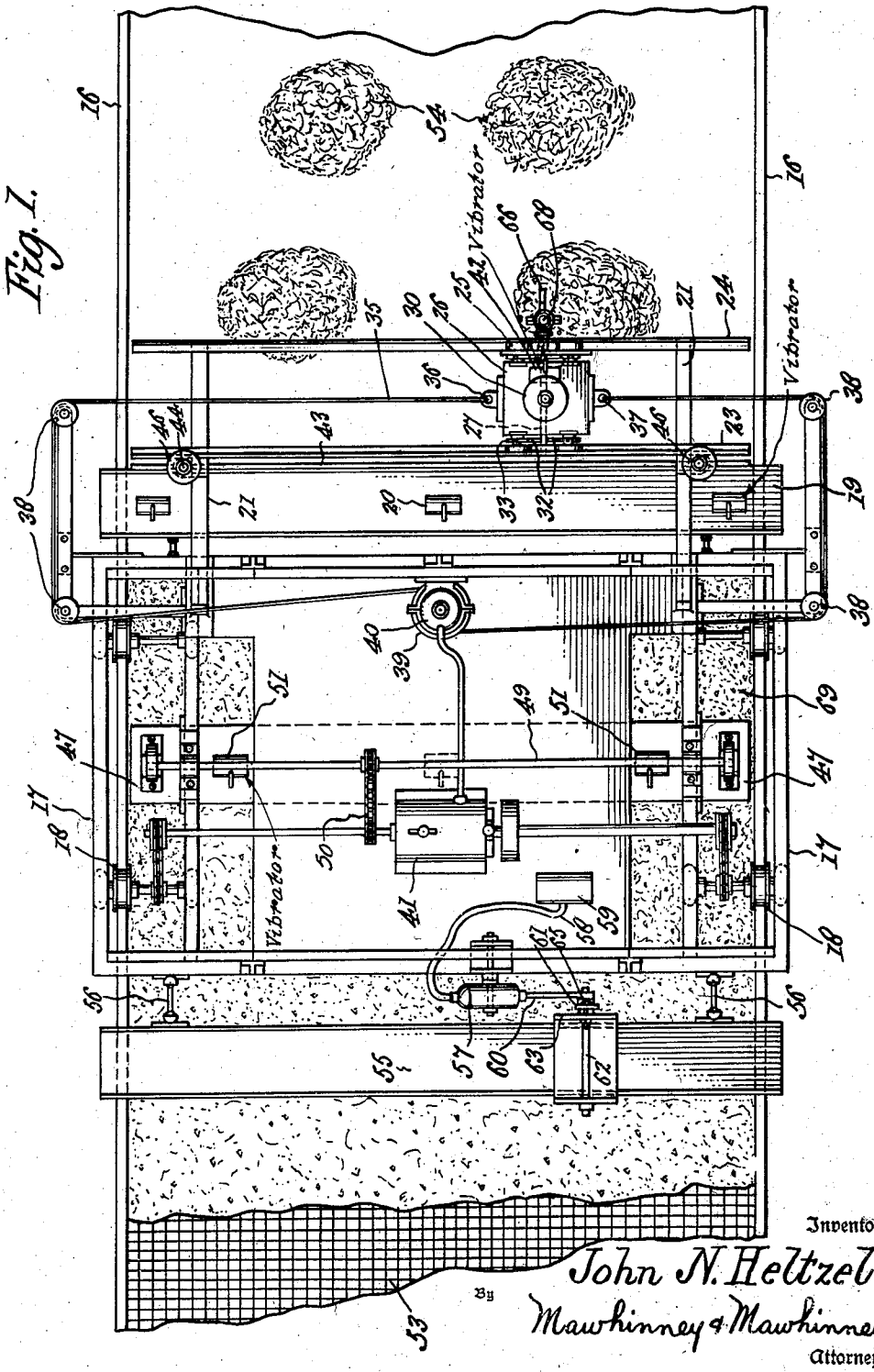
July 31, 1945. J. N. HELTZEL 2,380,435

COMBINATION ROAD BUILDING MACHINE AND CONCRETE SPREADER

Filed Oct. 26, 1940 3 Sheets-Sheet 1

Fig. 1.



Inventor

John N. Heltzel

By

Mawhinney & Mawhinney

Attorneys.

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Fig. 2.

