April 9, 1935. J. N. HELTZEL 1,997,216

METHOD OF AND MEANS FOR PRODUCING CONCRETE SURFACING JOINTS

Filed Dec. 17, 1928 3 Sheets-Sheet 1

FIG. 1.

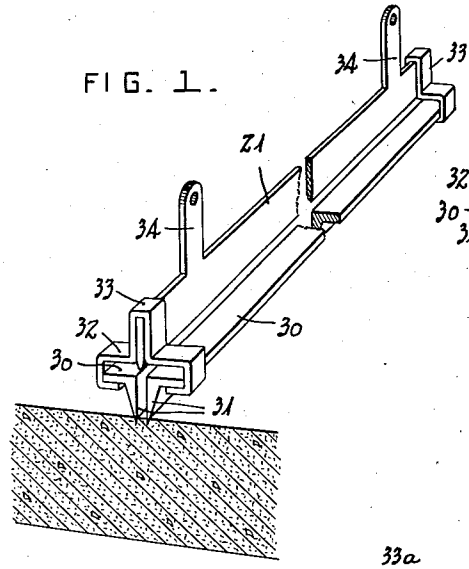


FIG. 2.

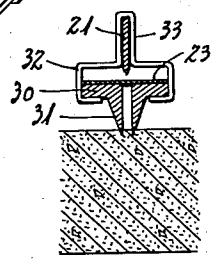


FIG. 3.

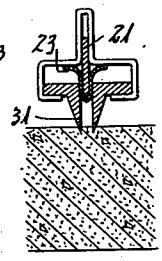


FIG. 4.

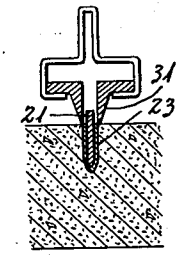


FIG. 5.

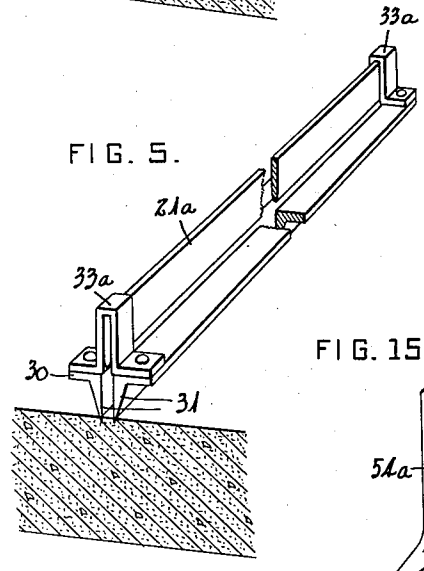


FIG. 6.

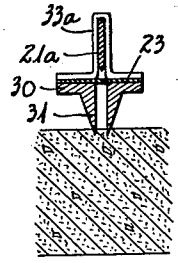


FIG. 7.

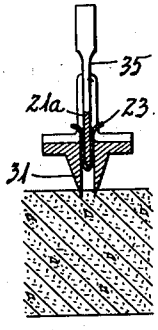


FIG. 8.

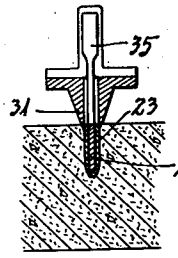


FIG. 15.

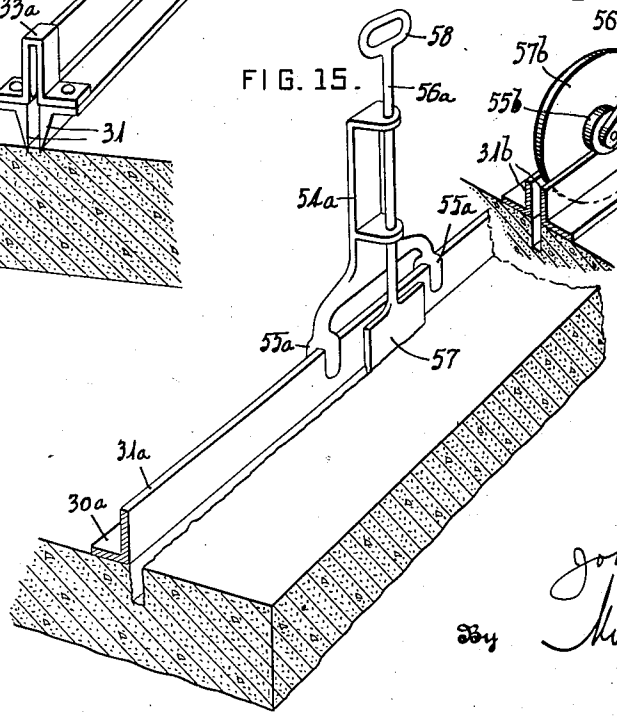


FIG. 16.

