—2 of Fig. 1.

Fig. 3 is an enlarged side elevational view of the novel paver.

Fig. 4 is a rear elevational view of the machine.

Fig. 5 is a fragmentary plan view of the machine with the compactor-tamper mechanism omitted.

Fig. 6 is a cross sectional view of the machine showing the compactor-tamper assembly in rear elevation.

Fig. 7 is a detailed sectional view taken on the line 7—7 of Fig. 6 showing the tamper quick-lift operating lever ratchet.

Fig. 8 is a detailed view in perspective showing the quick-lift suspension of the tamper members.

Fig. 9 is an enlarged partial plan view of the compactor-tamper assembly.

Fig. 10 is a vertical sectional view taken on the line 10—10 of Fig. 9.

Fig. 11 is an enlarged fragmentary side elevational view of the machine showing the side forms carried thereby and the means preferably employed for resiliently holding the same to the desired adjusted position.

Fig. 12 is a vertical sectional view taken on the line 12—12 of Fig. 11.

Fig. 13 is a detailed vertical sectional view showing the compactor-tamper mechanism employed.

Fig. 14 is a detailed vertical sectional view

taken on the line 14—14 of Fig. 5 showing the special tamper preferably employed adjacent the side forms to assure maximum density along the edge of any strip of pavement laid by the machine.

Fig. 15 is a diagrammatic view of the means employed to drive the various elements of the machine.

Fig. 16 is a diagrammatic view showing the preferred movement of the compaction and tamper members.

Fig. 17 is a diagrammatic view showing the path of travel of the base of the heel of a compaction member.

Fig. 18 is a diagrammatic view showing the path of travel of the toe of a compaction member.

Fig. 19 is a diagrammatic view showing the path of travel of the toe of a tamper member.

Fig. 20 is a fragmentary sectional view showing how the compaction and tamper members may be heated when the paving machine is used the spread, compact and tamp asphalt mixes.

Fig. 21 is a side elevational view of the novel paver equipped for use in laying asphalt mixes.

Fig. 22 is a fragmentary plan view showing the generator mounting and drive preferably employed to heat the compaction and tamper members when the paver is used to lay asphalt mixes.

The embodiment of the machine disclosed in Figs. 1 to 19 inclusive adapted for use in laying concrete pavement and the modification thereof shown in Figs. 20 to 22 inclusive for use in laying asphalt mixes each carry their own forms, however, although not shown and described in detail, it is contemplated that the novel compactor-tamper mechanism disclosed and claimed herein may be used in a like and similar manner in machines for laying either concrete or asphalt pavement which are constructed to run on the usual pre-set forms as heretofore common practice.

In the following detailed description of the illustrative embodiments of the invention shown in the drawings, like reference numerals and letters refer to like and corresponding parts throughout the several views.

General Description

A brief general description will be given first followed by a more detailed description of the construction and operation of the machines. The novel paver disclosed in Figs. 1 to 19 inclusive comprises a main frame 25 preferably supported for mobility on front wheels 26 and rear caterpillar type endless treads 27. The said main frame 25 has a sub-frame 28 adjustably suspended therefrom which carries compaction members 29 and tampers 30 disposed rearwardly with respect to a hopper 31 supported on the main frame 25 from which concrete or asphalt mixes are fed by gravity after agitation and lateral distribution by suitable conveying type agitator blades 32. The said compaction members 29 are preferably mounted and powered to compact and smooth mixes spread thereahead by a rapid combined elliptical and rocking movement which has been found to produce an extremely dense finished pavement having substantially no voids therein. The said compaction members 29 are so formed as to advance surplus material fed thereto thereahead during their combined elliptical and rocking movement, only accepting for compacting sufficient material to assure maximum density of the pavement being laid thereby. The said tampers 30 follow the compaction members 29 and provide a finished tamp by a rapid treadle action.

Side forms 33 are preparably carried by the machine along both sides thereof and are resiliently mounted on the main frame 25 in such a manner as to float on the fine-graded terrain or semifinished surface upon which a concrete or asphalt pavement is laid by the machine. A special tamper 34 is provided at each side of the hopper 31 disposed adjacent the side forms 33 and located just ahead of the compaction members 29. The said special tampers 34 compact the edges of strips of pavement during the laying thereof by the machine.

The sub-frame 28 is suspended from the main frame 25 on suitable means for raising, lowering and tilting the same with respect to the main frame 25. The heels of the tampers 30 are mounted on quick-lift means particularly to admit of being lifted at the beginning of the laying of a strip of pavement and being lowered when the rear caterpillar traction members 27 rise to the finished grade as the machine advances onto freshly laid pavement, however, the quick-lift means may be employed at other times during the operation of the machine to raise and lower the heels of the tampers 30 as may be required or found desirable.

The novel paver disclosed in Figs. 20 to 22 inclusive is similar in every respect to the paver disclosed in Figs. 1 to 19 inclusive with the exception that the side forms 330 thereof are shortened and heating elements have been provided on the compaction members 29 and the tampers 30. A generator 35 has been added to supply electric current to the compaction member and tamper heating elements. The special tampers 34 have also been omitted.

The paver disclosed in Figs. 1 to 19 inclusive is preferably used for laying concrete mixes and is readily changed over by the minor detailed changes above mentioned and as disclosed in Figs. 20 to 22 inclusive to a paver adapted to lay asphalt mixes. Both embodiments of the invention utilize the same novel compactor-tamper mechanism which has been found to compact and tamp mixes spread thereahead into an extremely dense finished pavement having a minimum of voids therein.

A detailed description of the construction and operation of the novel pavers will now be given.

