March 13, 1934. J. N. HELTZEL 1,950,673

JOINT INSTALLING MACHINE

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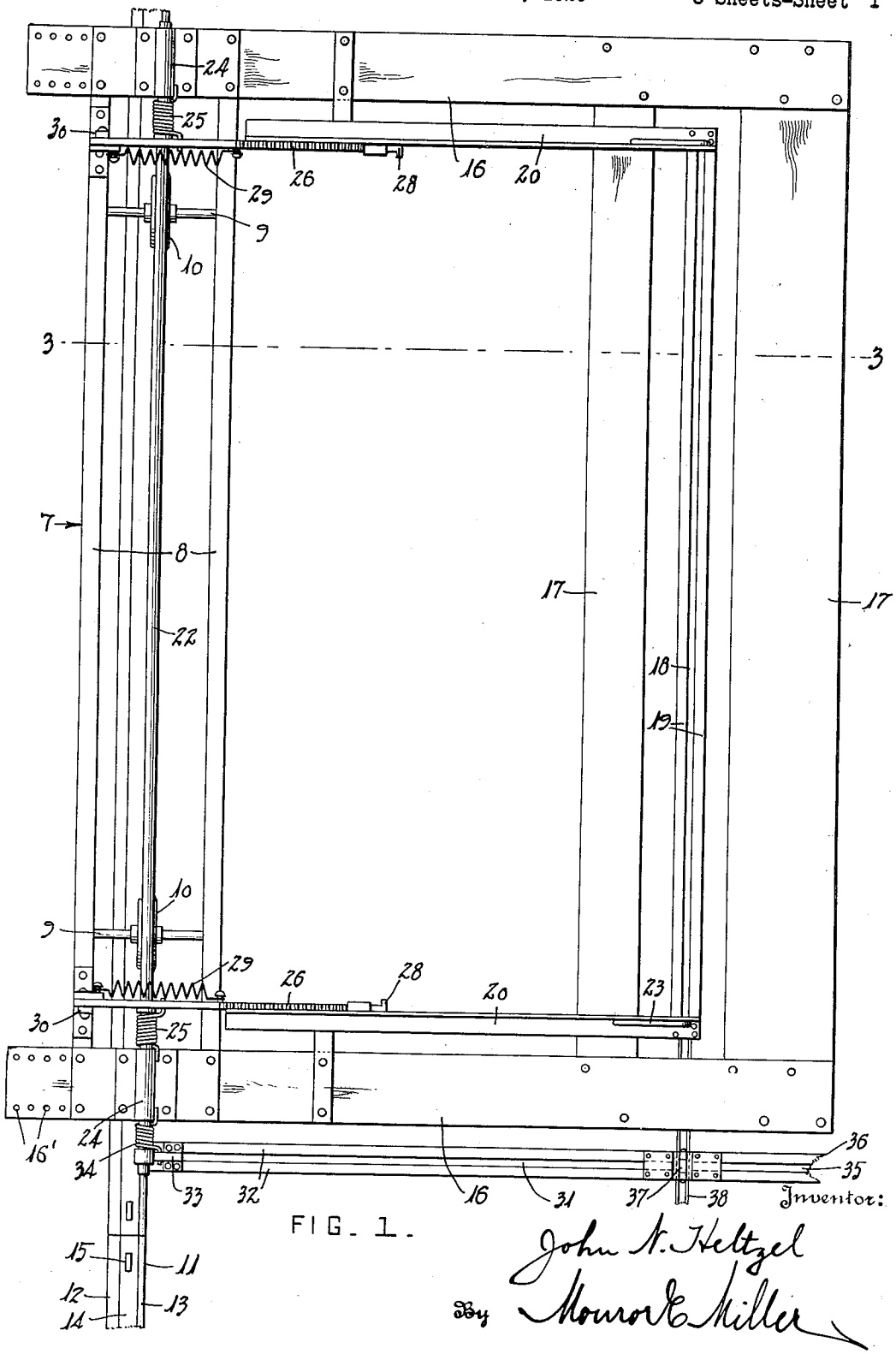


FIG. 1.