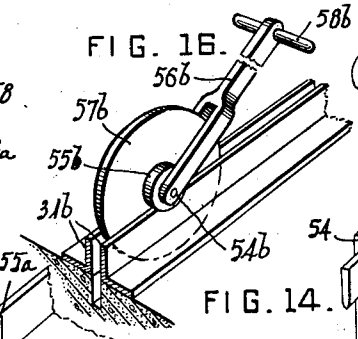
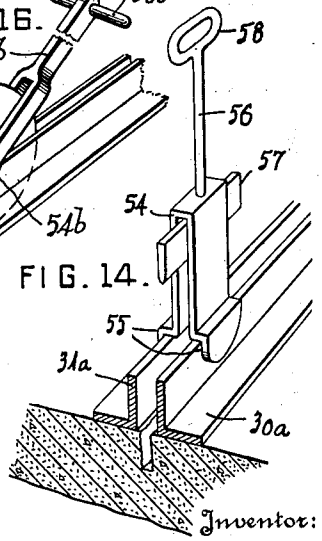


FIG. 14.



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METHOD OF AND MEANS FOR PRODUCING CONCRETE SURFACING JOINTS

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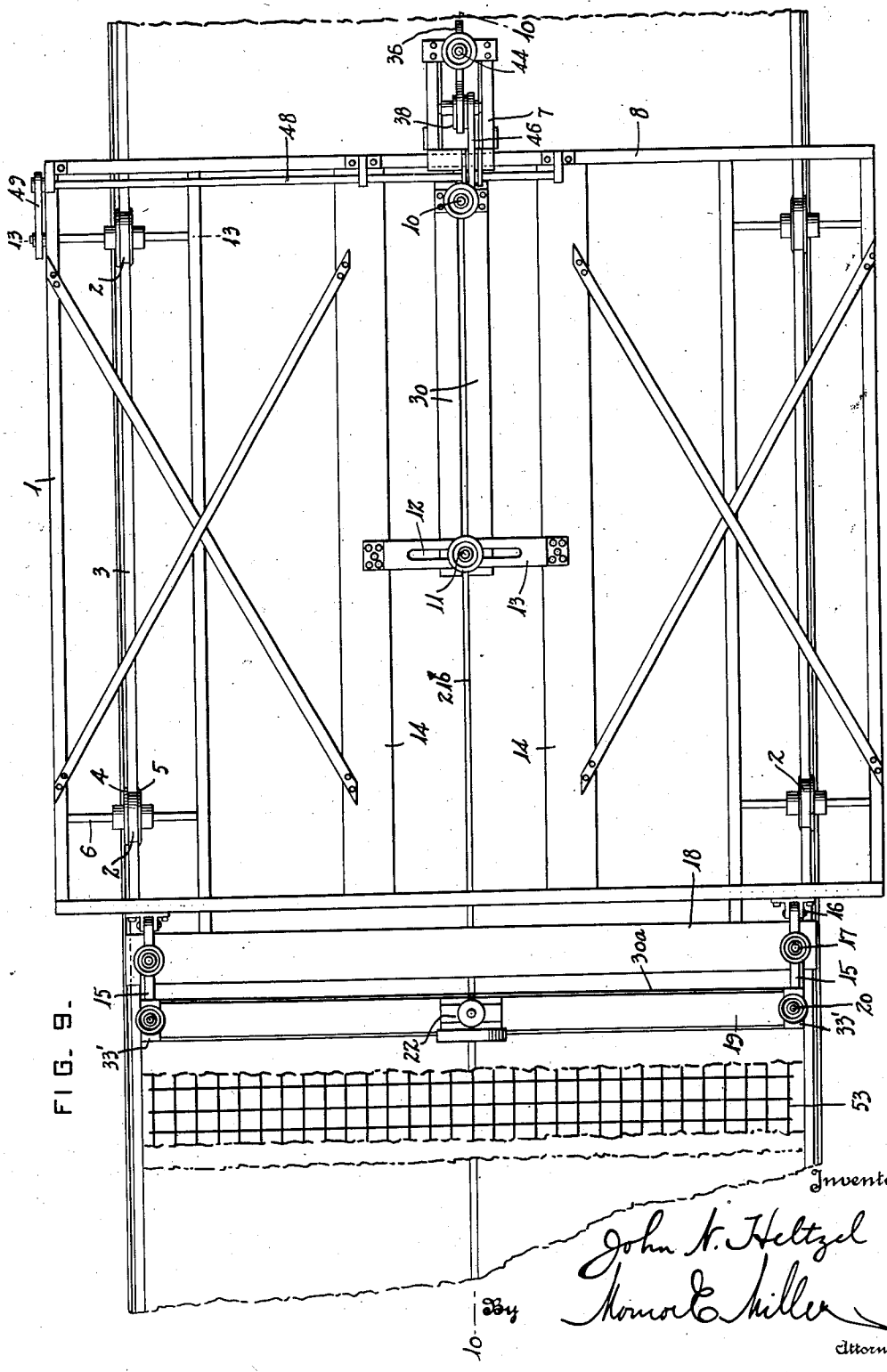


FIG. 9.