Main frame and mobile means

The main frame 25 is composed of a pair of longitudinally disposed laterally spaced preferably box shaped members 40 and forward, central and rear main cross members 41, 42 and 43 respectively spanning transversely between the said longitudinal frame members 40. The rear of the said main frame 25 is supported on longitudinally disposed outer bolsters 44 depending from the rear of the said box shaped longitudinal members 40 and on longitudinally disposed inner bolsters 45 secured to the bottom of the central cross member 42 and the rear cross member 43. Each pair of bolsteds comprising one outer bolster 44 and one inner bolster 45 is pivotally supported on a caterpillar tread axle 46 which in turn is mounted on a pair of side rails 47 of one of the caterpillar endless treads 27. Front and rear caterpillar tread sprocket shafts 48 and 49 carrying caterpillar tread sprockets 50 are journaled in the usual

take-up type bearings 51 bolted or otherwise secured to the said side rails 47. Although not shown, the usual caterpillar tread idlers may be employed to prevent the lower run of the caterpillar endless treads 27 from deflecting between the caterpillar tread sprockets 50. Each caterpillar endless tread 27 has a drive sprocket 52 keyed to the rear tread sprocket shaft 49 to admit of driving the same by means of a chain drive, clutch and transmission means as hereinafter described in detail.

The front end of the side longitudinally disposed main frame members 40 extends a considerable distance forward from the forward cross member 41 and are each supported on a front wheel 26 preferably having a tire 53 thereon. Each front wheel is rotatably mounted on an axle 54 fixed through the lower bifurcated end 55 of a vertically disposed spindle 56 journaled through a suitable bracket 57. Steering of the paver is accomplished by turning of the said spindles 56 by such means as a conveniently located steering wheel 58 mounted on a steering column 59 connected to worn and pinion gearing 60 adapted to turn a transversely disposed steering shaft 61 on the outer ends of which arcuately movable levers 62 and 63 are keyed in diametrically opposed relationship to each other; the said arcuately movable levers 62 and 63 impart opposed reciprocating motion to a pair of steering rods 64 linked at their rear ends to the said arcuate levers 62 and 63 and at their front ends to steering arms 65 keyed to the upper ends of the said spindles 56, all as best shown in Figs. 1, 3, 4 and 5.

At the side of the machine nearest the steering wheel 58 a pair of short secondary longitudinal frame members 66 are provided to support the outer end of the compactor-tamper drive shaft 67. Another pair of secondary longitudinal frame members 68 located near the center of the machine supports the caterpillar drive transmission 69 and caterpillar drive main clutch 70. And still another pair of secondary longitudinal frame members 71 located at the side of the machine opposite the steering wheel 58 supports the engine 72, main clutch 73 and main transmission 74. All the said secondary longitudinal frame members 66, 68 and 71 are supported on and rigidly secured to members 41, 42 and 43. An operator's platform 75 is preferably welded to the top of the main frame 25 in the region of the steering wheel 58 and other operating controls.

Hopper and agitator

A suitably shaped open bottom hopper 31 preferably constructed of sheet steel and reinforced as required extends across substantially the entire width of the paver and is suspended from the longitudinal box shaped frame members 40 and from the forward cross member 41 of the main frame 25 as indicated in Figs. 1, 2, 3 and 5. The lower edge 310 of the said hopper 31 is preferably disposed at an elevation higher than the thickest pavement which the paver is adapted to lay.

A transversely disposed agitator shaft 80 is journaled on suitable bearings 81 secured to the sides of the hopper 31 a short distance above the open bottom thereof. One end of the said agitator shaft 80 is extended through one of its supporting bearings 81 and has a drive sprocket 82 keyed thereon as shown in Fig. 5. The said agitator shaft 80 is rotated rather slowly by a chain drive running over the sprocket 82 as hereinafter described in detail.

The said agitator shaft 80 has a plurality of spaced conveying type agitator blades 32 secured thereon radially extending therefrom. The said agitator blades are pitched as shown in Fig. 5 to distribute concrete or asphalt mixes across the entire width of the hopper 31 is indicated by the arrows 83 in Fig. 1. The said concrete or asphalt mixes are dumped into the hopper 31 at about the transverse center thereof from dump trucks or the like which are preferably employed to supply the concrete or asphalt mixes to the paver during the operation thereof.

Side forms

The novel paver preferably carries its own side forms 33 which are adjustably suspended from the main frame 25 and are adapted to resiliently float on the terrain upon which a concrete or asphalt pavement is laid by the machine. Each side form 33 is preferably formed channel shaped and has a narrow upper flange 85 and a wide lower flange 86 as best shown in Figs. 4 and 6. The said flanges 85 and 86 of the side forms 33 are outwardly disposed with respect to the paver whereby to provide a smooth inner face against which pavement being laid by the paver may be compacted without adhering thereto. The wide lower flange 86 of each side form 33 rides on the rough grade indicated by the dot and dash line 87 throughout the drawings. The depth of the side forms 33 is preferably greater than the maximum depth of the thickest pavement which may be laid by the paver. Also, the said side forms 33 are sufficiently deep to admit of the top thereof to extend above the lower edge 310 of the hopper 31 when the said side forms are adjusted to their lowest position.

Each side form 33 is provided with at least two vertically disposed offset preferably channel shaped slides 88 preferably welded thereto which are telescopingly retained by vertically disposed keeper members 89 between pairs of vertically disposed guides 90 preferably welded to the outside of a longitudinally disposed box shaped main frame member 40 as best shown in Figs. 9, 11 and 12. The said keepers 89 are preferably secured to the guides 90 by means of machine screws 91. The fit between the offset slides 88 of each side form 33 and the main frame member 40, keepers 89 and guides 90 is such as will permit the side form 33 to follow the rough grade 87 as the paver advances thereover during its operation and yet maintain the side form 33 in its desired and proper alignment. Although but two sets of offset slides 88, keepers 89 and guides 90 are shown in the drawings for each side form 33, it is obvious that three or four sets may be used if found desirable and advantageous where extremely long side forms 33 are employed.

Referring now particularly to Figs. 3, 4, 5, 11 and 12, each side form 33 is carried by the longitudinal box shaped main frame member 40 thereabove and is constantly urged against the rough grade 87 by a spring loaded side form supporting plunger 92 telescopingly mounted through a sleeve 93 disposed through the said box shaped frame member 40 and secured thereto by suitable machine screws 94. Each side form 33 is provided with a fixed pivot pin 95 extending outwardly therefrom which is journaled through the depending end 96 of the said plunger 92, the said pivotal connection between the side form 33 and its supporting plunger 92 being employed to

minimize the possibility of the plunger 92 binding in its sleeve mounting 93 due to any play that may exist or develop between the slides 88 of the side form 33 and the guides 90 on the main longitudinal frame member 40 between which the said slides are telescoped.