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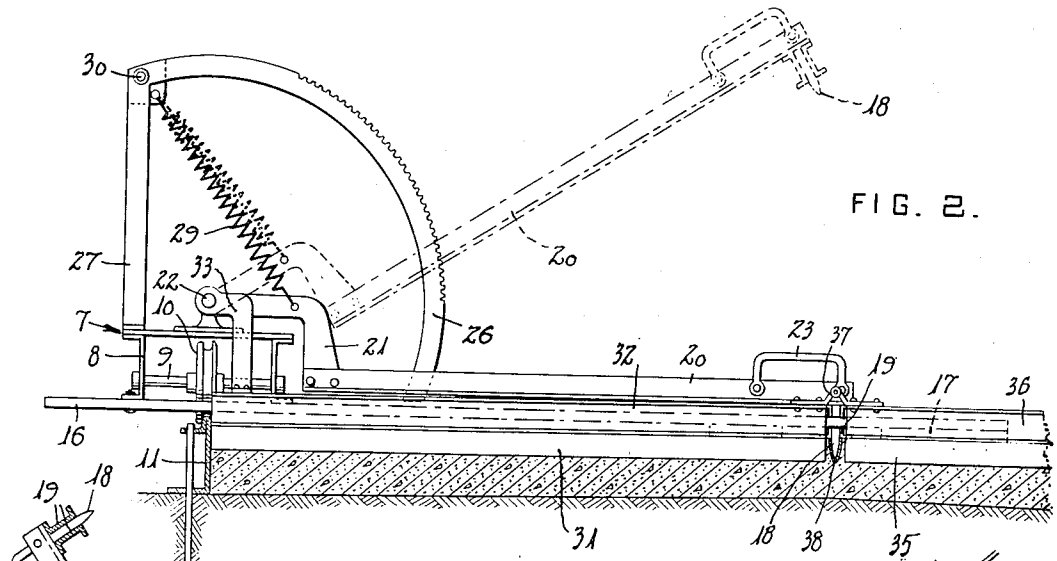


FIG. 2.

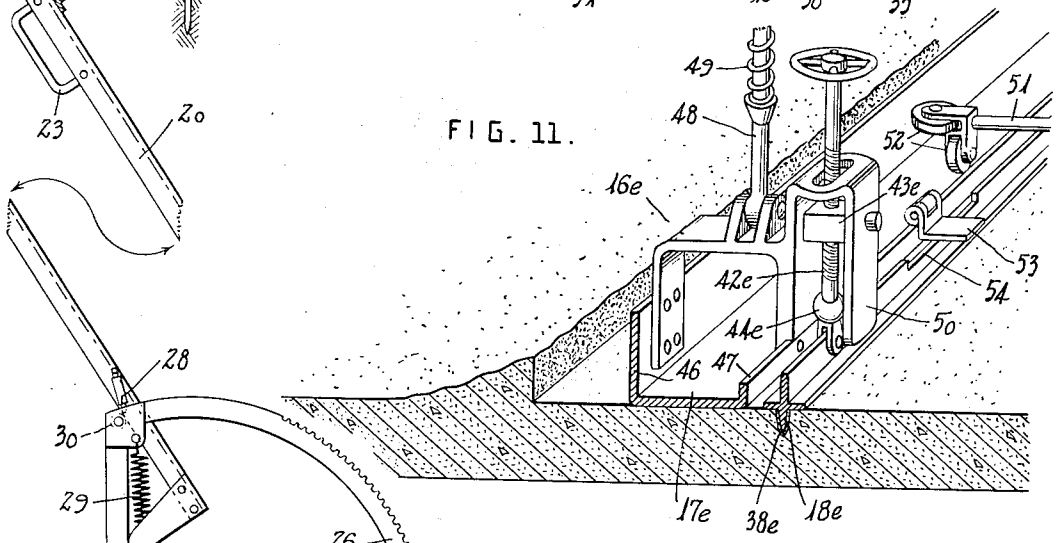


FIG. 11.