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METHOD OF AND MEANS FOR PRODUCING CONCRETE SURFACING JOINTS

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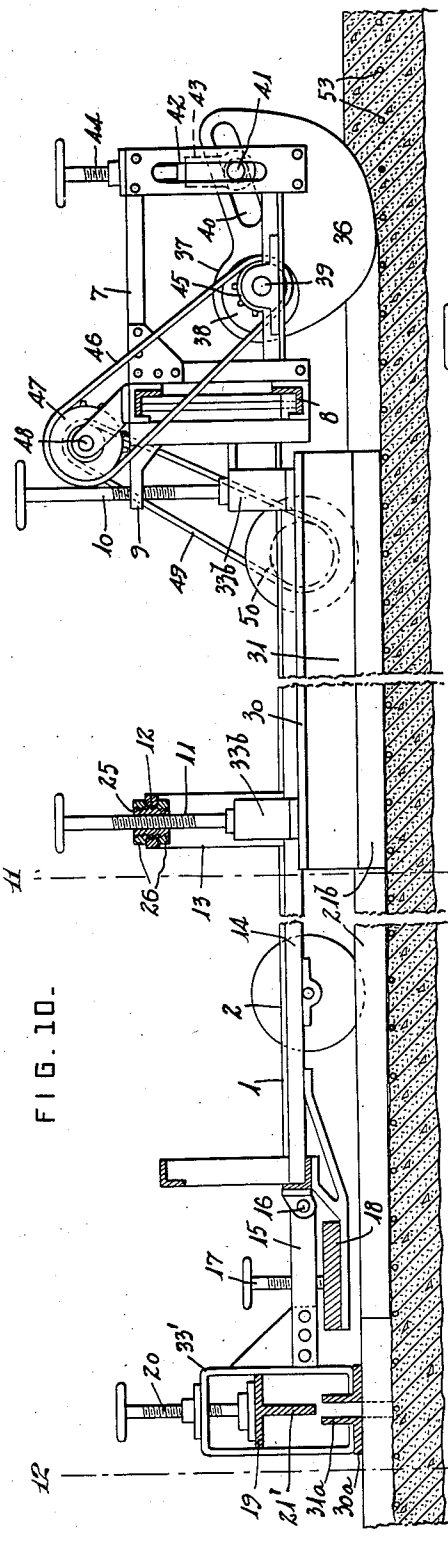


FIG. 10.

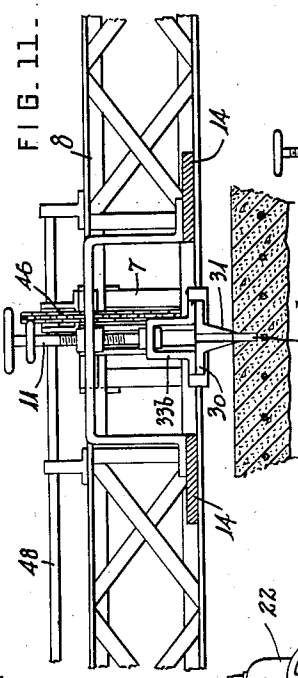


FIG. 11.

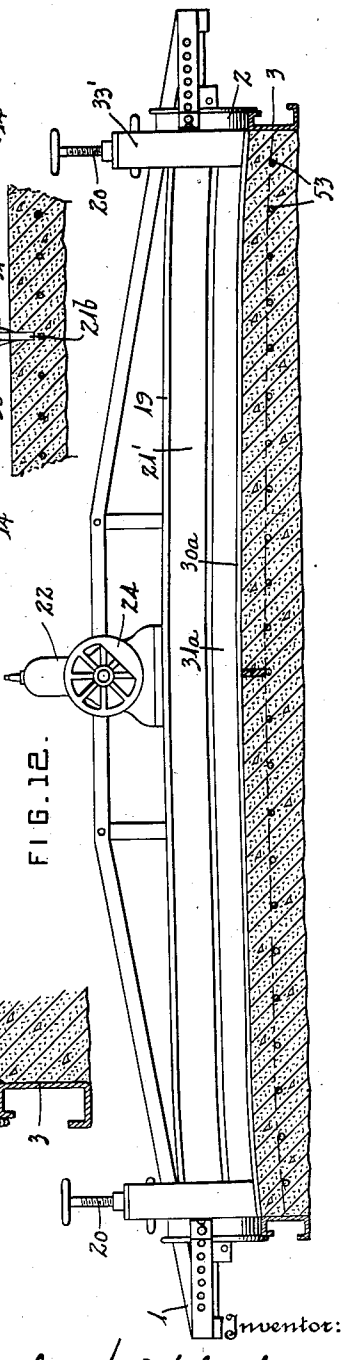


FIG. 12.

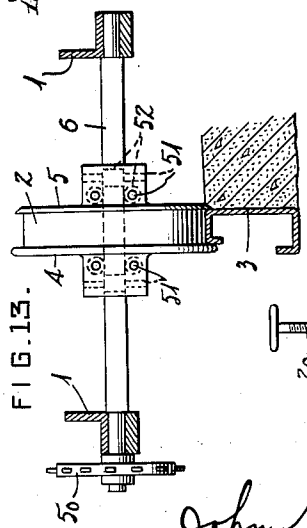


FIG. 13.

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Patented Apr. 9, 1935 1,997,216

UNITED STATES PATENT OFFICE

1,997,216

METHOD OF AND MEANS FOR PRODUCING CONCRETE SURFACING JOINTS

John N. Heltzel, Warren, Ohio

Application December 17, 1928, Serial No. 326,538

45 Claims. (Cl. 94—39)

The present invention relates to concrete surfacing structures, such as roads, pavements, platforms, floors, and the like, and aims to provide novel and improved method of and means for producing joints in a concrete road or other surfacing structure, this application being in part a continuation of application Serial No. 3,972, filed January 22, 1925, Patent No. 1,697,563 granted January 1, 1929.