Each side form 33 is adapted to be raised or lowered to the desired working position by means of an L-shaped lever 97 which is fulcrumed on a suitable pivot pin 98 extending through the upper end of a lever supporting bracket 99 secured to the top of a main longitudinal box shaped frame member 40 as best shown in Fig. 11. The lever 97 is fixed in any desired position by means of a set pin 100 which is telescoped through a suitable aperture in the said lever 97 and through one of the positioning apertures 101 in an arcuately shaped stay arm 102 cantilevered from the said lever supporting bracket 99. The extreme end 103 of the lever 97 is preferably bifurcated for receiving the side form supporting plunger 92 therebetween. The said side form plunger 92 and the side form 33 carried thereby is preferably suspended from the top of the said bifurcated end 103 of the lever 97 by means of a suitable pin 104 fixed through the upper end of the said plunger 92 disposed normal to the bifurcated end 103 of the said lever 97. The raising and lowering of the bifurcated end 103 of the said L-shaped lever 97 raises and lowers the side form 33 suspended therefrom to the rough grade 87.

To prevent the paver from riding on its side forms 33 and losing traction, and to compensate for any reasonable variation in the rough grade 87, the side form supporting plungers 92 are spring loaded to cause the side forms 33 carried thereby to follow any irregularities in the grade on which the paver is operated. Each of the said side form supporting plungers 92 is provided with a vertically disposed slot 105 therethrough disposed just below and normal to the bifurcated end 103 of the lever 97 as best shown in Figs. 11 and 12. A compression spring 106 is telescoped over the said plunger 92 with annular washers 107 at each end thereof. A lower fixed pin 108 through the said plunger 92 disposed below the lower annular washer 107 anchors the lower end of the said compression spring 106 in a suitable location along the said plunger 92 and the upper washer 107 disposed firmly against an upper movable pin 109 extending through the said vertical slot 105 in the said plunger 92 resiliently maintains the said movable pin 109 against the bottom of the bifurcated end 103 of the lever 97. The reaction of the said movable pin 109 against the bottom of the bifurcated end 103 of the lever 97 constantly but yieldably urges the side forms 33 to their lowest adjusted position.

When the side forms 33 ride over high spots in the rough grade 87 on which pavement is being laid by the paver, the said compression springs 106 permit the said forms to yield to accommodate themselves to reasonable irregularities in the said rough grade 87. When lowering the side forms 33 to the rough grade 87, it is well to compress the springs 106 partially by adjusting the levers 97 to a position lower than normally necessary whereby to urge the said side forms 33 firmly yet resiliently against the rough grade 87 over which a pavement is being laid to prevent any of the concrete or asphalt mix from being forced under the side forms 33 by the force of the compactor-tamper mechanism employed.

Each side form 33 is preferably provided with a pair of vertically disposed angle brackets 110 one of which is located on each side of the side form supporting plunger 92 as best shown in Fig. 11. A large diameter machine screw 111 is threaded through each bracket 110 until the end thereof is juxtaposed to the said plunger 92 with only working clearance therebetween. A lock nut 112 fixes the said machine screws 111 in their adjusted positions. The machine screws 111 prevent any undue tilting longitudinal of the side forms 33 about the pivots 95 thereof which would cause binding of the slides 88 thereof between the guides 90 secured to the longitudinal main frame members 40.

Subframe

The subframe 28 which carries the compaction members 29 and tampers 30 is composed of a forward transversely disposed channel member 115 and a rear transversely disposed channel member 116 held in the desired spaced relationship with respect to each other by a plurality of upper channel struts 117 connected to the top flanges thereof and by a plurality of suitably bent lower angle struts 118 connected to the bottom flanges thereof.

The said subframe 28 is suspended at each end from the main frame 25 by means of a pair of adjustable hanger rods 119 pivotally connected at their lower ends to the top of the channel members 115 and 116 and at their upper ends to a pair of arcuate levers 120 keyed to a suitably disposed subframe hanger shaft 121 at one side of the paver and to a suitably disposed subframe hanger shaft 122 at the other side of the paver. The subframe hanger shaft 121 is supported on suitable bearings 123, 124 and 125 which are in turn supported on the main frame forward cross member 41, the main frame central cross member 42 and one of the secondary longitudinal main frame members 66 respectively.

An operating crank 126 connected to worm and pinion gearing 127 rotates a sprocket 128 connected by an endless chain 129 to a sprocket 130 keyed on the end of the subframe hanger shaft 121, rotates the said hanger shaft 121 and raises and lowers one end of the subframe 28. The subframe hanger shaft 122 is supported on suitable bearings 131, 132 and 133 which are in turn supported on the main frame forward cross member 41, the main frame central cross member 42 and the main frame rear cross member 43 respectively. An operating crank 134 connected to worm and pinion gearing 135 rotates a sprocket 136 connected by an endless chain 137 to a sprocket 138 keyed on the subframe hanger shaft 122 and rotates the said hanger shaft 122 and raises and lowers the other end of the subfame 28. Thus, the sub-frame 28 may be raised, lowered and tilted with respect to the main frame 25 during the operation of the paving machine as may be desired or required to maintain the longitudinal grade and transverse slope of a strip of pavement being laid thereby.

In order to prevent movement of the subframe 28 with respect to the main frame 25 and to transfer the reaction of the movement of the compaction members 29 and tampers 30 carried by the subframe 28 to the main frame 25, a pair of vertically disposed roller guides 139 are welded or otherwise secured to the inside of each of the main frame members 40 in such suitable spaced relationship as to permit the guide contact plates 140 and 141 on the subframe members 115 and 116 respectively to be adjusted in

constant contact thereagainst as hereinafter described in detail. The said roller guides 139 are preferably composed of a channel frame member 142 having a plurality of closely spaced guide rollers 143 journaled on pins 144 pressed through the flanges thereof. The web of the said channel guide frame member 142 is cut away to permit the periphery of the rollers 143 to extend therethrough as best indicated in Figs. 9 and 10.