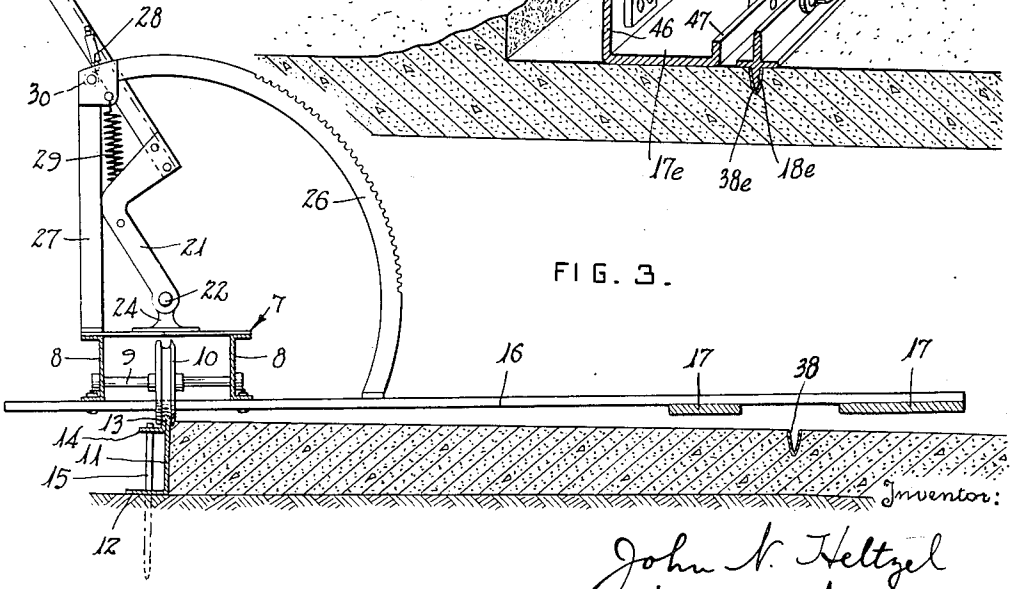


FIG. 3.

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FIG. 10.

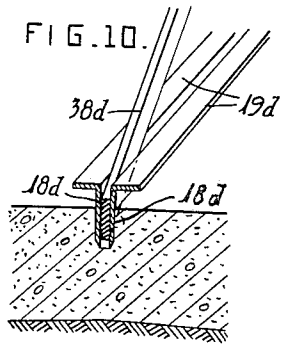


FIG. 4.

FIG. 7.

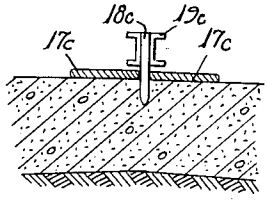


FIG. 8.

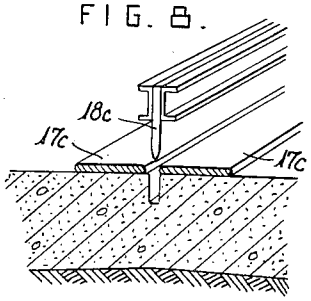


FIG. 9.

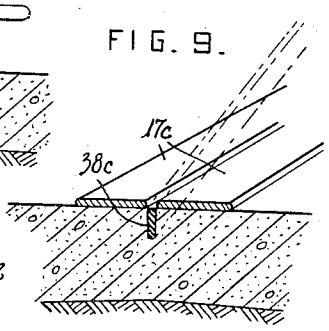


FIG. 5.