A further object of the invention is the provision of novel means for guiding a blade and/or strip to enter the plastic concrete, in order that the strip or joint member may be deposited accurately and conveniently in the concrete.

A further object is the provision of additional improvements in embodying the joint installing means in a machine.

With the foregoing and other objects in view, which will be apparent as the description proceeds, the invention resides in the construction and arrangement of parts, as hereinafter described and claimed, it being understood that changes can be made within the scope of what is claimed, without departing from the spirit of the invention.

The invention is illustrated in the accompanying drawings, wherein—

Figure 1 is a perspective view of a joint installing device embodying the improvements, portions being broken away.

Fig. 2 is a cross section of said device illustrating the first step in the method of producing the joint.

Fig. 3 is a similar cross section showing the strip or sheet being forced down and folded preparatory to entering the concrete.

Fig. 4 is a similar cross section showing the strip forced down into the concrete.

Fig. 5 is a perspective view similar to Fig. 1 illustrating a modified form of device, portions being broken away.

Figs. 6, 7 and 8 are cross sections corresponding to Figs. 2, 3 and 4, showing the steps in the formation of the joint.

Fig. 9 is a plan view of a machine embodying longitudinal and transverse joint installing devices.

Fig. 10 is a longitudinal vertical section on the line 10—10 of Fig. 9, on an enlarged scale, portions being broken away.

Figs. 11 and 12 are cross sections on the respective lines 11—11 and 12—12 of Fig. 10.

Fig. 13 is an enlarged cross-section on the line 13—13 of Fig. 9.

Fig. 14 is a perspective view of a concrete spading or chopping device for producing a cut or slot in the plastic concrete to receive the joint strip or member.

Fig. 15 is a perspective view of another form of spading or chopping device.

Fig. 16 is a perspective view of another device for producing a cut or slot in the plastic concrete and depressing a joint strip therein.

Referring to Figs. 1, 2, 3 and 4, which are taken from application Serial No. 3,972 hereinbefore referred to,

A mandrel blade 21 is movable downwardly between a pair of parallel guide bars or members 30 when thrust downwardly to enter the plastic concrete. Said bars 30 have depending flanges 31, the lower edges of which are sharp in order to slightly enter the concrete along the opposite sides of the line of the joint, the bars 30 being supported by hand or by machine or other mechanical means. Arches 32 are secured to the bars 30 and have upstanding slotted guides 33 in which the mandrel blade 21 is disposed when raised, and the blade 21 has suitable means for depressing and raising it.

As shown, the blade 21 has the upstanding arms 34. In using the appliance it is positioned over the desired line, with the edges of the flanges 31 entering the concrete slightly. The strip 23 of paper, fabric, sheet metal or other suitable material is then positioned on the bars 30, and may be slid lengthwise on said bars under the blade which is in raised position. The blade is then moved downwardly, thereby forcing the central portion of the sheet or strip 23 down into the slot between the bars 30, and folding the strip to bring the opposite wings or sides thereof against the sides of the blade. The strip is thus folded or doubled before entering the concrete, and the blade moving downwardly will force the strip into the concrete, as seen in Figure 4, after which the blade is raised to retract it from the strip; the blade 21 not being in contact with the sidewalls of the concrete along the joint, the concrete will not tear up or become distorted when the blade 21 is withdrawn from within the folded strip 23 because the sides of the blade are in contact with the inside walls of the strip 23; the blade 21, therefore, does not contact with the inside wall of the plastic concrete and there is no friction or distorting action of the plastic concrete when the blade 21 is withdrawn from within the strip. By using the bars 30 the strip is folded thereby, and this will reduce the agitation of the concrete at the joint, assisted by the flanges 31 between which the strip enters the concrete.

The flanges or blades **31** need not enter the concrete, but merely touch the concrete, or may even be spaced slightly above the concrete, which is also true of the flanges or blades of the device shown in Figures 5, 6, 7 and 8 which are also taken from said Patent No. 1,697,563. If desired, the blades may penetrate the plastic concrete for a depth of several inches and be trailed along the road for progressively receiving joint material between the blades to be deposited in the plastic concrete by a continuous operation. The blades may also be reversed as shown in Figures 14 and 15 with flanges resting on the concrete or supported slightly above the surface of the concrete.

As shown in Figures 5–8 the bars **30** have flanges **31**, and said bars are connected by upstanding slotted guides **33***a* in which the mandrel blade **21***a* is positioned.

As seen in Figure 6, the strip **23** is placed on the bars **30** under the raised blade **21***a*, and said blade is then forced downwardly to fold the strip and force it downwardly between the flanges **31** into the concrete, substantially the same as with the device shown in Figures 1–4. The blade **21***a* is forced downwardly by means of one or more rams **35** which are used to receive the blows of a hammer or other driving implement, said rams **35** passing downwardly between the bars **30**, as seen in Figure 8.

The bars **30** may then be removed from the concrete leaving the blade or strip **21***a* and the doubled strip **23** in the concrete, so that the blade or bar **21***a* will form a part of the completed joint, or said blade may be removed subsequently when an open joint is desired; therefore, it will be understood that if a poured joint is desired, the blade **21***a* will be permitted to remain within the folded strip **23** only temporarily to support the strip in an expanded condition while the concrete is being finished. After the concrete has taken its initial set, the blade **21***a* may be withdrawn from the concrete from between the inside walls of the folded strip provided it is desired to pour and seal the joint with a tar, bituminous or other suitable material. The folded strip forms a pocket or receptacle so that if a crack develops below the strip **23**, the filler material will be confined within the folded strip and will be retained therein. The blade **21***a* may be a bar or strip to form a part of the completed joint, or may be a form for holding the groove open, so that the grove may subsequently be filled with tar, bitumen, or other composition to seal the joint as described.