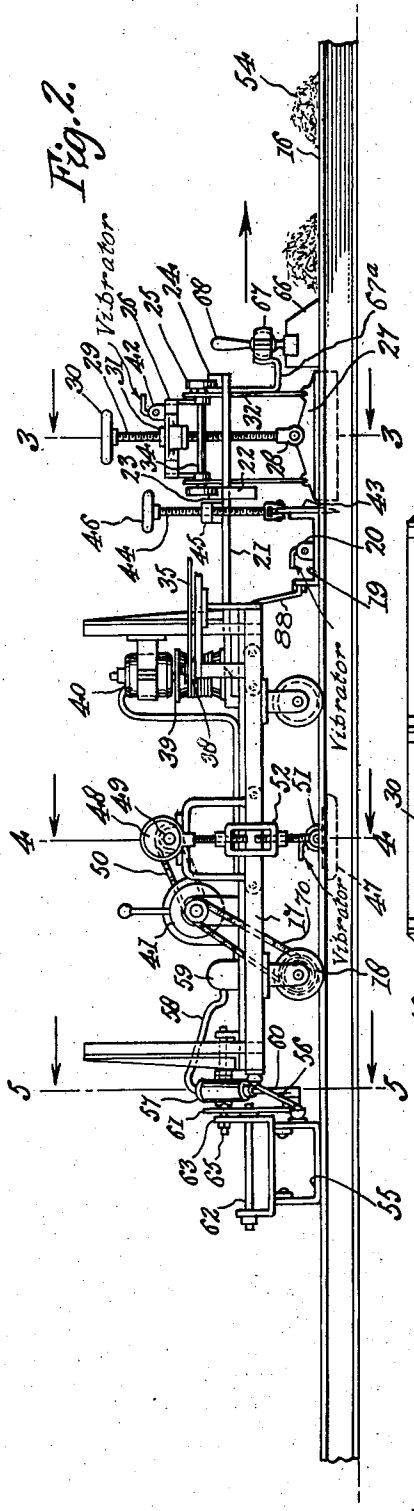
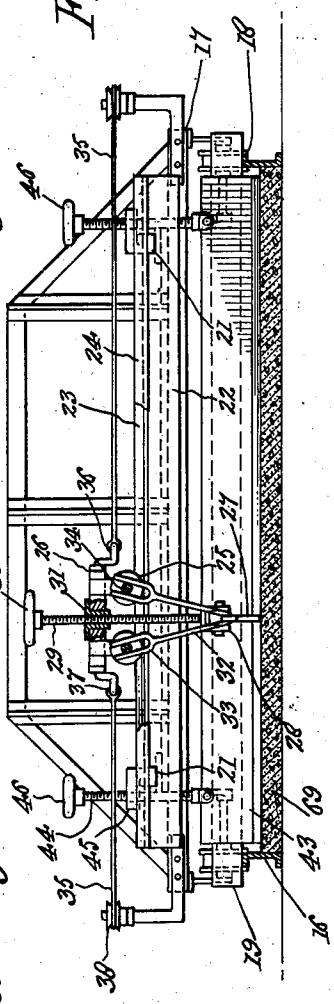


Fig. 3.



Inventor
John N. Heltzel
By Mawhinney & Mawhinney
Attorneys.

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Fig. 5.

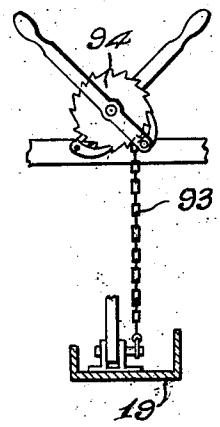


Fig. 4.

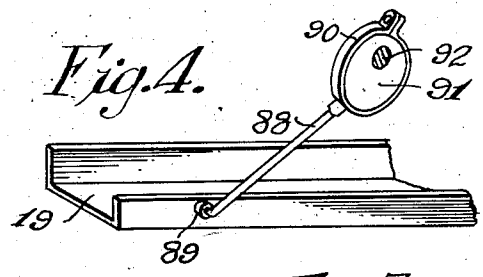


Fig. 7.