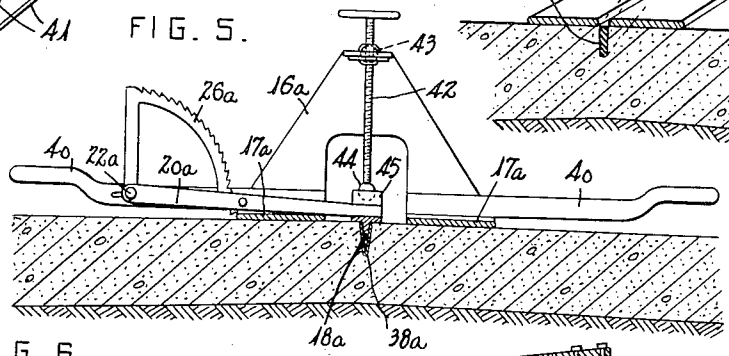
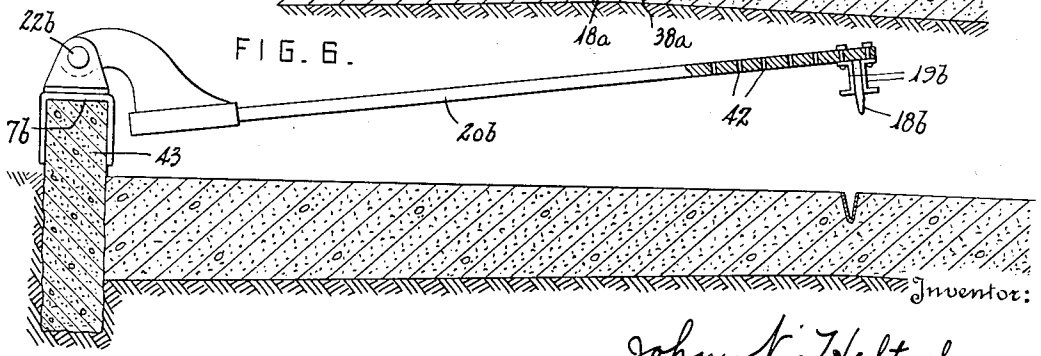


FIG. 6.



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UNITED STATES PATENT OFFICE

1,950,673

JOINT INSTALLING MACHINE

John N. Heltzel, Warren, Ohio

Application March 2, 1929, Serial No. 343,991

14 Claims. (Cl. 94—45)

The present invention relates to joint installing machines for use in the building of concrete roads and similar surfacing structures, and aims to provide a novel and improved machine of that kind.

One object of the invention is the provision of a joint installing device movable along and operable from one side of the road under construction, without requiring the machine to bridge or span the entire road.

Another object of the invention is to provide a joint installing machine which may be conveniently moved on the road forms or rails at one side only of the road, in order that the machine may be simple in construction for manual operation and propulsion.

A further object is to provide novel means for mounting the joint installing blades or members for movement to and from the concrete, and for mounting a platform for movement on and off the concrete.

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 plan view of the machine.

Fig. 2 is an end view thereof showing the longitudinal joint installer partly raised in broken lines.

Fig. 3 is a cross section on the line 3—3 of Fig. 1 showing the longitudinal joint installer swung to its extreme position away from the concrete.

Fig. 4 is a perspective view of a modified machine.

Fig. 5 is a cross-section thereof.

Fig. 6 is an elevation, partly in section, of a simple form of device for use when the road slabs are built after the curbs.

Figs. 7, 8 and 9 are sectional details illustrating the steps in installing a joint strip or form.

Fig. 10 is a sectional detail illustrating the use of a pair of blades for installing a joint strip or form.

Fig. 11 is a fragmentary perspective view illustrating a transverse joint installing device associated with a screed.

The frame 7 of the machine includes a pair of parallel longitudinal beams 8 between which axles 9 are mounted near the opposite ends of the frame, and flanged wheels 10 are mounted on said axles to run on the forms or rails at one side of the road under construction.

The wheels 10 are adjustable transversely on the axles 9 in order to adjust the frame 7 transversely of the road, in order to space the longitudinal joint the desired distance from the corresponding side of the road.

