CONCRETE PIPE MACHINE WITH TRIANGULAR FRAME

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References Cited
UNITED STATES PATENTS
2,178,015 10/1939 Brunetti 425/262
2,536,239 1/1951 Tyndall 29/288

ABSTRACT

A packer head concrete pipe machine operable to make a cylindrical concrete pipe in an upright mold. The machine has a triangular frame assembly formed with three upright frame members fixed to each other with cross braces. A rotatable turntable has a center hole for accommodating one of the frame members. The turntable carries three molds and is sequentially rotated to move the molds in longitudinal alignment with the packer head and a cylindrical core having vibrating units. Three hydraulic cylinders function to move the packer head longitudinally of the mold during formation of the pipe. The core follows the packer head through the pipe.

17 Claims, 3 Drawing Figures
3,829,268

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CONCRETE PIPE MACHINE WITH TRIANGULAR FRAME

BACKGROUND OF THE INVENTION

A conventional packer head concrete pipe machine has a vertically moving rotating packer head which functions with an upright mold to form a concrete pipe. The packer head is mounted on a cross head which supports the power means and transmission for rotating the packer head. The cross head is supported on a frame structure. Lift means on the frame structure are used to move the cross head in a vertical direction. Gourlie et al. show in U.S. Pat. No. 3,262,175 one type of packer head concrete pipe machine.

Conventional concrete pipe making machines have supporting framework comprising a pair of posts held in upright positions by diagonal braces. An example of this framework is shown by Snyder in U.S. Pat. No. 1,904,094. Larger concrete pipe machines have rectangular frame assemblies which include four corner posts to support the cross head and concrete feeding device. An example of a machine for making concrete items having four corner posts is shown by Rogers in U.S. Pat. No. 1,126,571. The Rogers machine also has a rotatable mold carrier having four stations. The carrier is located between adjacent posts with only one mold exposed to the outside of the frame assembly, whereby a single mold must be removed and replaced at a single station. A four post frame for a concrete pipe making machine must be transported in sections and assembled at the plant site. It requires considerable time and labor to erect a four post frame.

SUMMARY OF THE INVENTION

The invention is directed to a concrete pipe making machine of the packer head type for forming a concrete pipe in a mold. The machine has a triangular frame assembly having three upright frame members rigidly connected together. The triangular frame permits the construction of a relatively large machine which can be transported on a highway by conventional means in one basic piece. The one piece triangular frame can be erected with a minimum of time and labor. The triangular frame increases the space for a cross head carrying the packer head. Three hydraulic rams operatively connect to the cross head relative to the triangular frame during the formation of the pipe. The mold for the pipe is supported by a turntable. The turntable has three stations for carrying three separate molds. One mold is used with the packer head to make a pipe. Two of the molds are located externally of the frame so that one mold can be removed from the turntable while a second mold can be placed on the turntable. This turntable needs only $\frac{3}{4}$ turn to index a new form under the packer head. The turntable has a center hole for accommodating one of the frame members of the triangular frame. The turntable is supported for rotation about its upright central axis and is selectively indexed with a drive unit to sequentially move the molds relative to the packer head. A vertically movable cylindrical core is located below the packer head. The core is moved up into the pipe behind the packer head. Vibrators on the core function to dissipate voids and air spaces in the concrete.

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IN THE DRAWINGS

FIG. 1 is a perspective view of the packer head concrete pipe machine of the invention with the pipe mold shown in section;

FIG. 2 is a sectional view taken along line 2—2 of FIG. 1; and

FIG. 3 is a sectional view taken along line 3—3 of FIG. 1.

Referring to the drawings, there is shown in FIG. 1 a packer head concrete pipe making machine, indicated generally at 10, having an upright triangular frame assembly 11. The frame assembly 11 extends through a floor 12 and is supported on a base or foundation 13 located below the floor. Frame assembly 11 is one basic structure which can be transported on the highway and erected in a fast and economical manner. A circular turntable, indicated generally at 14, is located in an opening or hole 16 in the floor 12 and carries the molds 17 and 18 used in the forming of concrete pipe.