The blade or strip **21***a* can also be forced down between the bars **30** into the concrete, without using the strip or sheet **23**, and said strip **21***a* may be of metal, wood, composition, or any suitable material, to provide a joint member to remain in the concrete, or to be used as a form for subsequent removal to produce a groove in the concrete to be filled with sealing material.

Figs. 9, 10, 11, 12 and 13 illustrate a machine embodying longitudinal and transverse joint installing devices.

The longitudinal joint installing device comprises the bars **30** having the vertical blades **31**, and the blades or angle irons are connected by the arches **33***b*.

A carriage or bridge carries the joint installing devices and comprises a suitable frame **1** mounted on the wheels **2** which travel on the side rails or forms **3**, which define the side edges of the road. The wheels **2** have outer flanges **4** and have inner sharp flanges **5** which move between the rails **3** and the concrete to bevel or round off the edges of the concrete. The wheels **2** are mounted on axles **6** on which the frame **1** is mounted, and the wheels may be adjusted transversely for roads of different widths.

A bracket **7** is mounted for transverse adjustment on the forward transverse truss **8** of the frame, and has a rearwardly extending bracket **9** through which a vertical screw **10** is screw-threaded, and the lower end of said screw is swivelled in the front arch **33***b* of the longitudinal joint installing device, and a vertical screw **11** is similarly swivelled in the rear arch **33***b*.

The screw **11** is screw-threaded within a sleeve **25** disposed within a slot **12** in a transverse arch **13** which is secured on spaced longitudinal platforms **14** mounted in the frame **1** at opposite sides of the longitudinal joint installing device.

Nuts **26** are threaded on the sleeve **25** to clamp same in different positions and by loosening the nuts **26** the rear end of the joint installing device may be adjusted transversely, while the forward end thereof is adjustable transversely with the bracket **7**. The joint installing device may thus be adjusted transversely with reference to the frame **1**.

The bars **30** may be adjusted by means of the screws **10** and **11** so that the flanges **31** may contact with or slightly enter the plastic concrete, or with the flanges spaced above the concrete, and the strips **21***b* may be conveniently positioned between the bars **30** and forced downwardly into the plastic concrete. The flanges **31** guide the strip downwardly into the concrete, and each strip may be positioned in front of the last strip which was deposited in the concrete, so that the strips abut end to end.

The transverse joint installing device is disposed in rear of the frame **1** and comprises the parallel transverse bars or angle irons **30***a* having the upstanding flanges **31***a* between which a blade **21'** is movable, the bars **30***a* being connected by arches **33'** which are secured to rearwardly extending levers **15** that are fulcrumed, as at **16**, to the frame **1**.

The bars **30***a* may be supported in contact with or spaced above the concrete. As shown, screws **17** are carried by the levers **15** to seat on a transverse platform **18** carried by the frame, to support the levers **15**. Said levers may be swung upwardly for lifting the device from the concrete.

The blade **21'** is of T-iron, and has the flanges **19** slidable within the arches **33'**, and screws **20** are threaded through the arches and are swivelled to the blade **21'** for conveniently raising and lowering said blade.

The blade **21'** may be used to cut a groove or slot in the plastic concrete, after which the blade may be raised and a joint strip deposited between the flanges **31***a*, so that the blade may be operated as a ram to force the strip down into the concrete.

The blade **21'** may intersect the longitudinal joint, or may be interrupted so as not to interfere with the longitudinal joint.

In order to vibrate the blade **21'** so that it will be more effective when depressed to enter the concrete or to force a strip down, an engine **22** is mounted on the blade between the ends thereof and has an unbalanced flywheel **24** which in vibrating the blade will assist in driving it downwardly as the screws **20** are rotated to move said blade downwardly.

The machine has means for cutting or slitting the plastic concrete in advance of the longitudinal

joint installing device. Thus, a rocking and sliding blade 36 is disposed in the vertical plane of the longitudinal joint at the front of the carriage, and has a band 37 embracing an eccentric 38 secured on a transverse shaft 39 mounted for rotation in the bracket 7, whereby the blade 36 is adjustable transversely with the bars 30. The blade 36 has a slot 40 receiving a pin 41 on which a roller is preferably disposed to work in the slot 40, and said pin 41 is carried by a vertically adjustable slide 43 adjusted upwardly and downwardly by means of a screw 44, whereby the blade 36 may be adjusted vertically at its forward end to remove the blade from the concrete or to depress the blade to different depths into the concrete.

The shaft 39 has a sprocket wheel 45 thereon connected by a sprocket chain 46 with a sprocket wheel 47 feathered on a transverse shaft 48 mounted on the truss 8, and the sprocket wheel 47 is adjustable transversely with the bracket 7.

