APPARATUS FOR MOLDING CONCRETE, ASPHALT, AND LIKE MIXES
John B. Heatlie, 21 Weller St., Geelong West, Victoria 3218, Australia
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4 Claims

ABSTRACT OF THE DISCLOSURE

An apparatus for molding concrete, asphalt, and like mixes, wherein the apparatus has a hopper for storing the mix, a supply port from the bottom of the hopper leading to a ramming chamber which has an open front and open back and end bottom portion. A ram plate actuated by at least one link and crank, compacts and extrudes the mix into and through the mold box. The ram plate is rigidly connected to at least one rod connected through mechanical linkage this rod and ram plate are subjected to a reciprocating motion within the ramming chamber, which movement has a longitudinal and vertical moment. Furthermore, a stoker blade may operate in conjunction with the ram plate to positively feed the mix into the ramming chamber when the ram plate is being withdrawn therefrom.

This invention relates to an apparatus or unit for molding concrete mix, asphalt or the like and is concerned more particularly with the continuous formation of concrete or the like structures such as curbs or guttering. An example of such a unit is described in prior U.S. patent specification No. 2,932,875.

In specification No. 2,932,875 there is disclosed a unit for molding concrete mix comprising an open ended mold box provided with an open lower side, the mold box being mounted on a base, a consolidating and propelling means also mounted on the base and slideable within a ramming chamber associated with the mold box to effect the consolidation and molding of concrete mix in the mold box to conform the concrete mix to the shape of the mold box and at the same time move the unit from the newly consolidated and molded concrete mix.

In one particular form of the prior invention, the consolidating and propelling means comprises a ram plate pivotally mounted within the unit and pivotally connected to a piston shaft, the said plate being capable of pivotally reciprocating movement within the ramming chamber which is in communication with the mold box. It is this particular form of the prior invention which is mainly used in practice, but it has been found that with this form of the invention a disadvantage sometimes arises in that with a moisture content in the concrete mix of less than the recommended value the pressure exerted on the compacting of the mix is insufficient to provide adequate compaction with the result that zones of the finished product may be porous. This is not a desirable quality.

It is the object of this invention to overcome the disadvantage just referred to and with this object in view the present invention broadly resides in the provision of a ramming plate rigidly connected to at least one rod for effecting consolidation and propulsion, and means for supporting the ram plate and the rods.

According to this invention the unit for molding concrete, asphalt or like mixes includes means capable of permitting the mix to be fed in to a ramming chamber, consolidating and propelling means mounted to operate in conjunction with said chamber to compact and extrude the mix or like material into and through a mold box, said consolidating and propelling means including a ram plate rigidly connected to at least one rod which ram plate is adapted to have imparted thereto an oscillatory movement within the ramming chamber whilst the ram plate reciprocates therein, and means supporting the ram plate and the rod.

The rods can be directly connected to a crank or like driving means whereby the ram plate and the rigidly connected rods are given an oscillatory motion in addition to the reciprocatory motion in the longitudinal direction of the unit.

The means for supporting the ram plate and rods or shafts may conveniently comprise links which are pivotally connected to suitable points on the rods or shafts and are pivotally connected at their opposite ends to fixed points in the frame of the unit. The said links may extend upwardly or downwardly from the ram plate rods. Alternatively the rods may be provided with a projection arranged to slide in cam grooves within the unit.

A particular form of the invention which may be preferred is providing a unit for molding concrete mix or the like including a base made of a pair of longitudinal skids or runners with cross members spacing the runners. A mold box is provided connected to the base which mold box may also support the prime mover having annular drive plates or crank discs. The said crank driving means are connected to the rear ends of the ram plate rods which extend forwardly of the unit and the forward ends of the rods are rigidly connected to the ram plate which is disposed more or less vertically within the cavity of the ramming chamber. Preferably one or more gussets or stays are provided connecting the rods to the ram plate in order to ensure a rigid connection between them.

The rods and the ram plate may be made as separate parts bolted together so that they can be readily dismantled for inspection and repair.

The unit also includes a pair of links each having one end pivotally connected to one of the rods and the other end pivotally connected to the frame. The links may extend upwardly from the rods or downwardly from them and in each case it is desirable that the links should be substantially vertical when the ram plate is in its vertical position and that the arc traced by the pivotal connection to the rods has only slight curvature which shall impart the most efficient inclination and pressure to the ram plate.

The effective surface of the ram plate may be planar or slightly convex and the plate is preferably arranged so that when it is at its extreme forward position its face is inclined for most efficient compacting concrete mix into the mold box. The drive of the cranks is arranged so that they turn forwardly, i.e. so that commencing from the extreme forward position of the ram plate the ends of the rods connected to the cranks move downwardly and then rearwardly as the cranks continue to rotate. This means that the ram plate is given an oscillatory action as well as a longitudinally reciprocatory motion and at the commencement of its rearward movement the lower edge of the ram plate is given a slight movement or kick forwardly to firmly consolidate the lower part of the mix. As the cranks begin to rotate they draw the ram plate to its rearmost position and thereupon commence to move forwardly again and in doing so concrete mix delivered from the hopper is thrust forwardly by the ram plate during the initial part of the forward movement the ram plate has a considerable forward inclination but as the forward movement nears completion the ram plate is moved further towards the erect position and is then inclined rear-
wardly to some extent before being drawn rearwardly again. It is found that the combined oscillatory and reciprocatory motion of the ram plate results in very effective compacting of the concrete mix over the full depth of the mold box and thereby overcomes the disadvantage which has sometimes been experienced in the past.