The machine 10 includes a concrete feeding device 19 for receiving concrete from a concrete delivery apparatus 21. The concrete is directed by the feeding device 19 into the mold 17 over a rotatable packer head, indicated generally at 22. The packer head 22 is a vertically moving and rotating unit operable to form a cylindrical concrete wall in the pipe forming mold 17. Examples of concrete pipe making machines having packer heads are disclosed in U.S. Pat. No. 3,262,175 and No. 3,619,872.

The triangular frame assembly 11 has three upright columns, legs or members 23, 24 and 25. The members 23, 24 and 25 are positioned in a triangular arrangement and extend upwardly generally parallel to each other. The lateral distance between the members is generally equal. Member 23 is the apex leg. Members 24 and 25 are base legs. As an alternative triangular arrangement, apex leg 23 can be laterally spaced from the base legs 24 and 25 a distance greater than the distance between the base legs 24 and 25. As a second alternative triangular arrangement, the lateral distance of the apex leg 23 from the base legs 24 and 25 can be shorter than the lateral distance between the base legs. A triangular cross member 26 is secured to the upper ends of the members 23, 24 and 25. A plurality of diagonal braces 27 and horizontal members 27A are connected to the upright members 23, 24 and 25 to form a rigid one piece triangular frame assembly.

Movably located within the frame assembly 11 is a horizontal plate 28 and a cross head assembly 29. The cross head assembly 29 has a cross head base or plate 31. The corners of the plate 28 and base 31 are connected to each other with upright rods 32, 33 and 34. An elongated tubular housing 36 is secured to the cross head base 31 and extends downwardly through the feeding device 19. Tube 31 carries a rotatable shaft 37. The rotor 38 of the packer head 22 is secured to the lower end of shaft 37. Rotor 38 is a conventional packer head unit, as disclosed in U.S. Pat. No. 3,262,175. The cross head assembly 29 includes a motor and power transmission unit (not shown) driveably connected to the shaft 37 to rotate the shaft and thereby rotate the packer head 22. An example of an electric motor and power transmission unit on a cross head assembly of a packer head machine is disclosed in U.S. Pat. No. 3,262,175. The triangular arrangement of the frame assembly 11 provides the necessary space.
within the frame assembly for the motor and power transmission structure of the cross head assembly. The cross head assembly 29 and the cross plate 28 are guided for vertical movement relative to the members 23, 24 and 25 by a track and roller mechanism. Referring to FIG. 2, an upright track 39 is secured to the inside of member 23. The track 39 has an outwardly directed V-shaped rib 40 which forms a rail for a grooved wheel or roller 41. Roller 41 is rotatably mounted on a pivot or bolt carried by a generally U-shaped yoke 42 secured to the plate 28. Each corner of the plate 28 has a similar roller and track guide. Also, the base 31 of the cross head assembly 29 has similar rollers which ride on the upright tracks secured to the insides of the members 23, 24 and 25.

The cross head assembly 29 is selectively raised and lowered with three power units shown as separate upright hydraulic rams 43, 44 and 45. Each hydraulic ram is a piston and cylinder unit having one end secured to a corner of the base 31 and on an opposite end secured to the upper corner of the frame assembly 11. The hydraulic rams 43, 44 and 45 are connected to a source of hydraulic fluid under pressure with suitable control means (not shown). The control means are operable to concurrently operate the three hydraulic rams 43, 44 and 45 thereby to selectively raise and lower the cross head assembly 29 and change the vertical position of the packer head 22. The control means can be located on a movable platform or on a catwalk mounted on the frame assembly 11.

Turntable 14 is a circular generally flat platform having a center hole 46. The apex leg 23 of the frame assembly 11 extends through the hole 46 whereby the turntable 14 rotates around the leg 23. The turntable 14 is carried on a plurality of rollers or movable supports 47. The supports are circumferentially spaced about the table and are mounted on a fixed structure. The supports can be supported on the apex leg 43 as well as portions of the floor 12. Turntable 14 has three equally spaced holes 48, 49 and 50 providing access to the space below the turntable 14. Positioned on the turntable 14 concentric with the hole 50 is a groove forming ring or pallet 51 supporting the mold or cylindrical mold jacket 17. Circumferentially spaced positioners or tabs 52 secured to the top of the turntable 14 serve to locate the pallet 51 on the turntable 14 relative to hole 50. Similar tabs secured to the turntable are associated with the holes 48 and 49.