The guide contact plates 140 located on the subframe transverse channel member 115 near each end thereof is preferably welded thereto as shown in Fig. 10. However, the guide contact plate 141 located on the sub-frame transverse channel member 116 near each end thereof is adjustably supported on the ends of adjusting screws 145 disposed through the said channel member 116 and threaded through a suitable adjusting screw mounting plate 146 welded across the ends of the flanges of the channel member 116 as best shown in Figs. 9 and 10. By turning up the adjusting screws 145 the guide contact plates 140 and 141 are brought tightly up against the rollers 143 of the roller guides 139 whereby to prevent longitudinal movement of the subframe 28 with respect to the main frame 25. The said adjusting screws 145 are fixed in their adjusted position by means of turning the lock nuts 147 threaded thereon tightly against the adjusting screw mounting plates 146.

The said subframe 28 has a pair of upwardly disposed brackets 148 secured on top of the said forward and rear transversely disposed channel members 115 and 116 by such means as the rivets 149. The brackets 148 have the compactor-tamper drive shaft 67 journaled on the top thereof by means of suitable bearings 150.

Compactor-tamper mechanism

The novel compactor-tamper mechanism employed comprises a plurality of compactor-tamper assemblies each composed of a compaction member 29 and a tamper 30. Each compaction member consists of a suitably curved shoe 155 and a bulldozer plate 156 extending upwardly from the toe of the said shoe 155 both of which are preferably removably secured to a shoe casting 157 in such a manner as to admit of removal for repair or replacement. Each compaction member shoe casting 157 is provided with a pair of upwardly and rearwardly extending arms 158 which are secured to the eccentric strap 159 of eccentrics 160 keyed to a transversely disposed eccentric drive shaft 161 which is supported on a plurality of bearings 162 bracketed from the rear transverse channel subframe member 116 on suitable brackets 163 secured thereto by such means as the machine bolts 164 as best shown in Figs. 9 and 13. Each pair of eccentrics 160 which actuate one of the compactor-tamper assemblies of the paver is preferably mounted on the eccentric drive shaft 161 in 180 degree staggered relationship with respect to the adjacent pair of eccentrics 160 which actuate the adjacent compactor-tamper assembly to reduce the vibration of the compactor-tamper mechanism to a minimum, see Fig. 9.

Each compaction member 29 is pivotally linked and supported from the forward transverse channel sub-frame member 115 on a pair of depending pivot bars 165 each pivoted by an upper pivot pin 166 journaled through a pair of brackets 167 secured by machine bolts 168 to the said forward transverse sub-frame member 115 and by a lower pivot pin 169 journaled through an L-shaped fitting 170 fixed through one or two suitable lugs 171 cast integral with and extending upwardly from the shoe casting 157 by the securing nuts 172.

Each tamper 30 is formed of a suitably curved plate 300 which is generally horizontally disposed and positioned directly to the rear of each compaction member 29. A spacer bar 1590 is positioned between and supported by each pair of eccentric straps 159 from which the forward end or toe of each tamper 30 is pivotally supported by means of an adjustable threaded sleeve type depending pivot bar 173 pivoted by an upper pivot pin 174 extending through a lug 175 secured by means of a bolt 176 to the said spacer bar 1590 and by a lower pivot pin 177 extending through a suitable fitting 178 secured by means of a nut 179 to the center of the front end tamper supports 180. The rear end or heel of each tamper support 180 is pivotally connected by means of a suitable fitting 181, securing nut 179 and pivot 182 to the depending end of a tamper strut rod 183 secured by upper and lower nuts 184 threaded thereon to a bracket 185 welded or otherwise secured to a sub-channel 186 disposed parallel to and nested within the rear transversely disposed channel subframe member 116. The said sub-channel 186 is retained in slidable relationship against slide plates 187 welded on the web of the said rear transversely disposed channel sub-frame member 116 by batten angles 188 secured across the edges of the flanges of the said channel sub-frame member 116 by angle clips 189 as best shown in Fig. 13.

The said sub-channel 186 is raised and lowered by quick-lift means as hereinafter described to quickly adjust the elevation at which the heel of the tamper 30 is positioned during the operation of the machine. Also, the height at which the compaction members 29 operate with respect to the eccentric drive shaft 161 may be adjusted by threading the pivot bars 165 supporting the same more or less into the upper pivot pin 166 journaled through the brackets 167 on the forward transversely disposed channel sub-frame member 115. The pivot bars 165 are fixed in their adjusted position by means of lock nuts 190 threaded thereon. The height at which the forward end of the tampers 30 operates with respect to the eccentric drive shaft 161 may be adjusted by turning the pivot bar 173 into or out of its threaded sleeve 191. A lock nut 192 threaded on the pivot bar 173 fixes the same in its adjusted position when turned against the end of its threaded sleeve 191.

The quick-lift mechanism employed to support, raise and lower the rear ends or heels of the tampers 30 is best shown in Figs. 6, 7, 8 and 13. As hereinbefore described, the heels of the tampers 30 are pivotally connected to the lower depending end of tamper strut rods 183 which are in turn fixed through brackets 185 welded to a sub-channel 186 retained in nested relationship within the said rear transversely disposed channel sub-frame member 116. The said sub-channel 186 is suspended from a quick-lift shaft 193 journaled in suitable cradles formed in the upper channel struts 117 of the sub-frame 28 by means of two bifurcated arcuate levers 194 keyed on the said quick-lift shaft 193 which engage spaced nuts 195 threaded on the upper end of hanger rods 196 welded to the said sub-channel 186 and extending upwardly therefrom through the flange thereof and telescopingly through the upper flange of said rear transversely disposed channel sub-frame member 116 as best shown in Fig. 8.

Lock nuts 197 keep the spaced nuts 195 threaded on the hanger rods 196 in their proper adjusted position. The said quick-lift shaft 193 is also journaled at each side of each of the said bifurcated arcuate levers 194 through suitable angle clips 198 welded to the top of the said rear channel sub-frame member 116 as shown in Fig. 8.

The quick-lift shaft 193 is rotated by a suitable quick-lift lever 199 keyed thereto and is prevented from being rotated by the lifting action of the heels of the tampers 30 during the operation of the paving machine by a suitably disposed spring loaded pawl 200 on the said quick-lift lever 199 which engages a ratchet 201 secured to one of the upper channel struts 117 of the sub-frame 28 by means of the bolts 202.