As shown, the side form or rail comprises a vertical web 11 having the base flange 12, and having the doubled portion 13 forming the tread on which the wheels 10 travel, with an outstanding flange 14 extending from the doubled portion 13. Stakes 15 are driven downwardly through registering openings in the flanges 12 and 14 to maintain the rail in position on the road subbase. This type of rail is preferable to permit the wheels 10 to have a slight transverse rocking motion on the rail, although other types of rails may be used.

Transverse boards or planks 16 are secured by bolts or other securing elements across the beams 8 near the ends of said beams, and said boards have series of apertures 16' to receive the securing elements, to provide for transverse adjustment of said boards with reference to the road. Parallel longitudinal planks or boards 17 are secured to the boards 16 to provide a platform for the workmen when installing and finishing the longitudinal joint. The boards 17 are spaced apart to receive the longitudinal joint installing blade between them.

The platform being secured to the frame 7 may be raised off the concrete, as seen in Fig. 3, by tilting the frame or truck 7 slightly on the rail, thereby permitting the machine to be moved longitudinally of the road.

The longitudinal joint installing blade 18 is secured between a pair of channel members 19, with the blade projecting below said members to enter the plastic concrete, and the members 19 are secured to transverse arms 20 having the angle brackets 21 hingedly mounted on a longitudinal shaft 22 which is journaled in bearings 24 secured on the frame 7.

The arms 20 have handles 23 for conveniently raising said arms and the blade 18, and coiled torsion springs 25 are disposed on the shaft 22 between the brackets 21 and bearings 24 in order to have a tendency to swing the arms 20 upwardly.

Notched segments 26 are secured at their lower ends on the boards 16 and are connected at their upper ends to posts 27 mounted on the frame 7, and the arms 20 have latches or dogs 28 to en-

gage in the notches of said segments for holding the arms 20 raised at different heights.

Coiled springs 29 also connect the brackets 21 with the upper ends of the posts 27 to assist the springs 25 in lifting the arms 20 from the concrete.

The posts 27 have stops 30 to limit the movement of the arms 20 when they are swung beyond vertical position away from the concrete, as seen in Fig. 3, whereby the arms 20 and parts carried thereby counter-balance the boards 16 and platform in order that the machine may be readily tilted sidewise on the rail, as seen in Fig. 3, to lift the platform from the concrete for conveniently moving the machine from one position to another longitudinally of the road.

The transverse joint installing blade 31 is secured between a pair of channel members 32, similar to the blade 18, and the blade 31 extends from the rail on which the machine moves to the line of the longitudinal joint, as seen in Fig. 2. The members 32 are connected near one end by a bracket 33 with the shaft 22, in order that the blade 31 may be swung upwardly and downwardly about the longitudinal axis of the shaft 22 with the blade moving in a vertical transverse plane. A torsion spring 34 is disposed between the bracket 33 and the corresponding bearing 24 to urge the blade 31 upwardly.

A companion transverse joint installing blade 35 is secured between a pair of channel members 36, which are hingedly connected, as at 37, with the members 32, so that the blade 35 can swing with or relatively to the blade 31 into the plastic material at the side of the longitudinal joint line opposite to the blade 31. The blades 35 may also be folded over the blade 31.

In using the machine, it is moved to the desired longitudinal position on the road under construction, after the plastic concrete has been finished, and the platform 17 is let down on the plastic concrete in order that the workmen may stand on said platform while installing and finishing the joint. The arms 20 are raised to the desired height and may be permitted to swing downwardly by gravity so as to thrust the blade 18 into the plastic concrete to produce a groove therein, or the blade may be forced down into the concrete under pressure or the blows of a ram. It is preferable to place a joint form or member 38 of V-shaped section astride the blade 18 in order that said form may be forced down into the concrete, thereby holding the groove open. The forms or strips 38 may be deposited in the concrete end to end as the machine is advanced step by step along the road under construction. After a form or strip 38 has been installed, the machine is then advanced to its next position and the next form or strip is installed in the same manner, thereby forming a longitudinal groove in the road along the desired line.