The turntable 14 rotates about a generally upright axis and is sequentially indexed ⅝ of a turn with a drive means, indicated generally at 53. Drive means 53 comprises a motor or power unit 54 operating a power transmitting structure comprising a drive gear 55A and a driven gear 55B. The driven gear 55B is secured to the bottom of turntable 14. Other types of power transmitting structure, as chain and sprocket drives, can be used to rotate the turntable 14. Conventional stops (not shown) are used to maintain the index position of turntable 14.

Extended outwardly from the midsection of the apex leg 23 is a generally horizontal I-beam 56. A hinge 57 pivotally secures the inner end of beam 56 to the leg 23. Located above beam 56 is a tie bar 58 secured at one end to the leg 23 and at the opposite end to the outer portion of the beam 56. Movable mounted on I-beam 56 is a hoist 57 having a cable 61. Beam 56 and hoist 57 comprise a jib crane used to place the tongue formers and mold 18 on the turntable 14 while the pipe is being made in mold 17. A plurality of fingers or holders 62 are connected to the cable 61 and are adapted to grip the mold 18. The hoist 59 is used to move the empty molds onto the turntable 14 whereby mold 18 is ready to be indexed to the pipe making position.

The feeding device 19 is located within the frame assembly below the cross plate 28. The feeding device comprises a table 63 having a central hole 64. An upright cylindrical wall surrounds the outer peripheral edge of the wall 66 and surrounds the table. A plurality of inwardly directed blades 67 are secured to the wall 66 and serve to guide concrete through the center hole 64 into the mold 17. A plurality of sleeves 68 mount the side wall 66 to upright supports or rods 70. The feeding device 19 can be raised and lowered to accommodate different size molds. Hydraulic cylinders, screws or winches (not shown) can be used to elevate and lower the feeding device 19. An example of a feeding device for a packer head concrete pipe machine is disclosed in U.S. Pat. No. 3,551,968.

The concrete delivery apparatus 21 comprises a generally funnel shaped hopper 69 having an open top for receiving concrete. Located below the hopper is a conveyor 71. The conveyor 71 is operable to move concrete from the bottom of the hopper 69 and discharge the concrete to the center portion of the feeding device 19. The conveyor 71 can be supplied with a control means for regulating the feeding of concrete into the mold so as to provide a substantially constant supply of concrete to the packer head 22. An example of a suitable control means for the conveyor 71 is disclosed in U.S. Pat. No. 3,619,872.

Located below the opening 50 in turntable 14, there is a vibrating sleeve or cylindrical core 72 adapted to move upwardly behind the packer head 22 into the concrete pipe in mold 17. Sleeve 72 has a diameter which is substantially the same as the inside diameter of the pipe in mold 17. Suitable moving structure, as an upright hydraulic cylinder (not shown), is used to move the sleeve 72 up into the mold and retract the sleeve 72 from the mold. Examples of this structure are shown in U.S. Pat. No. 3,095,628 and No. 3,458,908. A plurality of vibrating units are attached to the sleeve 72 to vibrate the sleeve 72 as it moves up into the concrete pipe behind the packer head 22. The pipe is reinforced with a wire mesh 73. The mesh 73 is initially placed in the mold. In the forming of the pipe, the concrete is placed around the wire mesh 73 by the packer head 22.

During the formation of the pipe with the packer head 22, there is a possibility of spaces or voids below the horizontal wires of the wire mesh 73. By the use of the vibrating sleeve 72 behind the packer head 22, the spaces or voids below the horizontal wires are eliminated. The vibration applied to concrete settles and thereby eliminates air pockets or voids in the concrete. Sleeve 72 moves upwardly through hole 50 into the pipe and follows the packer head through the pipe. The sleeve 72 is then lowered or withdrawn while the packer head 22 is in the up position. The turntable 14 is indexed ⅝ turn placing mold 18 under the packer head 22 and moving mold 17 with the pipe therein externally of frame assembly 11. Mold 17 is removed from the turntable 14 during the making of another pipe in mold 18. Another empty mold is placed in the third position on the turntable 14 with the jib crane.
This process is repeated to continuously produce concrete pipe.