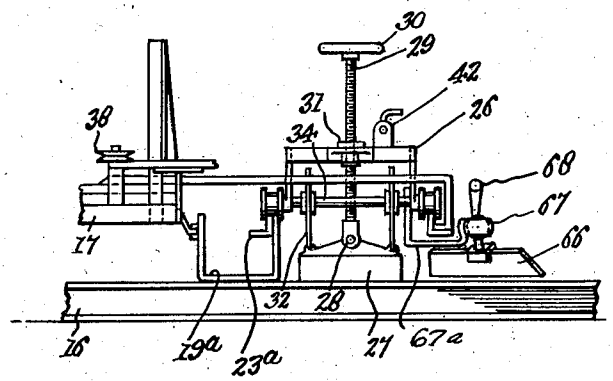
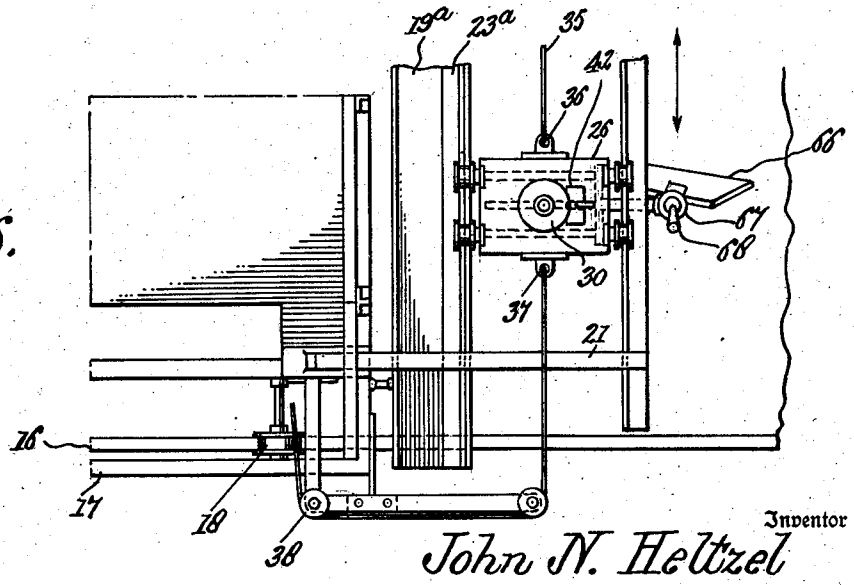


Fig. 6.



Inventor

John N. Heltzel

By Mawhinney & Mawhinney

Attorneys.

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UNITED STATES PATENT OFFICE

2,380,435

COMBINATION ROAD BUILDING MACHINE AND CONCRETE SPREADER

John N. Heltzel, Warren, Ohio

Application October 26, 1940, Serial No. 363,056

7 Claims. (Cl. 94—46)

The present invention relates to improvements in combination road building machine and concrete spreader, and has for its general purpose the building and finishing of concrete roads.

The invention contemplates not only the treatment of the concrete after it has been poured between the side forms but provides for an extension in front of the finishing machine which acts to prepare the subgrade favorably for the laying of concrete slabs in a manner to compact the subgrade whereby the slabs may more easily move or slide thereon in obedience to the contracting and expanding movement of such slabs.

An object of the invention is to provide a machine particularly for the spreading of substantially dry concrete laterally over a roadway and simultaneously vibrating the concrete while it is being laterally spread, followed by a screeding operation, in which the screed reciprocates transversely over the roadway, the screed being vibrated if desired.

Another object of the invention is to provide a vibrated tamper, in which the tamper reciprocates up and down and tamps the concrete and is simultaneously vibrated.

A further object of the invention is to provide a reciprocating surfacing screed adapted to be reciprocated by a hydraulic ram or other hydraulic device instead of by the usual mechanical means.

A still further object of the invention is to provide a vibrated subgrader subjected to vibratory action during its normal operation of removing the earth.

A still further object of the invention is to provide, in conjunction with the subgrader, a subgrade smoothing device spaced relatively to the spreader or spreaders of the finishing machine to enable in sequence the removal of earth, the compacting and the smoothing of the subgrade, the lateral and longitudinal spreading of the plastic concrete poured on such prepared subgrade and the screeding, tamping and follow-up screeding of the plastic concrete road under construction.

The invention consists in certain improvements over my prior Patents Nos. 1,977,850, granted October 23, 1934 and 1,996,153, granted April 2, 1935.

With the foregoing and other objects in view, the invention will be more fully described hereinafter, and will be more particularly pointed out in the claims appended hereto.

In the drawings, wherein like symbols refer to like or corresponding parts throughout the several views,

Figure 1 is a top plan view of an improved road building machine constructed in accordance with the present invention.