The shaft 48 is connected by a sprocket chain 49 with a sprocket wheel 50 secured to one of the front axles 6, whereby when the carriage is propelled, the eccentric 38 is rotated to give the rear portion of the blade 36 a rotary movement in the vertical plane of the joint. The forward portion of the blade 36 being slidable on the pin 41 will result in the blade having a sliding and swinging motion on the pin 41, so that the lower edge portion of the blade will have a sawing and chopping action in the plastic concrete to cut a slot or groove along the line of the longitudinal joint, so that the strips 21b may be more readily forced down into the concrete, or into the groove or slot.

As seen in Figure 13, the axle 6 on which the sprocket wheel 50 is secured is of square cross-section between portions of the frame 1, and pins 51 extend through the hub of the wheel 2 at right angles and have rollers 52 thereon contacting with the sides of the axle 6, thereby compelling the wheel 2 to rotate with the axle, and also mounting said wheel for free sliding movement on the axle for transverse adjustment.

The sprocket wheel 50 may be secured on either end of the axle 6 or between the ends thereof at either side of the wheel 2.

The operation of the machine will no doubt be apparent from the foregoing, but briefly described is as follows: When the machine is propelled forwardly the blade 36 cuts the plastic concrete and forces the reinforcing steel 53 down to a point substantially below or to the bottom of the joint strip, and when the machine has been moved forwardly the length of one of the strips 21b, the next strip is deposited between the bars 30 and forced down into the cut. This operation is repeated so as to deposit the strips 21b end to end and produce the longitudinal joint, and I have used a cutting disc instead of blade 36, which operates more satisfactorily; such a disc 103 is disclosed in my Patent No. 1,740,345, filed February 4th, 1925.

As will be noted in Fig. 11, when the strip 21b is forced down into the plastic concrete, its upper edge portion is still within the slot of the guide in overlapping relation with the bars 30, thereby maintaining the upper edge of the strip in place, and when the machine is moved forwardly the bars 30 move longitudinally from the strip to be positioned for the next strip.

At predetermined points of the road, the transverse joints are produced.

The workmen may stand on the platforms 14 and 18 for conveniently installing the joints and then finishing the concrete along the edges of the joints.

The joints may be installed above reinforcing fabric or rods 53 embedded in the concrete, which fabric or rods may be previously depressed to the proper depth by the blade 36.

Fig. 14 illustrates a spading or chopping device for cutting a groove or slot in the concrete, and may be used in connection with the bars 30a having the upstanding flanges, the blade 21' having been removed or omitted. This device comprises a vertical slotted guide 54 having its lower end open and formed with offsets 55 to seat on and straddle the flanges 31a, thereby positioning the guide with its slot in registration with the slot between the flanges 31a. A rod or stem 56 is slidable through the upper end of the guide 54 and has a spade or chopping blade 57 movable in the guide, and a handle 58 at its upper end. The blade 57 may be reciprocated vertically so as to cut the groove or slot in the concrete, and the guide 54 may be slid along the flanges 31'. This device may therefore be conveniently used for spading or chopping the concrete along a predetermined line so as to receive the joint strip or member.

Fig. 15 illustrates a modified form of spading device for use with a single bar 30a having the upstanding flange 31a which serves as a straight-edge guide. The device comprises an upstanding guide 54a having slotted portions 55a to fit astride the flange 31a for positioning the device and permitting it to move along said flange. A vertical rod 56a is slidable in the guide 54a and has the blade 57 at its lower end and the handle 58 at its upper end. The rod 56a may be reciprocated to force the blade 57 into the plastic concrete for cutting a groove or slot in which the joint strip or member may be deposited along a predetermined straight line.

If desired, the guide bar or member may be curved or of any other suitable shape or arrangement for cutting any desired groove or slot for receiving a joint strip of similar shape and arrangement. This enables oblique and other joints to be produced as well as transverse and longitudinal joints.

Fig. 16 illustrates the use of a disk 57b as a blade to roll between the guide blades 31b, and said disk has the axle 34b secured to the forked bar 56b having the handles 58b for pushing or pulling the disk along the slotted guide. Collars 55b are provided on the axle at the sides of the disk 57b to roll on the blades 31b and regulate the depth to which the disk enters the plastic concrete. The disk in being moved along the slot will cut a groove in the plastic concrete, and the disk may also be used for depressing a joint strip into the groove. Thus, after the groove has been formed and the joint strip is placed between the blades 31b, the disk 57b may be rolled on the strip to depress it, and in this use of the device collars or gages 55b of larger diameter may be used so that the lower edge of the disk cannot move below or substantially below the surface of the concrete when it is desired to deposit the strip substantially flush with said surface.

Having thus described the invention, what is claimed as new is:—

1. The method of producing a joint in a concrete surfacing structure consisting in positioning a guide member over the plastic concrete along the line of the joint, forcing a joint strip into the plastic concrete while guided by said member,

and removing the guide member from said strip.

2. The method of producing a joint in a concrete surfacing structure consisting in positioning a slotted guide over the plastic concrete along the line of the joint, forcing a joint strip from within the slot of said guide into the plastic concrete, and removing the guide from said strip.

3. The method of producing a joint in a concrete surfacing structure consisting in positioning a slotted guide over the plastic concrete along the line of the joint, forcing joint material through the slot of the guide into the plastic concrete, and removing said guide from said joint material.

4. The method of producing a joint in a concrete surfacing structure consisting in positioning a guide member over the plastic concrete along the line of the joint, cutting the plastic concrete along the line of said member, forcing a joint strip into the cut made while guided by said member, and removing said guide member from the joint strip.