The forms 38 are subsequently removed, after the concrete has set, and the groove is filled with tar, asphalt, or other material, to seal the joint, and the concrete will break between the groove and the sub-base to produce the longitudinal joint.

The workmen may stand on the platform 17 for installing the joint as well as finishing the concrete along the joint.

In moving the machine from one position to another the arms 20 are swung upwardly against the stops 30, so that they counterbalance the platform 17, thereby permitting the machine to be readily tilted for raising the platform off the concrete, so that the machine may be moved longitudinally without the platform dragging or sliding on the soft concrete.

The transverse joints are installed at predetermined intervals by properly positioning the machine, and, after raising the blade 31, swinging said blade downwardly by gravity or by the blow of a ram to form the transverse joint groove between the corresponding rail and the longitudinal joint. The transverse joints at the opposite side of the longitudinal joint may be formed by the blade 35 or by a supplemental machine when moved along the opposite rail.

The machine is inexpensive in construction as well as operation, being light in weight in order that it can be moved manually on the rail, and the joint installing means also being operable manually.

The platform 17 in addition to supporting the workmen also has the function of holding down the concrete at the opposite sides of the blade 18 when said blade is forced down into the concrete, thereby preventing the upward bulging or heaving of the concrete which might otherwise result.

The machine may also be used for producing various kinds of joints so that various blades may be used. The blades may be such as to be withdrawn from the concrete, or to remain in the concrete, or may be such as to deposit joint forms, strips or members in the concrete.

Figs. 4 and 5 illustrate longitudinal platforms 17*a*, which are preferably of sheet metal having rounded edges and upwardly curved ends in order that the platforms may be floated on the plastic concrete without scoring or marring the surface. Said platforms are connected at their ends by yokes 16*a*, and outstanding handles 40 are secured on said platforms adjacent to the yokes for conveniently lifting and carrying the machine.

Draft members 41 are connected to the forward yoke 16*a* in order that the platforms may be slid on the concrete, and the machine may be pulled manually or by a tractor, concrete mixer, or the like, or may be trailed back of a finishing machine.

It is understood that the apparatus shown in Figure 4 may also be used for installing transverse joints. When thus used, it would be required that the apparatus be of sufficient length so as to span the roadway under construction. The operations are the same with transverse joints as described for installing longitudinal joints.

Arms 20*a* are pivoted, as at 22*a*, to quadrants 26*a*, which are mounted for transverse adjustment in slots 24*a* in the handles 40 at one side, and the joint producing blade 18*a* is secured to the arms 20*a* to enter the plastic concrete between the platforms 17*a*. Any suitable blade may be used. As shown, a V-shaped strip 38*a* is placed over the blade 18*a* to be forced into the plastic concrete.

In order to force the blade 18*a* down into the plastic concrete, screws 42 are threaded through nuts 43 which are in the form of balls mounted for turning movement in the yokes 16*a*, to provide a universal joint connection between each screw and the yoke, permitting the screw to swing out of the path of the corresponding arm 20*a*. The screws have balls 44 on the lower ends thereof to be disposed in sockets 45 secured on the arms 20*a*, so that when the blade has been moved down to the concrete, the screws may be swung to position the balls 44 over the sockets 45 and

the screws may then be screwed downwardly to apply pressure to the arms 20*a* and blade 18*a*. With the workman and other load on the platforms 17*a*, the weight thereof is applied to the blade to force the blade down into the plastic concrete. The screws 42 may then be unscrewed and swung to one side to permit the blade to be raised.

The arms 20*a* have dogs 28*a* to engage the notches of the quadrants 26*a* for holding the arms 20*a* and blade in raised position.

Fig. 6 illustrates a simple form of device for installing a longitudinal joint when the road slab is built after the curb 43 has been constructed. The device consists of one or more saddles 7*b* to fit astride the curb 43, and an arm 20*b* for each saddle pivotally connected thereto, as at 22*b*. The blade 18*b* secured between the channel irons 19*b* which provides a rail on which the saddles are movable, or any other suitable blade, is secured to the arm or arms 20*b* to be raised and lowered similar to the blades 18 and 18*a* hereinbefore described.