Figure 2 is a side elevation of the same.

Figure 3 is a vertical transverse section taken on the line 3—3 of Figure 2.

Figure 4 is a fragmentary view showing a pitman and eccentric method of screed operation.

Figure 5 is a side elevation of a screed adjusting device with the screed in section.

Figure 6 is a fragmentary top plan view showing a slightly modified form of the lateral spreading devices.

Figure 7 is a side elevational view of the parts shown in Figure 6.

Referring more particularly to the drawings, 16 designates the side forms defining the roadway and between which the concrete is poured by a paver or mixing machine onto the subgrade in the customary manner. The carriage of the conventional finishing machine is represented generally at 17 and is supported for movement upon the wheels 18 which roll along upon the tops of the side forms 16 in a manner well known in the art. It is also well known that these wheels 18 may be driven by sprocket and chain transmission 70 or otherwise from a power unit installed on the carriage as shown in Figures 1 and 2. The structural frame 17 of the machine is also well known in the art.

At the front of the machine is carried in a usual manner the front screed 19 on which are mounted one or more vibrators 20. Besides the vibratory action communicated to the screed 19 by the vibrators 20, such screed is given the usual lateral reciprocation across the roadway by well known means either hydraulic or mechanical. One form of mechanical device is shown in Figure 4 and embodies a pitman 88 having a pivotal connection at 89 with the screed 19 and driven from shaft 92 by eccentric 91 and eccentric strap 90. The screed may also be raised or lowered away from or down to the concrete in a conventional manner. One device for accomplishing this purpose is shown in Figure 5, which is similar to the device illustrated in Figure 15 of my prior Patent 1,996,153. In accordance with such construction, one or more chains 93 are connected to the screed 19 and to suitable winding or lifting means 94 on the carriage for conveniently raising and lowering the screed 19. Such mechanism is well known in the art.

Supported by extension beams or outriggers 21

is a bulkhead member 22 extending across in front of the screed and at an elevation above the front wall or apron of the screed. Such bulkhead 22 carries one track member 23 which cooperates with a companion track member 24 parallel therewith to provide a transverse runway for the wheels 25 of a transverse carriage 26. The transversely moving carriage supports a transverse spreader plate 27.

As shown in Figure 2 a socket member 28 is pivoted to the central portion of the spreader plate 27, such socket member 28 being carried by the screw shaft 29 rotatable by the hand wheel 30 and having threaded engagement with an insert nut 31 (shown in Figure 3) and affixed to the transverse carriage 26. By rotating the hand wheel 30 in one or the other direction the screw shaft 29 may be made to move down or up through the nut 31 and the transverse carriage 26 for the purpose of raising and lowering the spreader plate 27. To the spreader plate are also connected at opposite sides of the socket member pairs of arms 32, diverging upwardly in a substantially V formation (see Figure 3) and having at their upper ends forks 33 for straddling the shafts 34 upon which the wheels 25 of the transverse carriage 26 are mounted. The forks 33 are open at their upper ends to admit of their original assembly upon, and their removal at any time from, the shafts 34; such forks 33 being elongated over the diameter of such shafts 34 to permit of a loose play substantially vertically in the movement of the arms 32 up and down in accompaniment to the adjusting action upon the spreader plate 27 of the screw shaft 29.

The transverse carriage 26 may be given a continuous reciprocating action back and forth across the roadway by any suitable means, for instance by a cable 35 the opposite ends of which are attached to opposite sides of the carriage 26 at the points indicated at 36 and 37 in Figure 1. This cable is looped around pulleys 38 at the sides of the machine and is wound around a spool or drum 39. The spool 39 may be rotated in selectively opposite directions by any suitable means, for instance by a reversible electric motor 40 which is supplied with current from the motor generator unit 41.

The transverse carriage 26 is preferably equipped with one or more vibrators 42, the vibratory action being communicated through the screw shaft 29 to the spreader 27 and through the spreader to the concrete to the end that the concrete will be vibrated simultaneously as it is spread in the act of the spreader member 27 moving backwards and forwards across the roadway.

It will be understood that the spreader 27 may be controlled manually by the reversible motor, or conventional limit switches or stops well known in the art may be provided so that the limit switches will automatically reverse the movement of the transverse carriage 26 at the ends of its movement. The ends of such movement may be close to the side forms 16 or spaced a desired distance therefrom.