Referring now to Fig. 16, the compactor-tamper mechanism is represented diagrammatically. A compaction member 29 and tamper 30 are shown in *a*, *b*, *c* and *d* positions which represent a preferred movement thereof through one complete cycle of the movement of the eccentric 160 in the direction indicated by the arrows 203 in Figs. 13 and 16 around the eccentric drive shaft 151. Fig. 17 shows the path taken by the point X at the heel of the compaction member 29 and Fig. 18 shows the path taken by the point Y at the toe of the said compaction member 29 during one complete revolution of the said eccentric drive shaft 161 and the movement of the eccentric 160 therearound. Also, Fig. 19 shows the path taken by the point Z at the toe of the tamper member 30 during one complete revolution of the eccentric drive shaft 161 and the movement of the eccentric 160 therearound.

Figs. 16 to 19 inclusive illustrate digrammatically the combined generally elliptical and rocking movement of the compaction members in a path parallel to the travel of the paver when in operation coupled with and followed by a treadle action tamper which have been found to produce an extremely dense fully compacted pavement. The bulldozing action of the compactors 29 is illustrated in Fig. 16 which also shows the *a*, *b*, *c* and *d* positions of the bulldozer plate 156 carried by each compaction member 29 during one complete revolution of the eccentric drive shaft 161 and the movement of the eccentric 160 therearound.

The term "generally elliptical and rocking movement" of the compaction members is not to be construed as limiting the invention to the exact movement shown in the diagrammatic illustration disclosed in Figs. 16 to 19 inclusive. The movement of the compaction members may also be defined as a forward and back movement and a downward movement at the completion of the forward movement greater at the front of the said compaction members than at the rear thereof. Or, the movement of the compaction members may be stated as a compound motion including a forward and back movement and an oscillatory movement. The adjustment of the compactors 29 with respect to their point of suspension and the amount of eccentricity of the eccentric 160 determines the precise movement thereof.

The bulldozers 156 advance surplus material spread ahead of the compactor-tamper mechanism and permit only sufficient material to be fed from the hopper 31 under the compaction members 29 to assure a finished thoroughly dense pavement of the depth to which the paver is adapted to operate. The action of the compaction member 29, tampers 30 and, of course, the bulldozers 156 is preferably quite rapid, it being preferred to drive the eccentric shaft 161 at 150 to 300 R. P. M. The drive for the compactor-tamper mechanism will be hereinafter described in detail

A special tamper member 34 is provided at each side of the hopper 31 disposed adjacent the side forms 33 and located just ahead of the compaction members 29. The said special tampers 34 are preferably used to provide an extremely dense and workable concrete adjacent the side forms 33 which will not slump unreasonably as the side forms 33 progress with the travel of the machine. Referring now to Fig. 14, each special tamper 34 is rigidly connected to a tamper bar 205 reciprocatingly mounted in telescopic relationship through suitable brackets 206 welded or otherwise secured to the hopper 31. The tamper bar 205 is preferably provided with a left and right hand threaded adjusting section 207 onto which lock nuts 208 are threaded to fix the tamper bar 205 at any length to which it may be adjusted. A rapidly rotating special tamper eccentric shaft 209 is journaled on suitable bearings 210 and is driven by suitable means as hereinafter described in detail. Each special tamper is pivotally suspended by a pivot pin 211 from an eccentric arm 212 depending from a suitable eccentric 213 mounted thereabove on the eccentric shaft 209. The eccentric shaft 209 is preferably rotated at a speed to reciprocate the special tampers 34 considerably faster than the movement of the compaction members 29.

Drives

Referring now particularly to Fig. 15 and generally to the drive mechanism shown elsewhere throughout the drawings, the entire machine is preferably powered by a single source of power such as the gasoline or Diesel engine 72 through a main clutch 73 operated by a main clutch hand lever 215 disposed within reach of the operator's platform 75 connected to the clutch lever 730 by a suitable linkage 216. A main transmission 74 controlled by a hand lever 740 is coupled to the clutch 73 and has the main drive shaft 217 coupled thereto by means of a suitable flexible coupling 218.

A caterpillar drive transmission 69 controlled by a hand lever 690 is driven by an endless chain drive 219 running over a sprocket 220 keyed on the main drive shaft 217 and a sprocket 221 extending from the caterpillar drive main clutch 79 having a control lever 790 which is coupled to the said caterpillar drive transmission 69. The slow speed shaft 222 of the caterpillar transmission 69 has a sprocket 223 keyed thereon which is connected by an endless chain 224 to a sprocket 225 keyed on an idler shaft 226 onto which clutches 227 controlled by hand levers 2270 are mounted through which power is applied to each of the left and right hand caterpillar treads 27 by means of chain drives 228 running over sprockets 229 keyed on stub shafts 230 carrying the driven members of the clutches 227 and over the drive sprockets 52 of the caterpillar treads 27.

The main drive shaft 217 has a compactor-tamper clutch 231 thereon controlled by a hand lever 2310 through which power is applied to an idler shaft 232. The compactor-tamper drive shaft 67 is driven from the idler shaft 232 by means of a chain drive 233 running over sprockets 234 and 235 keyed to the idler shaft 232 and to the compactor-tamper drive shaft 67 respectively. Inasmuch as one end of the compactor-tamper drive shaft is supported on the main

frame 25 and the other end of the compactor-tamper drive shaft is supported on the sub-frame 28, and since the sub-frame 28 is adapted to be raised and lowered with respect to the main frame 25, two universal joints 236 and a splined section 670 are employed to operatingly connect the two end sections of the said compactor-tamper drive shaft 67. The eccentric drive shaft 161 is driven by a chain drive 237 running over a sprocket 238 keyed on the eccentric drive shaft 161 and a sprocket 239 keyed on the compactor-tamper drive shaft 67 located between the brackets 148 on the sub-frame 28.

The agitator shaft 80 is driven by means of a chain drive 240 running over a sprocket 82 keyed on the said agitator shaft 80 and over a sprocket 241 keyed on an idler shaft 242 rotated by the compactor-tamper drive shaft 67 through the meshed reduction gears 243 and 244 keyed on the idler shaft 242 and the compactor-tamper drive shaft 67 respectively.