The arm 20*b* has a series of apertures 42 to receive the securing elements of the blade, in order that the blade may be adjusted to different distances from the curb. The saddles 7*b* are readily positioned on the curb for mounting the arms 20*b*.

Figs. 7, 8 and 9 illustrate the platforms or boards 17*c* located close together, and they may be part of a machine, or loose platforms laid on the concrete. The platforms are spaced apart sufficiently to permit the blade 18*c* to pass snugly between them, and the channel irons or members 19*c* between which the blade is secured may serve as stops to contact with the platforms for limiting the movement of the blade into the concrete.

The platform may be trailed longitudinally of themselves with the blades 18*c* in the plastic concrete, the spaced platforms serving as floats to simultaneously float the concrete on each side of the joint cutting means, to produce the groove when an open joint is desired or the platforms may be moved longitudinally of themselves to advanced positions while the platforms are raised out of contact with the concrete.

The blade is then lifted from the concrete, as seen in Fig. 8, leaving a groove, and the joint strip or form 38*c* is then inserted downwardly through the slot between the platforms into the groove, as seen in Fig. 9. The joint member may be a strip of performed material to remain in the concrete as a part of the joint, or may be a form to be removed after the concrete has set to permit tar or other sealing material to be poured into the groove.

Fig. 10 illustrates the use of a pair of blades 18*d* adapted to enter the plastic concrete and having the out-turned flanges 19*d* at their upper edges, and the joint member or form 38*d* may be inserted downwardly between the blades and forced down into position in the groove formed by the blades. The joint strip or form may be clamped between the blades by suitable clamps (not shown) and the joint strip or form forced down into the concrete with the blades, as a unit. The blades may then be separated slightly and withdrawn from the concrete, leaving the joint strip or member 38*b* embedded in the concrete, as disclosed in my pending application Serial No. 223,161, filed September 30, 1927.

Fig. 11 illustrates a transverse joint installing device associated with a reciprocating screed 17*e* of a road finishing machine, which may operate in advance of the longitudinal joint installing apparatus shown in Figs. 1, 2 and 3.

The screed 17*e* has the front wall 46 and the rear wall 47, said front wall pushing the surplus material ahead of the screed, and as seen in Fig. 11 the screed is moved rearwardly from the surplus material for the installation of the transverse joint.

The walls 46 and 47 are connected by yokes 16*e*, only one of which is shown, and each yoke is pivoted to the lower end of a rod 48 of the finishing machine, said rod being pressed downwardly by a spring 49, to hold the screed on the side rails or forms.

The screed is reciprocated, and a push rod 51 of the machine has rollers 52 bearing against the wall 46 and the bottom of the screed, for pushing the screed forwardly with the machine.

The joint installing blade or mandrel 18*e* is located in rear of the screed, and is movable within an overhanging portion 50—53 of each yoke 16*e*, a screw 42*e* being threaded through a nut 43*e* trunnioned within the portion 50 and having its lower end connected by a swivel and universal joint 44*e* with the blade 18*e*, to permit the blade to be reciprocated longitudinally.

The screws 42*e* may be rotated for raising and lowering the blade. An arm 53 is hinged to the wall 47 of the screed to be swung rearwardly into a cut-out portion 54 of the blade 18*e*, in order that when the screed is reciprocated the arm 53 will strike the ends or shoulders of the portion 54, thereby reciprocating the blade 18*e*. The arm 53 may be swung forwardly over the screed when the blade is raised.

In operation, when the joint installing blade or member 18*e* is at the proper location, the forward movement of the screed is stopped, and by rotating the screws 42*e* the blade will be forced down into the concrete. In order to agitate the blade, a hand tamper may be used to tamp the blade, or the arm 53 may be swung into the portion or recess 54 of the blade so as to reciprocate the blade during its downward movement into the concrete. The blade will thus move into the concrete with a sawing action as the blade is moved downwardly by the screws.