5. The method of producing a joint in a concrete surfacing structure consisting in positioning a slotted guide over the plastic concrete along the line of the joint, cutting the plastic concrete through the slot of the guide, forcing joint material through said slot of the guide into the cut made in the plastic concrete, and removing said guide from the joint material.

6. The method of producing a joint in a concrete surfacing structure consisting in positioning a slotted guide over the plastic concrete along the line of the joint, cutting the plastic concrete through the slot of said guide, forcing a joint strip from within the slot of the guide into the cut made in the concrete, and removing said guide from said joint strip.

7. The method of producing a joint in a concrete surfacing structure consisting in positioning a slotted guide over the plastic concrete along the line of the joint, placing a strip of flexible material on said guide over the slot thereof, and moving a blade downwardly into and through said slot to double said strip on the blade and force it down through said slot into the plastic concrete.

8. Means for producing a joint in a concrete surfacing structure comprising a guide to be positioned over the plastic concrete and having a slot for guiding a joint strip downwardly into the concrete, and means movable downwardly into said slot from above the slot to force said strip downwardly into the concrete.

9. An apparatus for producing a joint in a concrete surfacing structure comprising a guide having a slot, and means adapted to enter said slot from above the slot for forcing a joint strip from within said slot into the plastic concrete.

10. An apparatus for producing a joint in a concrete surfacing structure comprising a slotted guide to be positioned over the plastic concrete, and a blade movable into said guide from above the guide and adapted to force a joint strip from within the guide into the plastic concrete.

11. An apparatus for producing a joint in a concrete surfacing structure comprising a carriage movable over a plastic concrete, a guide carried by said carriage to be positioned over the plastic concrete along the line of the joint and having a slot for guiding a joint strip down into the concrete, and means movable into said slot from above the slot for forcing the joint strip down into the concrete.

12. An apparatus for producing a joint in a concrete surfacing structure comprising a carriage movable over the plastic concrete, a guide carried by the carriage having an upwardly opening slot to be disposed along the line of the joint and to receive joint material to enter the plastic concrete, and means movable downwardly into said slot from above the slot for forcing the joint material down from within the slot into the plastic concrete.

13. An apparatus for producing a joint in a concrete surfacing structure comprising a carriage movable over plastic concrete, a slotted guide carried by the carriage to be disposed over the plastic concrete along the line of the joint, and means movable downwardly into said slot from above the slot for forcing a joint strip down from within the slot through said guide into the concrete.

14. An apparatus for producing a joint in a concrete surfacing structure comprising a carriage movable over plastic concrete, a slotted guide carried by the carriage to be disposed over the plastic concrete along the line of the joint, and a blade movable downwardly into said slot from above the slot to form a joint strip from within said guide into the concrete.

15. Apparatus for producing a joint in a concrete surfacing structure comprising a carriage movable over the plastic concrete, a slotted guide to be positioned above the plastic concrete, means adjustably supporting said guide from the carriage, and means movable into the guide from above the guide for forcing joint material downwardly from within the guide into the plastic concrete.

16. Apparatus for producing a joint in a concrete surfacing structure comprising a slotted guide, a blade movable downwardly through the guide into the plastic concrete, and means for vibrating said blade.

17. Apparatus for producing a joint in a concrete surfacing structure comprising a carriage movable over the plastic concrete, a cutting blade movable along the line of the joint, and means for mounting said blade from the carriage for sliding and swinging movements in the plane of the joint.

18. Apparatus for producing a joint in a concrete surfacing structure comprising a carriage, a blade to move along the line of the joint, and means mounting said blade from the carriage for upward and downward, forward and rearward, and swinging movements in the plane of the joint.

19. Apparatus for producing a joint in a concrete surfacing structure comprising a carriage, a cutting blade mounted for sliding and swinging movements from the carriage, and means for imparting a rotary motion to another portion of the blade.

20. Apparatus for producing a joint in a concrete surfacing structure comprising a carriage, a cutting blade having a sliding and swinging connection with the carriage, and an eccentric mounted on the carriage and engaging said blade for actuating it.

21. The method of producing a joint in a concrete surfacing structure consisting in positioning a guide member over the plastic concrete along the line of a joint, guiding joint material downwardly by said guide member to enter the plastic concrete, and guiding means by said guide member to force the joint material downwardly into the plastic concrete.

22. The method of producing a joint in a concrete surfacing structure consisting in position-

ing a guide member over the plastic concrete along the line of a joint, guiding a joint strip downwardly by said guide member to enter the plastic concrete, and moving a blade downwardly while guided by said guide member to force said strip downwardly from the guide member into the plastic concrete.

23. The method of producing a joint in a concrete surfacing structure consisting in positioning a slotted guide over the plastic concrete along the line of a joint, guiding joint material downwardly from within the slot of said guide to enter the plastic concrete, and moving means downwardly into the slot of the guide from above said slot to force the joint material downwardly from within said slot into the plastic material.

24. The method of producing a joint in a concrete surfacing structure consisting in positioning a slotted guide over the plastic concrete along the line of a joint, guiding a joint strip downwardly from within the slot of said guide to enter the plastic concrete, and moving a blade downwardly into said slot from above the slot to force the joint strip downwardly from within the slot into the plastic concrete.