A preferred form of the invention will now be described with reference to the accompanying drawings in which:

FIG. 1 is a side elevation of the unit incorporating the invention; and

FIG. 2 is a plan view of the unit; and

FIGS. 3 to 7 are part views of the unit and show sequentially, a cycle in the operation of the consolidating and propelling means of this invention.

Referring to FIG. 1 the unit includes a frame 1 on the forward end of which is mounted a prime mover, in this form an internal combustion engine 2. The prime mover is adapted to drive a pair of cranks 3 (see FIG. 4) through suitable reduction gearing 4. Skids 5 are provided on the underside of the frame 1 to facilitate the unit's forward movement when in operation. Two connecting rods 6 are provided and pivotally connected at their butt-ends to the cranks 3.

The rods 6 extend into the ramming chamber 7 which is capable of being fed with concrete mix 8 from a hopper 9 mounted above and in communication with the ramming chamber 7. Disposed behind, and communicating with the ramming chamber 7 is the mold box 10.

The mold box 10 is formed having a cross-sectional shape which corresponds to the desired shape of the formed concrete. The mold box is open-ended and is open-bottomed at 10a.

A ram plate 11 is rigidly mounted to the distal ends of the rods 6 and is adapted to be reciprocated within the ramming chamber 7 towards and away from the entrance to the mold box 10 and oscillate as it reciprocates as will be described.

The means for supporting the ram plate 11 and rods 6 comprise a pair of links 12 which are pivotally connected at 13 to the rods 6 and are pivotally connected at 14 to fixed points on the frame 1. The links 12 extend downwardly from the rods 6 to the pivot point 14. However, the said links may depend from supports on the frame above the shafts to their attachment points 15 on the rods 6.

The face or effective ramming surface of the ram plate 11 may be planar or it may be slightly convex in elevation and arranged so that at its extended position its face is substantially vertical (see FIG. 5). The ram plate 11 has a rearwardly extending portion or cover 27 which portion prevents mix from falling behind the ram plate 11.

Referring particularly to FIGS. 3 to 7 a stoker blade assembly (indicated by the arrow 15) is provided, pivotally mounted to the rearside 16 of the hopper 9.

The stoker blade assembly 15 includes four arms 17 (see FIG. 2) mounted for pivoting movement about a common axis, the tips of said arms 17 being joined in pairs by cross members to form a pair of stoker blades 18.

The arms 17 are each substantually arcuate in formation, each arm 17 at one end being pivotally mounted to the inner surface of the rearside 16 of the hopper 9 and the arms 17 at their other ends being conjoined by said stoker blades 18.

Conjoining the medial portions of all four of the arcuate arms 17 is an axle 19 which axle 19 is secured at its medial point to an operating link or connecting rod 20 the other end of which link 20 is pivotally mounted to a cross member 21 conjoining the rods 6. Provision is made for increasing or decreasing the effective length of link 20 by constructing it as a turnbuckle.

Thus, it may be seen that as the ram plate 11 is caused to reciprocate, by the motion of rods 6 said motion is also transmitted to the arms 17 which in pivoting on the common axis impart an oscillatory movement to the stoking blades 18, said stoking blades 18 being adapted to be in their innermost position when the ram plate is withdrawn from the ramming chamber 7 (FIG. 3) and being adapted to be in their outermost position when the ram plate 11 is at its limit of travel into the ramming chamber 7 (see FIG. 5).

An ancillary hopper 22 is provided and situated adjacent the main hopper 9, the ancillary hopper serving to supply grunt topping to the formed mix.

In operation of the unit the operator, by using a steering tiller 23 and telescoping assembly handles 25 will maintain a guide-pointer (not shown) on the unit closely adjacent to and level with a preset guide cord which defines the line of the concrete formation to be placed and molded. The operator may also, by the same means, and by observance of a cross-level indicator (not shown) affixed to the frame, maintain the unit at true cross-level. Turning the telescoping assembly handles 25 will, in relation to the basic frame, screw telescoping assemblies 24 up or down to compensate for ground irregularities. This means of compensating for ground irregularities represents a very considerable saving in labor, which would otherwise be required to prepare the subgrade without any depth tolerance.

Referring to the series of drawings including FIGS. 3 to 7 the following description is provided so that the operation of the compacting and propelling means of this invention may readily be understood and in which drawings the cranks 3 are rotated by the prime mover in an anticlockwise direction as indicated by the arrow.

Firstly referring to FIG. 3 it will be observed that at this particular stage in the cycle the ram plate 11 is in its withdrawn position and the stoking blades 18 are in their innermost position having completed a stoking motion.