When mesh reinforcing is used the spreader plate 27 is adjusted down below the top surfaces of the forms 16. This dropped position of the lower edge of the spreader plate 27 is shown in Figures 2 and 3.

In rear of the transverse spreader plate 27 is a strike-off plate 43, which is adjustably carried by the screw shafts 44 having threaded engagement with suitable fixed nuts 45 carried upon the bulkhead or outrigger frame or what might be called the front supplementary frame, these screw shafts 44 being rotatable by hand wheels 46; the screw shafts 44 and hand wheels 46 being two or more in number, as indicated in Figure 3; and the whole operating for the purpose of adjusting the strike off plate 43 in a vertical sense toward and from the subgrade and the plastic concrete.

On the main carriage 17 there is carried a tamper 47 which is raised or lowered, or vibrated by the eccentrics 48 rotated by shaft 49. This shaft 49 is driven by the sprocket and chain transmission 50 from the motor 41. The tamper beam 47 is provided with a plurality of vibrators 51. Thus the member 47 forms a compression vibrator tamper. Suitable adjusting turnbuckles 52 are included in the eccentric arms by which the tamper beam 47 is supported from the eccentrics 48. The turnbuckles 52 may adjust the length of these arms to produce the proper pressure on the concrete.

The vibrators 51 may be of the electric or mechanical type, electrically or otherwise driven, so as to produce harsh vibration, to thus adequately vibrate the bottom course of the concrete to produce density.

After the bottom course of concrete has been laid and the reinforcing mesh 53 is positioned in place, the top course of concrete is positioned over the mesh as indicated by the heaps of concrete 54 in Figure 1. At this stage the transverse spreader plate 27 is raised to a higher level and the operation repeated, it being understood that the strike-off plate 43 is then raised accordingly; it being further understood that when required any of the plates 27, 43 or 66 may be raised clear of the roadway, that is out of position and function.

The screed member 19 screeds the material in the customary manner Following the screeding operation, the compression vibrated tamper 47 is adjusted to the proper position and the concrete tamped or compressed and simultaneously vibrated. The final finishing is done by the rear screed 55. This rear screed 55 is trailed back of the finishing machine by the universal members 56 or by any of the conventional methods well known in the art.

The lateral spreader illustrated and described in my prior Patent No. 1,979,850 was adequate for the spreading of the so-called "wet" mixes of that period; however, with the advent of "harsh" or "dry" mixes, as now being specified, it has been found that spreading this concrete by manual labor is almost beyond human endurance and consequently the apparatus involving the transverse spreader blade 27 has been evolved for the purpose of dealing mechanically and adequately with these modern mixes in a manner well calculated to secure the rapid, uniform and complete spreading of such material.

Referring more particularly to Figures 6 and 7, a modification is herein disclosed in which the screed 19a carries the track member 23a, the track member being an integral part of the screed. The carriage moves back and forth laterally as indicated in the direction of the double pointed arrow in Figure 6.

In addition to the spreader plate 27, I provide a supplemental spreader plate 66, which is pivoted, as indicated at 67, to an arm 67a of the carriage 26 through a universal knuckle joint.

This universal knuckle joint 67 is provided with a handle 68 which will permit the plate 66 to be rotated universally about the knuckle 67 whereby the plate may be suspended loosely so

as not to serve as a spreading unit; or the knuckle 67 may be tightened with the plate 66 in any suitable angular position, acting to throw the concrete at various angles either to or from the screed. The vibrating unit 42 on the carriage will vibrate both the spreader plates 27 and 66 and simultaneously will vibrate the screed 19a because the wheels at one side of the transverse carriage 26 are supported directly on the front wall or apron of the screed 19a. The screed reciprocates laterally independently of any movement of the carriage 26 and its wheels supported on the track 23a.

It will be understood that suitable conventional means will be provided to raise and lower the screed 19a, but in this case such screed will necessarily have a limited movement because of the presence of the carriage 26 resting in part on the screed track 23a so that it will not be practicable to raise the screed 19a to any great height. However even a raised screed height of one-half inch from the top surface of the concrete is sufficient to permit operation of the finishing elements and the carriage and track 23a will not interfere with any such vertical movement of the screed 19a.

It will be understood that I have produced a complete combination road building machine and concrete spreader of such a character that the various functions of the machine in sequence perform such individual operations required for the building of a modern road, starting for instance with the vibrated spreader which is followed by the vibrated tamper, as well as the vibrated surfacing apparatus. All of these elements must be used to perform the necessary operations.