25. The method of producing a joint in a concrete surfacing structure consisting in positioning a guide member over the plastic concrete along the line of the joint, forcing a joint strip into the plastic concrete while guided by said member and leaving the upper edge portion of the strip in overlapping relation with the guide member, and moving the guide member longitudinally to remove it from said strip and position the guide member for the successive strip.

26. The method of producing a joint in a concrete surfacing structure consisting in positioning a slotted guide over the plastic concrete along the line of the joint, forcing a joint strip from within the slot of said guide into the plastic concrete with the upper edge portion of the strip remaining in said slot, and moving the guide longitudinally to remove it from said strip and position the guide for the successive strip.

27. The method of producing a joint in a concrete surfacing structure consisting in positioning a slotted guide over the plastic concrete along the line of the joint, forcing joint material through the slot of the guide into the plastic concrete with the upper portion of said material remaining in said slot, and moving the guide longitudinally from said material to position the guide for the successive material.

28. The method of producing a joint in a concrete surfacing structure consisting in moving a guide member longitudinally of itself over the plastic concrete along the line of a joint, and forcing joint strips into the plastic concrete while guided by said member.

29. The method of producing a joint in a concrete surfacing structure consisting in moving a slotted guide longitudinally of itself over the plastic concrete along the line of a joint, and forcing joint strips from within the slot of the guide into the plastic concrete.

30. The method of producing a joint in a concrete surfacing structure consisting in moving a slotted guide longitudinally of itself over the plastic concrete along the line of the joint, and forcing joint material through said slot of the guide downwardly into the plastic concrete.

31. The method of producing a joint in a concrete surfacing structure consisting in moving a guide member longitudinally of itself over the plastic concrete along the line of the joint, cutting the plastic concrete along the line of and guided by said member, and forcing joint strips into the cut made while guided by said member.

32. The method of producing a joint in a concrete surfacing structure consisting in moving a slotted guide longitudinally of itself over the plastic concrete along the line of the joint, cutting the plastic concrete through the slot of the guide, and forcing joint material through said slot of the guide into the cut made in the plastic concrete.

33. The method of producing a joint in a concrete surfacing structure consisting in moving a slotted guide longitudinally of itself over the plastic concrete along the line of the joint, cutting the plastic concrete through the slot of said guide, and forcing joint strips from within the slot of the guide into the cut made in the concrete.

34. An apparatus for producing a joint in a concrete surfacing structure comprising an elongated guide member to be positioned over the plastic concrete for guiding a blade or strip moved into the concrete, and means for mounting said guide member for movement longitudinally of itself along the line of the joint.

35. An apparatus for producing a joint in a concrete surfacing structure comprising a slotted guide adapted to be disposed over the plastic concrete for guiding a blade or strip in the slot thereof for movement into the plastic concrete, and means mounting said guide for movement longitudinally of itself along the line of the joint.

36. Apparatus for producing a joint in a concrete surfacing structure comprising a carriage movable over the plastic concrete, a cutting blade, and means for mounting said blade from the carriage for reciprocation longitudinally of the movement of the carriage and for reciprocating said blade in said direction for producing a longitudinal joint in the plastic concrete.

37. The method of forming grooves in plastic concrete, comprising the forcing of a joint member into the plastic material, said member being supported in an expanded condition by a second member inserted within the first member, removing the second member thereafter and filling the space occupied by the second member with a sealing material.

38. The method of installing joints in plastic concrete, consisting of forcing a folded joint member into plastic concrete and thereafter removing an expanding member from within the top of the second member, and thereafter applying joint material within the open top of the first named member to seal the joint and produce a traffic line.

39. A joint installing machine comprising a wheeled carriage spanning a road under construction, a single longitudinal aligning member carried by the carriage, a joint cleaving implement having means associated with the member for supporting the implement on the member for movement longitudinally along the member to cleave plastic concrete to receive a joint strip.

40. A joint aligning and installing guide, comprising a single longitudinal member, a joint cleaving implement having portions to engage the guide for movement of the implement along the guide to cleave plastic concrete to receive a joint strip to be aligned by the guide.

41. A semicircular joint cleaving implement carried by a carriage spanning a roadway under construction, said implement having up and down, backward and forward movement, means for exerting pressure on the implement while operat-

ing in the plastic material, and means for raising the implement from contact with the concrete.

42. A road building machine comprising a wheeled carriage operating on side forms and moving over a road under construction with reinforcing steel imbedded within said road, an implement carried by the carriage to penetrate into the plastic concrete to a depth substantially as that of the reinforcing, and means for exerting pressure on the implement to depress any reinforcing which contacts with the bottom of implement.

43. The method of producing joints in concrete surfacing structures, consisting of depressing a U-shaped longitudinal joint member down into plastic concrete by an implement to be moved within the channel formed by the U and thereafter removing the implement and applying joint material within the channel.

44. The method of producing joints in plastic concrete, consisting of forcing a U-shaped longitudinal joint member down into the plastic concrete by an implement inserted within the U portion and exerting pressure on the implement and withdrawing the implement from the member and applying joint material into the U portion of the member remaining in the concrete.

45. The method of constructing joints in concrete surfacing structures, consisting of forcing a U-shaped member into the plastic concrete and holding the sides of the member against the plastic concrete by an implement inserted within the sides of the member.

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