ABSTRACT OF THE DISCLOSURE

A pipe forming apparatus comprising a pipe form and a platform for supporting the pipe form with means for inserting cementitious materials into the interior of the pipe form and a rotating packer head for distributing the material in the form, and a powered main lift mechanism for raising the packer head after it has distributed and formed the pipe, and a non-rotating vibratory core adapted to be inserted through the bottom of the pipe form and means for detachably engaging said core with said rotating packer head, and an upwardly movable guide system for said vibratory core, said detachably engaging means including a hydraulic system and an upwardly movable sleeve member adapted to encompass a biased locating collar to maintain said packer head and core in interengaged relationship until said hydraulic system is moved downwardly.

The present invention generally relates to the formation of concrete pipe, and particularly eliminates the problem of residual strain created by the troweling of zero slump concrete with rotary motion.

It is an object of the present invention to provide a pipe forming apparatus in which the cementitious material is disposed within a cylindrical pipe form and in which a rotary packer head is inserted within the pipe form to distribute and form the pipe without such rotary packer head being stuck to the concrete mix, by utilizing a vibratory core with novel means for detachably connecting the vibratory core to the packer head or rollerhead.

The present invention is an improvement over the pipe forming apparatus disclosed in application Ser. No. 867,344 in the U.S. Patent Office. It is another object of the present invention to provide a novel structure for detachably connecting a rotary packer head to a non-rotatable core by utilizing a cylindrical housing in which is disposed a movable sleeve member operatively connected to a hydraulic system for moving the sleeve member so as to encompass a lock collar disposed in the housing, which lock collar has an extension spring member normally urging it into a contracted position to engage a non-rotatable stud member disposed on the lower end of the rotatable packer head.

Various objects and advantages of the present invention will be readily apparent from the following detailed description when considered in connection with the accompanying drawings forming a part thereof and in which.

FIG. 1 illustrates the invention as applied to a concrete pipe making machine of the type commonly used in the industry and as described in the aforementioned patent application.

FIG. 2 is an enlarged detail view of the detachable locating or engaging means which connects the packer head to the vibratory core, illustrated in a locked position.

FIG. 3 is a view similar to FIG. 2 but illustrating the locating means as the packer head and the vibratory core are being disengaged, and

FIG. 4 is a section taken along the lines 4—4 of FIG. 3. Referring to the drawings, the reference numeral generally designates a pipe making machine, as described in U.S. patent application Ser. No. 867,344 filed Oct. 13, 1969, and includes a pipe form 11 with a spigot 12 and a lower frustoconical skirt forming a bell end 14, as described in the earlier pending application. A platform 16 is provided for the form 11, and includes a central opening 18 therein disposed below the bell end 14. The platform 16 can be a turntable for indexing of work.

A pallet 20 is disposed within the end 14 of the pipe form and is slightly movable vertically within the bell end 14 for initial formation of the bell end of the pipe, as described in the earlier mentioned application. A conveyor 28 is provided for filling the pipe form, and a non-rotatable vibratory core 60 is provided for insertion into the lower end of the pipe form and is disposed for movement above the upper end of the pipe form as described in the earlier application. The core is provided with a vibrator 62 for vibrating the core 60 and a piston 36 which is contained the major portion of the hydraulic system, including the hydraulic cylinder 38 and the piston rod 40 for moving the core 60 from a position below the pipe form to the full line position illustrated in FIG. 1, as also described and disclosed in the earlier mentioned patent application.

The pipe forming operation begins by the lowering of the packer head 30 together with the housing 88 and the pilot stud 94 on to the pipe form 11 and the raising of the core 60 by the fluid pressure in cylinder 38 as described in the earlier patent application.

In accordance with the present invention, a novel means is provided for joining the core 60 with the rotating packer head or distributor 30. Referring to FIGS. 2 and 3, the locking assembly comprises a cylindrical housing 106 secured by bolt members 108 to a hydraulic cylinder 112 within which is disposed a piston, not shown, which is provided with a piston rod 114 extending out of the upper end thereof. The upper end of the piston rod 114 has a pin 116 extending therethrough and through aligned opening in a sleeve member 118 secured to a circular plate 120 closing off the lower end of a lock sleeve member 122 disposed within the housing 106. The plate 120 is provided with vertical openings or slots 124 therein for receiving therethrough a plurality of vertical rods 126 secured at their lower ends to the plate 128 forming the lower end of the housing 106. The upper ends of the rods 126 are provided with screws 129 which secure the retaining ring 133 thereto.

The retainer ring is provided with an annular upwardly extending rim 134 adjacent its upper end to form an annular seat 136 therearound upon which is disposed an expansible lock collar or chuck 138.

The collar 138, as best seen in FIG. 4, is made up of a plurality of arcuate segments 140, all of which taken together form an annular member. The segments are normally urged inwardly or held together by an extension spring 142 disposed in a circumferential groove 144 extending around the outer periphery of the segments 140. The spring 142 normally urges the segments 140 against the outer surface of the annular rim 134 on retaining ring 133, as best seen in FIG. 2. The bottoms of the segments 140 are provided with a cutaway or recessed portion 142 therein so as to provide a shoulder which bears against the outer surface of the rim 134.

The pilot stud 94 is similar in shape as described in the above mentioned patent application and is formed on the lower end of the support shaft of the rotating housing 88 and is tapered on its lower end as indicated at 146 so as to guide itself into the central opening formed by the segments 140 of the retainer ring 138. The stud 94 is also provided with a lock recess formed with cambered abutting faces so as to receive the complementary cambered abutting faces 150 disposed on the inner face of the segments 140 to lock the housing 88 to the stationary.
housing 106 disposed within the core 60 to detachably engage the rotary packerhead 30 to the stationary core 60 when desired.