The blade may be used for producing a cut or groove in the concrete, or a V-shaped joint strip or form 38*e* may be placed on the blade before it is depressed, so as to be deposited in the concrete, said strip remaining in the concrete when the blade is raised. After the blade is raised above the concrete, the screed is then raised from the concrete and the machine backed up to bring the screed over the joint strip or member, and the screed is then let down on the concrete and is reciprocated over the joint strip or member to bring said strip or member flush with the surface of the concrete and to finish the concrete adjacent to the joint.

The joint member may be a V-shaped form, as shown, to be removed subsequently and the groove filled with suitable sealing material, or the joint member may be of suitable premolded joint material to remain in the concrete.

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

1. A machine of the character described comprising a frame having means movable on a rail at one side of a road under construction, a longitudinal joint blade, and means for hingedly connecting the blade with the frame for the upward and downward movement of the blade on an axis parallel with the blade.

2. A machine of the character described comprising a frame having means movable on a rail at one side of a road under construction, and transverse and longitudinal joint installing blades hingedly connected with said frame.

3. A machine of the character described comprising a frame having means movable on a rail at one side of a road under construction, a platform connected to said frame and adapted to rest on the plastic concrete of the road, and a joint installing blade hingedly connected with the frame for upward and downward movement adjacent to the platform.

4. A machine of the character described having means movable on a rail at one side of a road under construction, a platform connected to said frame to tilt therewith on said rail for the movement of the platform on and off the plastic concrete of the road, and a joint installing blade connected with said frame for upward and downward movement adjacent to the platform.

5. A machine of the character described comprising a frame having means movable on a rail at one side of a road under construction, inwardly extending members secured to said frame, a platform secured to said members, arms hingedly connected with the frame, and a longitudinal joint installing blade carried by said arms to move downwardly into the plastic concrete adjacent to said platform.

6. A machine of the character described comprising a frame having means movable on a rail at one side of a road under construction, a platform connected with said frame and adapted to rest on the plastic concrete of the road, and joint installing means hingedly connected with the frame and including a blade movable downwardly into the concrete, said joint installing means being adapted to be swung beyond a vertical position away from the road to counterbalance said platform.

7. A machine of the character described comprising supporting means, a joint installing blade, and means for hingedly mounting said blade from said supporting means for the upward and downward movement of the blade on an axis parallel with the blade.

8. A machine of the character described comprising means to fit on a rail at one side of a road under construction, and a joint installing blade hingedly connected at one end with said means to swing toward and away from the surface of the road.

9. A device of the character described comprising means to fit on a rail at one side of a road under construction, a joint installing blade hingedly connected at one end to said means, and another joint installing blade hingedly connected to the free end of the first named blade.

10. A device of the character described, comprising a plurality of hingedly connected joint installing blades adapted to extend over a roadway, to be moved up and down to and from the plastic concrete, and means for mounting the blades.

11. A device of the character described, comprising a frame, and a plurality of hingedly connected joint installing blades pivoted to the frame for up and down movement to and from the plastic concrete for producing a cleft in the plastic concrete.

12. A device of the character described for cutting joints in a plastic surfacing structure, comprising a longitudinal joint cutting blade, and spacing members attached to the blades and having provisions for hinged connection with a member extending along one side of the road for up and down swinging movement of the blade to and from the surface of the concrete.

13. A joint installing machine, comprising spaced platforms adapted to extend upon opposite sides of the joint groove to be formed in the road, means supporting said platforms for movement toward and from the roadway whereby the platforms are adapted to serve as floats, and groove producing means operating between said platforms and supported independently of the platforms for movement toward and from the roadway.

14. The method of producing joints in plastic concrete, consisting of positioning spaced members on the plastic material, moving a cleaving member by gravity to register in the concrete through the space between the members, causing a separation and, thereafter, depositing joint material in the separation.

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