While there has been shown and described a packer head concrete pipe making machine having a triangular frame assembly, it is to be understood that various changes in the machine including the frame assembly can be made by those skilled in the art without departing from the invention. The triangular frame assembly can be used with a machine that does not include the vibrating sleeve 72 or a machine that only has a vibrating sleeve to form the pipe in the mold. Also, a two hole turntable can be used in lieu of a three hole turntable. Other mold transport means can be used to locate the mold under the packer head. The invention is defined in the following claims.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A concrete pipe making machine comprising: means for forming a concrete pipe in a mold, frame means supporting the means for forming a concrete pipe for movement relative to the mold, said frame means having first, second, and third upright frame members located in triangular relationship relative to each other, and means secured to the first, second, and third frame members to fix said triangular relationship, turntable means for supporting the mold, said turntable means having a center hole, one of said first, second or third upright frame members extended through said hole, means supporting the turntable means for rotation about the upright central axis of the turntable means, and drive means for rotating said turntable means.

2. The machine of claim 1 wherein: the means forming a concrete pipe includes a cross head assembly, means positionable in said mold to form the inside wall of the concrete pipe, connecting means mounting the means positionable in said mold to the cross head assembly, and first, second and third hydraulic ram means operable to move the cross head assembly relative to the frame means and thereby move the means positionable in said mold relative to said mold.

3. The machine of claim 2 wherein: the first, second and third hydraulic ram means extend generally parallel to the first, second and third frame members, and one hydraulic ram means is located adjacent each frame member.

4. The machine of claim 1 wherein: the means forming a concrete pipe includes a rotatable packer head to form the inside wall of the concrete pipe, and cylindrical core means movable into the concrete pipe behind the packer head, and vibrating means for applying vibration to the concrete pipe.

5. The machine of claim 4 wherein: the vibrating means are mounted on the cylindrical core means.

6. The machine of claim 1 wherein: the first, second and third frame members are located generally parallel to each other.

7. The frame assembly of claim 1 wherein: the first, second and third frame members are spaced from each other by generally the same lateral distance.

8. The machine of claim 1 wherein: the means secured to the first, second and third frame members include a plurality of diagonally located brace members.

9. The machine of claim 1 including: a feeding device adapted to direct concrete into the top of the mold, and means for mounting the feeding device on the frame means, said mounting means including upright members located adjacent the first, second and third frame members.

10. The machine of claim 1 wherein: the means forming a concrete pipe includes a cross head assembly, means for movably mounting the cross head assembly on the first, second and third frame members for movement in a generally upward direction, a packer head positionable in said mold to form the inside wall of the concrete pipe, connecting means mounting the packer head to the cross head assembly, and first, second and third hydraulic ram means operable to move the cross head assembly relative to the frame means to thereby move the packer head longitudinally of the mold.

11. The machine of claim 10 wherein: the means movably mounting the cross head assembly on the frame means includes coacting roller and guide means on the cross head assembly and first, second and third frame members.

12. The concrete pipe making machine of claim 1 wherein: the turntable means comprises a circular member having three holes circumferentially spaced from each other and means surrounding the holes to longitudinally align the molds with the holes, cylindrical core means movable through one of said holes into the concrete pipe behind the packer head and vibrating means for applying vibration to the concrete pipe.

13. The machine of claim 12 wherein: the vibrating means are mounted on the cylindrical core means.

14. In a concrete pipe making machine having means for forming a concrete pipe in a mold the improvement of: frame means operable to support the means for moving a concrete pipe for movement relative to the mold, said frame means having first, second and third upright frame members located in triangular relationship relative to each other, and means secured to the first, second and third frame members to fix said triangular relationship; turntable means for supporting the mold, said turntable means having a center hole, one of said first, second or third upright members extended through said hole, and means supporting the turntable means for rotation about the upright central axis of the turntable means.

15. The structure of claim 14 wherein: the first, second and third frame members are located generally parallel to each other.

16. The structure of claim 14 wherein: the first, second and third frame members are spaced from each other by generally the same lateral distance.

17. The structure of claim 14 wherein: the means secured to the first, second and third frame members include a plurality of diagonal braces.

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