The special tampers 34 are driven by means of a chain drive 245 running over sprockets 246 and 247 keyed on the idler shaft 232 and on the tamper eccentric shaft 209 respectively.

The various drive means disclosed and described herein are not a part of this invention, it being understood that the means for applying power to and driving the various movable elements of the novel paver disclosed herein may be altered and arranged in any desired manner without departing from the scope of the invention.

Alternate Embodiment

The novel paver disclosed in Figs. 1 to 19 inclusive is changed in but a few minor details to admit of the same being used for laying, compacting and tamping asphalt mixes.

The embodiment of the invention preferably employed to lay concrete mixes disclosed in Figs. 1 to 19 inclusive and the embodiment of the invention preferably employed to lay asphalt mixes disclosed in Figs. 20 to 22 inclusive are substantially identical except that the side forms 330 of the embodiment of the invention disclosed in Figs. 20 to 22 inclusive are shortened and that heating elements 248 and 249 have been added to the compaction members 29 and tampers 30 respectively which are connected by electric cables 250 through the conduit 251 to an electric panel and fuse box 252. By referring particularly to Figs. 21 and 22, it will be observed that a suitable electric generator 35 is preferably added to the embodiment of the invention disclosed therein which is supported on the secondary longitudinal main frame members 68 and is driven by means of a V-belt drive 253 running between pulleys 254 and 255 keyed on the generator shaft 256 and the main drive shaft 217 respectively. The said generator 35 is electrically connected to the electric panel 252.

It will be noted that the special tampers 34 have been omitted in the embodiment of the invention disclosed in Figs. 20 to 22 inclusive inasmuch as they need not be employed when the novel paver is being used for laying most asphalt mixes.

OPERATION

The embodiment of the invention shown in the drawings have been described in detail and a description of the operation of the various elements has been given in connection with the novel mechanisms employed, however, following will be given a brief description of the operation of the novel paver as a unitary whole showing the operation of the component parts thereof in relationship to each other.

In the use of a paver carrying its own side forms as herein disclosed, the front wheels 26 and rear caterpillar treads 27 both first rest on the rough grade 87. The term "rough grade" 87 used herein refers to the fine or partially graded terrain, subgrade or other base upon which a concrete or asphalt pavement is to be laid by the novel paver herein disclosed.

The sub-frame 28 is adjusted with respect to the main frame 25 by means of the cranks 126 and 134 to set the compactors 29 and tampers 30 to the desired finished grade 870 with the heels of the tamper members 30 lifted with respect to the compactors 29 by the quick-lift lever 199. The side forms 33 or 330 are set against the rough grade 87 by means of the levers 97. If a concrete pavement is to be laid by the paver, the special tamper members 34 are adjusted to the desired position by turning the adjusting sections 207 of the tamper bars 205. If an asphalt mix is to be laid by the paver, the special tamper members are removed or otherwise made inoperable and the generator 35 is started to supply current to the heating elements 248 and 249 of the compaction members 29 and tampers 30 respectively for pre-heating the same to prevent the asphalt mix from sticking thereto. The compactor-tamper mechanism is then started operating and the concrete or asphalt mix is dumped by supply trucks or the like into the hopper 31 as indicated by the dash and two dot lines 257 in Figs. 2, 3 and 21 wherein the agitator blades 32 which revolve continuously during the operation of the compactor-tamper mechanism distribute the said mix across the hopper 31 from whence it gravitates to the rough grade 87 below the open bottom 310 of the hopper 31 and ahead of the compaction members 29 which are equipped with bulldozer plates 156.

The mix thus spread as indicated by the dash and two dot lines 258 in Figs. 2, 3 and 21 is compacted by the compaction members 29 having a combined elliptical and rocking movement as is obvious from the diagrammatic representation of the operation thereof disclosed in Figs. 16 to 19 inclusive. The bulldozing action of the compaction members 29 causes the bulldozer plates 156 thereof to advance surplus mix not compacted into the finished pavement strip thereby ahead of the said compaction member 29 as the machine is moved forward as indicated by the arrow 260 in Figs. 1, 2, 3 and 21 under power applied to the caterpillar treads 27 as hereinbefore described in detail. The tamper members 30 follow the compaction members 29 and tamp the mix compacted by the compaction members 29 to a final smoothness and to a maximum degree of density. As soon as the front ends of the caterpillar treads 27 creep onto the finished pavement at the finished grade 870, the quick-lift mechanism operated by the quick-lift lever 199 is employed to drop the heels of the tampers 30 and the sub-frame 28 carrying the compaction members 29 and tampers 30 is lowered by the cranks 126 and 134 to readjust the compactor-tamper mechanism to lay the desired thickness of pavement with the front wheels of the paver running on the rough grade 87 and the caterpillar treads 27 thereof running on the finished grade 870 of the pavement laid by the machine.

The sub-frame 28 may be tilted by the manip-

ulation of the cranks 126 and 134 when it is desired to lay a strip of pavement on a transverse slope or when it is desired to provide a super-elevation at the outer side of a curved strip of pavement being laid.

If and when the front wheels 26 travel over a change of grade, or if the machine is backed off of a strip of pavement just laid thereby, the height of the compactor-tamper mechanism is adjusted to suit the particular condition by the manipulation of the cranks 126 and 134 which raise or lower the sub-frame 28 carrying the entire compactor-tamper mechanism and by manipulating the quick-lift lever 139 which raises and lowers the heels of the tampers 30.

Obviously, not only does the machine completely and accurately lay concrete and asphalt mixes into a completely compacted pavement of maximum density but it is completely adapted to function under all working conditions to lay concrete or asphalt mixes without the use of pre-set forms. However, as hereinbefore mentioned, it is contemplated that the novel compactor-tamper mechanism disclosed herein may be employed in like machines adapted to travel in the usual and customary manner on pre-set road forms.

Although but one embodiment of the invention and one modification thereof has been disclosed and described herein, it is obvious that many changes may be made in the size, shape, arrangement and details of the various elements of the invention without departing from the spirit thereof and it is not intended to limit the scope of the invention other than by the terms of the appended claims.