Referring to FIGS. 2 and 3, it will be noted that the upper end of the lock sleeve 122 is provided with a beveled or outwardly tapered surface 152 to provide the upper portion thereof. The outer surface of the collar 138 is provided with a complementary tapered or mating surface 154 adjacent its outer periphery upon which the tapered surface 152 of the sleeve 122 abuts when the packerhead 30 and the housing 106 and its core 60 in which it is disposed are interengaged or detachably locked together.

In operation, when it is desired to attach the rotary packerhead 30 to the non-rotatable core 60 so as to move the packerhead 30 and the stationary core 60 through the pipe form 11 during forming of the pipe, the packerhead 30 is moved downwardly through the pipe form 11, as described in the above mentioned pending patent application and the core 60 is moved upwardly into the lower end of the pipe form 11 by the hydraulic cylinder 38, as described in the above mentioned pending patent application until the pilot stud 94 is disposed adjacent the top of the core 60. Thereafter, the pilot stud 94 is moved downwardly through the opening in the cover of the housing 106 and into and through the collar 138, as illustrated in an exaggerated manner in FIG. 3. The cambered surface of the stud 94 adjacent the lock recess 148 will cause the individual segments 140 of the collar to spread apart or to be separated so that the stud will snap into the collar and the extensible spring 142 will contract the segments around the stud when the recess 148 is properly disposed or seated adjacent its outer periphery or mating portion.

At this time, the sleeve 122 is disposed in the position shown in FIG. 3 with its upper edge below the lower surface of the collar 138 so as not to interfere with the movement of the stud 94 into the annular collar 138. Thereafter, the hydraulic cylinder 112 is actuated by means not shown, such as hydraulic pressure, to move its piston rod 114 upwardly to the position illustrated in FIG. 2. The movement of the piston rod 114 upwardly also moves the plate 120 therewith, which plate is guided along the rods 126. The piston rod is moved upwardly so that the sleeve 122 now encompasses or surrounds the outer surface 154 of the collar and the tapered surface 152 of the sleeve is then seated or abuts against the outer surface 154 of the collar so that the chuck is in its contracted position and the stud 94 is interengaged or locked to the housing 106 and the core 60. Thereafter the pipe forming operation is completed and the core and the packerhead 30 are moved upwardly through the pipe form 11, as described in the above mentioned pending patent application. Thereafter when it is desired to detach or disconnect the stud 94 from the housing 106 and the collar 138, the piston 114 is moved downwardly into its hydraulic cylinder 112 and the sleeve 122 is moved from the position shown in FIG. 2 to the position shown in FIG. 3 in which the tapered surface 152 is now disposed below the collar 138. Thereafter the packerhead 30 is moved upwardly and the stud 94 is snapped out of or withdrawn from the collar 138, as the movement of the stud upwardly will cause the lower end of the stud 94 to ride over the inner surface of the collar 138 and the resilient spring 142 will allow the segments to be moved outwardly or separate so that the stud can be withdrawn from the collar.

From the foregoing description it is readily apparent that the present invention provides a novel means for forming a pipe in which the rotating packerhead and the non-rotating core utilized in forming the pipe can be readily detachably connected to each other and quickly detached therefrom by a novel, compact, and sturdy structure that can be easily manufactured in an economical manner.

Inasmuch as the location and arrangements of the relative parts may be changed without departing from the scope of the invention, it is to be understood that the invention is not to be limited to the above description, except by the scope of the following claims.

What is claimed is:

1. A pipe forming apparatus comprising a pipe form, a platform for supporting said pipe form, a rotary packerhead with a stud member for insertion into said pipe form to form the pipe, a non-rotary core for insertion into said pipe form for connection to said rotary packerhead to form the pipe, a powered lift mechanism for raising and lowering said packerhead, another power mechanism for raising and lowering said core, and means secured to said core for detachably connecting said packerhead to said core, including a housing with an expansible chuck therein for receiving said stud member and a movable sleeve therein for surrounding said chuck to detachably connect said packerhead to said core, and hydraulic means operatively connected to said housing for upward movement of said sleeve to encompass said chuck and lock said stud member in said chuck until said sleeve is moved downwardly.

2. The pipe forming apparatus of claim 1 wherein said housing is cylindrical and said chuck comprises a plurality of segments disposed concentrically about the inner surface thereof.

3. The pipe forming apparatus of claim 2 wherein biasing means are provided for normally urging said segments in a contracted position.

4. The pipe forming apparatus of claim 3 wherein said segments comprise arcuate portions with a continuous recess in their outer peripheries.

5. The pipe forming apparatus of claim 4 wherein said biasing means is a spring member disposed in said recess.

6. The pipe forming apparatus of claim 3 wherein the outer surface of said segments is tapered and said sleeve has a complementary tapered surface along its upper inner surface for abutting said segment tapered surface.

7. The pipe forming apparatus of claim 6 wherein said housing has an annular retaining ring and said chuck is disposed thereon.

8. The pipe forming apparatus of claim 7 wherein said housing has upwardly extending rod members and said retaining ring is secured on top of them.

9. The pipe forming apparatus of claim 8 wherein said sleeve has a plate secured to its lower end and said plate has openings therein through which said rod members extend.

10. The pipe forming apparatus of claim 9 wherein said hydraulic means includes a cylinder and piston rod secured to the lower end of the housing and pin means are disposed on said piston rod for securing it to said plate.

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