Referring now to FIG. 4 the cranks 3 have rotated through substantially 90° which movement, due to the placement and pivoting action of the links 12 causes the ram plate 11 to commence a ramming movement into the ramming chamber 7 the ramming surface of the ram plate 11 having a forward inclination. Thus, during this stage of the ramming operation the concrete mix is forced outwardly and downwardly into the mold box 10 to eventually press against the ground revealed by the bottom opening 10a thus lifting the rear of the unit off the ground so that the rearward movement of the ram plate 11 against the resisting concrete mix causes the unit to move a short distance forward as will be later described.

Providing the operator of the unit adjusts the telescoping assemblies 24 during progress, so that the wheels 26 follow ground irregularities, the remainder of the unit will be maintained at the desired inclination and level. At the same time the stoker blades 18 are moving outwardly from the ramming chamber 7 and into the hopper 9.

FIG. 5 shows the ram plate 11 at the end of its ramming stroke having forced concrete mix into the mold box to compact and form the guttering or curbing and also move the unit forwardly away from the formed curb or guttering. Also the stoker blades have reached their outermost point and are now ready for a stoking action as will be described.

It may be seen that in the ramming action a movement has been imparted to the ram plate 11 which is substantially linear.

Referring now to FIG. 6 the cranks 3 have continued to rotate to a position some 220° from that shown in FIG. 3 and the ram plate 11 is now on its withdrawing movement. It will be seen, that due to the positioning and placement of the links 12 and the action of the crank 3, that in addition to the cranking moment of the movement of the ram plate 11 a vertical moment is also given to the plate 11 to assist in compacting the mix and ensuring that the mix is packed into the ramming chamber 7. Also the stoking blades 18 commence their downward movement to force mix 8 into the ramming chamber 7 as the ram plate 11 withdraws.
Referring now to FIG. 7 the ram plate 11 has almost returned to its commencement position and the stoking blades are continuing their inward movement to ensure that the ramming chamber 7 is packed with mix.

Further rotation of the cranks 3 cause the ram plate 11 to revert to the position shown in FIG. 3.

To prevent mix 8 from falling behind the ram plate 11 during its ramming stroke a deflecting guard 27 is provided on the top of the ram plate extending over a portion of the rods 6.

While there have been described above various aspects of this invention in conjunction with each other, it is to be understood that this invention comprehends the selection of any one of these aspects alone or in conjunction with any one or more of the remaining aspects.

What I claim and desire to obtain by Letters Patent of the United States of America is:

1. Apparatus molding concrete, asphalt or like mixes, including means for permitting said mix to be fed into a ramming chamber; and consolidating and propelling means mounted to operate in conjunction with said chamber to compact and extrude said mix into and through a mold box, said consolidating and propelling means including a ram plate rigidly connected to at least one rod, mechanical linkage means for imparting a reciprocating movement to said ram plate actuating means for positive movement of linkage means, and means provided for movably supporting said ram plate and rod whereby said reciprocating movement has at least a longitudinal moment and a vertical moment within said ramming chamber.

2. A unit for molding concrete or like mixes comprising an open ended and open bottomed mold box; a ramming chamber mounted adjacent to and in communication with said mold box; a base on which said mold box and ramming chamber are mounted; a supply port leading through the upper surface of said ramming chamber; a ramming plate mounted for movement within said ramming chamber on the distal end of at least one rod, the butt end of which rod being pivotally mounted to a crank, said rod being further supported by a link one end of which is pivotally mounted to said base and the other end of which is pivotally mounted to the rod towards the distal end thereof; a deflecting guard mounted on said ram plate to prevent mix from falling behind said ram plate, and means to rotate said crank to impart, in conjunction with said link, an oscillatory and longitudinally reciprocatory movement to said ram plate so as to compact and mold the mix introduced through said supply port and to move such mix through said mold box.

3. A unit for molding concrete or like mix comprising a mold box provided with an open forward and rear end and an open bottom; skids extending parallel to the axis of said mold box on which said mold box is mounted; a prime mover mounted on said skids; means driven by said prime mover to produce oscillatory motion generally axially of said mold box; a ramming chamber open at its top and mounted in communication with the forward end of said mold box; hoppers means adapted to supply mix through said open top to said ramming chamber; a ram plate operable within said ramming chamber and having imparted thereto a longitudinal and vertical movement produced by said prime mover through at least one rod one end of which is mounted to cranks rotated by said prime mover and the other end of which has said ram plate rigidly secured thereto, said rod being supported for movement by at least one link pivotally mounted to said rod and depending downwardly to a pivot connection with said skids, the inclination of said link being towards the front of said unit when said ram plate is in its withdrawn position; said movement of said ram plate being adapted to compact and mold mix flowing into said ram chamber from said hopper means and to move said unit forwardly as said compacted and molded mix exits from said open rear and bottom of said mold box.

4. Apparatus as claimed in claim 1 further including a means for positively feeding said mix into said ramming chamber, said means including at least two arms pivotally attached to a hopper at their one end and having a adjoining blade at their other end, and a linkage means joining said arms to said rod such that said blade is feeding mix as said ram plate moves from its ramming position.

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