I claim:

1. In a paving machine including mobile means therefor, a series of compaction members each composed of a bottom shoe and a front bulldozer plate disposed transversely of said machine, a single line of linkage means spaced transversely of said compactors pivotally suspending said compactors from said machine to the level of the top of pavement to be laid thereby, a transversely disposed eccentric shaft on said machine, eccentrics mounted on said eccentric shaft, and rearwardly and upwardly extending arms connecting said compaction members with said eccentrics whereby upon rotation of said eccentric shaft the compaction members are given a combined generally elliptical and rocking motion

2. In a paving machine including mobile means therefor, a series of compaction members each composed of a bottom shoe and a front bulldozer plate disposed transversely of said machine, a single line of linkage means spaced transversely of said compactors pivoted to the machine and to the compaction members suspending the said compaction members to the level of the top of pavement to be laid by said machine, a transversely disposed eccentric shaft on said machine, eccentrics on said eccentric shaft, and rearwardly and upwardly extending arms connecting said compaction members to said eccentrics whereby upon rotation of said eccentric shaft a combined generally elliptical and rocking movement in a path parallel to the travel of the machine is imparted to the said compaction members wherein the forward portion of each compaction member has a greater downward movement than the rear portion thereof.

3. In a paving machine including mobile means therefor, a series of compaction members each composed of a bottom shoe and a front bulldozer plate disposed transversely of said machine, a single line of linkage means spaced transversely of said compactors pivoted to the machine and to the compaction members suspending the said compaction members to the level of the top of pavement to be laid by said machine, a transversely disposed eccentric shaft on said machine, eccentrics on said eccentric shaft, and rearwardly and upwardly extending arms connecting said compaction members to said eccentrics whereby upon rotation of said eccentric shaft a combined generally elliptical and rocking movement in a path parallel to the travel of the machine is imparted to the said compaction members wherein the forward portion of each compaction member moves in a generally elliptical path having a greater vertical axis than the vertical axis of the generally elliptical path in which the rearward portion thereof moves.

4. In a paving machine, a main frame including mobile means therefor, a sub-frame, means for suspending said sub-frame from said main frame including means for raising, lowering and tilting the same with respect to the said main frame, a series of compaction members disposed transversely of said sub-frame, each compaction member being composed of a bottom shoe and a front bulldozer plate, a single line of linkage rods spaced transversely of said compactors suspending said compaction members from said sub-frame pivoted to the sub-frame at their upper end and to the compaction members at their lower end, an eccentric shaft mounted transversely of said machine on said sub-frame, eccentrics mounted on said eccentric shaft, and rearwardly and upwardly extending arms connecting said compaction members with said eccentrics whereby upon rotation of said eccentric shaft the compaction members are given a combined generally elliptical and rocking motion.

5. In a paving machine including mobile means therefor, a series of compaction members each composed of a bottom shoe and a front bulldozer plate disposed end to end transversely of the machine forming an aggregate member for compacting paving material supplied thereto into a strip of pavement and advancing surplus paving material thereahead, a single line of linkage means spaced transversely of said compactors pivotally suspending said compaction members from said machine to the level of the top of pavement to be laid by said machine, means for raising, lowering and laterally tilting said aggregate member with respect to pavement being laid and the terrain over which the pavement is being laid, a transversely disposed eccentric shaft on said machine, eccentrics mounted on said eccentric shaft, and rearwardly and upwardly extending arms connecting said compaction members with said eccentrics whereby upon rotation of said eccentric shaft the compaction members have imparted thereto a compound generally elliptical and rocking motion in a path parallel to the travel of the machine wherein the forward portion of each compaction member has a greater downward movement than the rear portion thereof.

6. In a paving machine including mobile means therefor, side forms carried thereby, a series of compaction members each composed of a bottom shoe and a front bulldozer plate disposed end to end transversely between the said side forms forming an aggregate member for compacting

paving material supplied thereto into a strip of pavement and advancing surplus paving material thereahead, a single line of linkage means spaced transversely of said compactors pivotally suspending said compaction members from said machine to the level of the top of pavement to be laid by said machine, a transversely disposed eccentric shaft on said machine, eccentrics mounted on said eccentric shaft, rearwardly and upwardly extending arms connecting said compaction members with said eccentrics whereby upon rotation of said eccentric shaft the compaction members have imparted thereto a compound generally elliptical and rocking motion in a path parallel to the travel of the machine wherein the forward portion of each compaction member has a greater downward movement than the rear portion thereof, and resilient means between the machine and the said side forms for urging the said side forms against the terrain adjacent the strip of pavement being laid.

7. In a paving machine including mobile means therefor, a series of compaction members each composed of a bottom shoe and a front bulldozer plate disposed end to end transversely of the machine forming an aggregate member for compacting paving material supplied thereto into a strip of pavement and advancing surplus paving material thereahead, a series of tampers disposed end to end transversely of the machine forming an aggregate member for tamping the strips of paving compacted by the said compaction members, a single line of linkage means spaced transversely of said compactors including pivot means at both ends thereof pivotally suspending said compaction members from said frame to the level of the top of the pavement to be laid by said machine, means for raising, lowering and laterally tilting said aggregate members simultaneously with respect to pavement being laid and the terrain over which the pavement is being laid, a transversely disposed eccentric shaft on said machine, eccentrics mounted on said eccentric shaft, rearwardly and upwardly extending arms connecting said compaction members with said eccentrics whereby upon rotation of said eccentric shaft the compaction members have imparted thereto a compound generally elliptical and rocking motion in a path parallel to the travel of the machine wherein the forward portion of each compaction member has a greater downward movement than the rear portion thereof, linkage means including transverse pivot means suspending the rear of said tampers from said machine to the level of the top of pavement to be laid by the machine, and linkage means connecting the forward end of said tampers to said compaction member actuating arms whereby to impart to said tampers a treddle action.