By vibrating the transversely moving spreading blade 27 and the longitudinal spreader, the concrete itself is compacted to a very high degree in accompaniment with the spreading action. The vibration communicated by the screed contributes to the compaction of the concrete mass. Therefore by these series of vibrated actions all taking place in short sequence and in the definite relations provided by the mounting of all these agencies on a single machine, I secure an improved concrete road body possessing stability and strength in a road which has not been secured to this high degree heretofore.

The plate or blade 66 forms a lateral spreading unit in addition to the lateral spreading blade 27 and may be adjusted up and down through the universal connection 67 or through any other suitable means. The arm 67a is supported by the carriage 26 and carries the blade 66 back and forth across the roadway with such carriage. By turning the blade 66 by means of the handle 68 to one angular position, the transverse movement of the blade 66 across the roadway will have the effect to throw more material toward the screed. By reversing the angular position of the blade 66 the transverse movement will throw the material away from the screed. In this way, simultaneously with the spreading action, a control of the spread concrete with reference to the screed is had by a simple adjustment.

It is obvious that various changes and modifications may be made in the details of construction and design of the above specifically described embodiment of this invention without departing from the spirit thereof, such changes and modifications being restricted only by the scope of the following claims.

What is claimed is:

1. In a road building machine, a track extending transversely of the roadway, means for supporting said track for movement along the roadway, a carriage having wheels rolling on said track, means for causing the reciprocating movement of the carriage back and forth on said track, a relatively short blade extending lengthwise of the roadway and supported adjustably from said carriage to spread concrete forward of a screed to be surfaced by the screed simultaneously as the machine moves forward.

2. In a road building machine, a surfacing member, a single flat spreading blade mounted forwardly of the surfacing member, with its edgewise dimension longitudinally of the roadway, means for moving said blade flatwise continuously substantially completely across the roadway to spread the material deposited on the sub-grade in advance of the action of the surfacing member, a supplemental spreader positioned in advance of the spreader blade, and means for angularly adjusting said supplemental spreader to deflect material to one or the other side thereof and of said main spreader member.

3. In a road building machine, a surfacing member, a single flat spreading blade mounted forwardly of the surfacing member, with its edgewise dimension longitudinally of the roadway, means for moving said blade flatwise continuously substantially completely across the roadway to spread the material deposited on the sub-grade in advance of the action of the surfacing member, a supplemental thin flat spreader blade mounted in advance of the first mentioned blade and in substantial longitudinal alinement therewith and movable transversely with said first mentioned spreader blade, and means for angularly adjusting said supplemental blade with reference to its longitudinal alinement with the first mentioned spreader blade.

4. In a road building machine, a track extending transversely of the roadway, means for supporting said track for movement along the roadway, a carriage movable on said track, means for causing the reciprocating movement of the carriage on said track, a relatively short blade extending lengthwise of the roadway and supported from said carriage to spread concrete forward of a screed to be surfaced by the screed simultaneously as the machine moves forward.

5. A road paving machine comprising a mobile truck adapted to travel on forms at each side of the area to be paved, a transverse runway on the truck, a carrier movable along the runway, a support depending from the carrier, spreader blade on the support set edgewise to the surface to be paved and extending longitudinally of the area being paved, means for moving the carrier back and forth whereby the spreader is caused to effect a preliminary distribution of the paving material which may be irregularly heaped in the space between the side forms, and transverse strike-off means on the truck rearwardly of the spreader for effecting a further and complementary paving operation.

6. A road paving machine comprising a mobile truck adapted to travel on forms at each side of the area to be paved, a transverse strike-off on said truck, a spreader blade extending longitudinally of the area to be paved and disposed forwardly of said strike-off, and means to cause back and forth movement in substantially the same transverse line of said spreader blade to

effect a preliminary distribution of the paving material prior to the action thereon of said strike-off.

7. A road surfacing machine comprising a main wheeled carriage, a transversely-reciprocated surfacing member carried by said carriage to surface road materials progressively as the carriage is moved longitudinally of the roadway, another carriage supported on the first-named carriage to move transversely across the roadway forwardly of said surfacing member progressively as the main carriage is moved longitudinally of the roadway, and spreader means extending longitudinally of the area to be paved and carried by and movable with said second-named carriage.

JOHN N. HELTZEL.