8. In a paving machine including mobile means therefor, side forms carried thereby, a series of compaction members each composed of a bottom shoe and a front bulldozer plate disposed end to end transversely between the said side forms forming an aggregate member for compacting paving material supplied thereto into a strip of pavement and advancing surplus paving material thereahead, a series of tampers disposed end to end transversely between said side forms forming an aggregate member for tamping the strips of paving compacted by the said compaction members, a single line of linkage means spaced transversely of said compactors including pivot means at both ends thereof pivotally suspending said compaction members from said machine to the level of the top of the pavement to be laid by said machine, a transversely disposed eccentric shaft on said machine, eccentrics mounted on said eccentric shaft, rearwardly and upwardly extending arms connecting said compaction members with said eccentrics whereby upon rotation of said eccentric shaft the compaction members have imparted thereto a compound generally elliptical and rocking motion in a path parallel to the travel of the machine wherein the forward portion of each compaction member has a greater downward movement than the rear portion thereof, linkage means including transverse pivot means suspending the rear of said tampers from said machine to the level of the top of pavement to be laid by the machine, linkage means connecting the forward end of said tampers to said compaction member actuating arms whereby to impart to said tampers a treddle action, and resilient means between the machine and the said side forms for urging the said side forms against the terrain adjacent the strip of pavement being laid.

9. In a paving machine including mobile means therefor, side forms carried thereby, a series of compaction members each composed of a bottom shoe and a front bulldozer plate disposed transversely of said machine, a single line of linkage means spaced transversely of said compactors pivotally suspending said compactors from said machine to the level of the top of pavement to be laid thereby, a transversely disposed eccentric shaft on said machine, eccentrics mounted on said eccentric shaft, rearwardly and upwardly extending arms connecting said compaction members with said eccentrics whereby upon rotation of said eccentric shaft the compaction members are given a combined generally elliptical and rocking motion, and resilient means between the main frame and the side forms for urging said side forms against the terrain adjacent the strip of pavement being laid.

10. In a paving machine, a main frame including mobile means therefor, side forms carried thereby, a sub-frame, means for suspending said sub-frame from said main frame including means for raising, lower and tilting the same with respect to the said main frame, a series of compaction members disposed transversely of said sub-frame, each compaction member being composed of a bottom shoe and a front bulldozer plate, a single line of linkage rods spaced transversely of said compactors suspending said compaction members from said sub-frame pivoted to the sub-frame at their upper end and to the compaction members at their lower end, an eccentric shaft mounted transversely on said subframe, eccentrics mounted on said eccentric shaft, rearwardly and upwardly extending arms connecting said compaction members with said eccentrics whereby upon rotation of said eccentric shaft the compaction members are given a combined generally elliptical and rocking motion, and means for urging said side forms against the terrain adjacent the strip of pavement being laid.

11. In a paving machine, a main frame including mobile means therefor, a subframe, means for suspending said sub-frame from said main frame including means for raising, lowering and tilting the same with respect to the said main frame, a series of compaction members disposed transversely of said sub-frame, each compaction member being composed of a bottom shoe and a front bulldozer plate, a single line of linkage rods spaced transversely of

said compactors suspending said compaction members from said sub-frame pivoted to the sub-frame at their upper end and to the compaction members at their lower end, an eccentric shaft mounted transversely on said sub-frame, eccentrics mounted on said eccentric shaft, rearwardly and upwardly extending arms connecting said compaction members with said eccentrics whereby upon rotation of said eccentric shaft the compaction members are given a combined generally elliptical and rocking motion, a tamper disposed rearwardly of each compaction member, linkage means including transverse pivot means suspendeding the rear of said tampers from said sub-frame to the level of the top of pavement to be laid by the machine, and linkage means connecting the forward end of said tampers to said compaction member actuating arms whereby to impart to the said tampers a treddle action.

12. In a paving machine, a main frame including mobile means therefor, side forms carried thereby, a sub-frame, means for suspending said sub-frame from said main frame including means for raising, lowering and tilting the same with respect to the said main frame, a series of compaction members disposed transversely of said sub-frame, each compaction member being composed of a bottom shoe and a front bulldozer plate, a simple line of linkage rods spaced transversely of said compactors suspending said compaction members from said sub-frame pivoted to the sub-frame at their upper end and to the compaction members at their lower end, an eccentric shaft mounted transversely on said sub-frame, eccentrics mounted on said eccentric shaft, rearwardly and upwardly extending arms connecting said compaction members with said eccentrics whereby upon rotation of said eccentric shaft the compaction members are given a combined generally elliptical and rocking motion, a tamper disposed rearwardly of each compaction member, linkage means including transverse pivot means suspending the rear of said tampers from said sub-frame to the level of the top of pavement to be laid by the machine, linkage means connecting the forward end of said tampers to said compaction member actuating arms whereby to impart to said tampers a treddle action, and resilient means between said main frame and said side forms for urging said side forms against the terrain adjacent the strip of pavement being laid.

13. In a paving machine including mobile means therefor, a series of compaction members each composed of a shoe curved on its bottom longitudinally with respect to the machine and disposed transversely of said machine, a single line of linkage means spaced transversely of said compactors pivotally suspending said compactors from said machine to the level of the top of pavement to be laid thereby, a transversely disposed eccentric shaft on said machine, eccentrics mounted on said eccentric shaft, and rearwardly and upwardly extending arms connecting said compaction members with said eccentrics whereby upon rotation of said eccentric shaft the compaction members are given a combined generally elliptical and rocking motion.

14. In a paving machine, a main frame including mobile means therefor, a sub-frame, means for suspending said sub-frame from said main frame including means for raising, lowering and tilting the same with respect to the said main frame, a series of compaction members disposed transversely of said sub-frame, each compaction member being composed of a shoe curved on its bottom longitudinally with respect to the machine, a single line of linkage rods spaced transversely of said compactors suspending said compaction members from said sub-frame pivoted to the sub-frame at their upper end and to the compaction members at their lower end, an eccentric shaft mounted transversely on said sub-frame, eccentrics mounted on said eccentric shaft, rearwardly and upwardly extending arms connecting said compaction members with said eccentrics whereby upon rotation of said eccentric shaft the compaction members are given a combined generally elliptical and rocking motion, a tamper disposed rearwardly of each compaction member, linkage means including transverse pivot means suspending the rear of said tampers from said sub-frame at the level of the top of pavement to be laid by the machine, and linkage means connecting the forward end of said tampers to said compaction member actuating arms whereby to impart to the said tampers a treddle action.

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