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MACHINE FOR CONSTRUCTING ELONGATED TUBULAR CONCRETE STRUCTURES

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Fig. 1

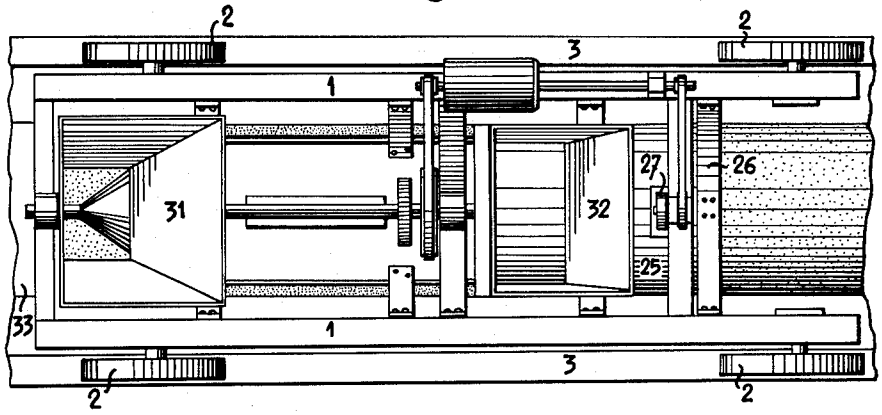
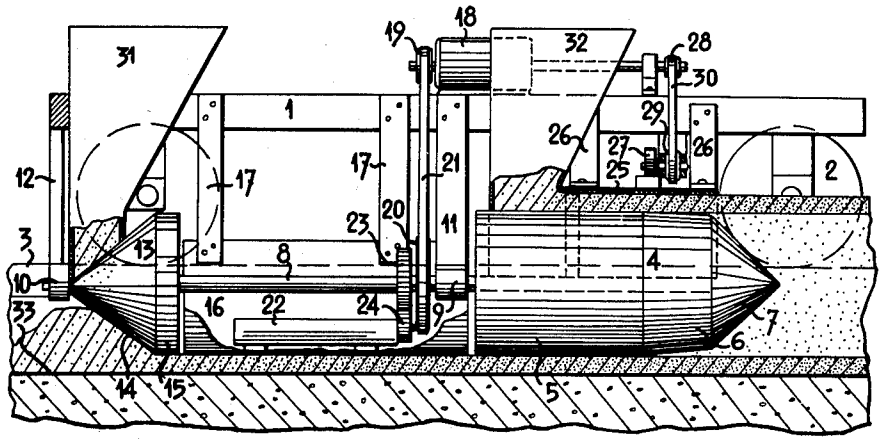


Fig. 2



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MACHINE FOR CONSTRUCTING ELONGATED TUBULAR CONCRETE STRUCTURES

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4 Claims. (Cl. 25—32)

This invention relates to a machine for constructing elongated tubular concrete structures such as pipe lines, such construction being carried out at the site where said pipe lines are to be used.

The machine includes generally, a framework adapted to move over a support forming the outer portion of a shell in which concrete is to be molded, said framework being rigid with at least one elongated member extending in parallelism with said support and assuming cross-sectionally the shape of the inner cross-section of the structure to be constructed, at least one additional member adapted to give its shape to the outer surface of the work and means being provided for feeding concrete over said elongated member.

The accompanying drawings illustrate diagrammatically and by way of exemplification, an embodiment of the machine according to the invention.

Fig. 1 is a plan view thereof, and

Fig. 2 a longitudinal cross-section.

Said machine includes a frame 1 provided with wheels 2 allowing its movement over the races 3 constituted in the case illustrated by rails. An elongated member 4 the cross-section of which has a shape corresponding to the inner cross-section of the pipe to be constructed, is suspended from the frame to lie in parallelism with the direction of displacement of the latter, i. e. in parallelism with the rails 3. Said elongated member 4 includes a part 5 assuming a generally cylindrical shape, in one piece with a slightly frustoconical part 6 and a conical part 7. The part 6 serves for facilitating the removal of the member 4 out of the moulded part of the pipe.

The unit formed by the parts 5, 6 and 7 is secured in suspended condition to the rear end of the spindle 8 rotatably carried inside the bearings 9 and 10 that are rigid with the carrier members 11 and 12 respectively, which latter are secured in their turn to the frame 1.

In the example described, further shaping members are laid in front of the elongated member 4. In the first place, there is secured to the front end of the spindle 8 a front nose-piece 13 including a conical part 14 rigid with a cylindrical part 15. Furthermore, between this front nose-piece 13 and the elongated member 4 is arranged a gutter-shaped smoothing member 16 suspended from the frame 1 through the flexible strips 17. A power unit 18 secured to the frame 1 drives the spindle 8 through the agency of the pulleys 19 and 20 and of a belt 21.

An actuating mechanism 22 is carried inside the smoothing member 16 and rotates under the action of the spindle 8 through the intermediate gears 23 and 24; said mechanism is adapted to provide for vibration of the part 16 depending from the frame through the agency of the blades 17.

A second smoothing member 25 adapted to give the desired shape to the outer upper part of the structure, is carried above the member 4 so as to form with the latter a temporary mould for the concrete. Said member 25 is also suspended from the frame 1 by inwardly curved flexible strips 26. A mechanism 27 including an eccentric and driven through the power unit 18 by means of pulleys 28 and 29 and of a belt 30 is provided for producing the vibration of said member 25.

A hopper 31 is secured to the front of the frame 1

in order to distribute a certain amount of concrete to the front of the nose-piece 13, said concrete being adapted to form the lower part of the pipe. A second hopper, 32, is arranged above the member 4 in order to feed over the latter the concrete which is to form the upper part of the pipe.

Said machine is operated as follows:

When it is desired to establish a concrete pipe, there is first cut a trench 33, e. g. by means of an excavator that may be independent of the frame 1 or otherwise. As a matter of fact, in the embodiment disclosed, the machine includes no excavator. However, it would be possible to secure such an excavator to the front portion of the frame 1. The trench 33 thus excavated forms then the support constituting the outer partial shell in which the structure is to be moulded.

In the case where the trench is dug either by hand or by means of an independent excavator, the races or rails 3 may be arranged over the ground either before or after the digging operation. In contradistinction, when the excavator forms part of the actual machine, the rails 3 are laid first on the ground, so as to serve as guides for the machine.

As the trench is being dug, the hoppers 31 and 32 are fed continuously with concrete from a concrete mixer which may be independent of the frame 1 or rigidly secured thereto. The concrete that is brought into the hopper 31 is distributed by the nose-piece 13 inside the trench and the member 16 smoothes through its vibration said concrete which assumes then the shape of a trough.

The concrete dropping through the hopper 32 is distributed over the member 4 the rotation of which produces a smoothing of said concrete. The latter advancing between the member 4 and the vibratory smoothing member 25, is moulded into the shape of the upper part of the pipe.

It is of advantage for the setting of the concrete to be performed as soon as the members 4 and 25 have shaped it. However, and according to the compacity assumed by the concrete, it is not essential for its setting to be performed as soon as it has been shaped. Taking into account the grade of the concrete and the speed of setting of the latter, it is possible to provide members 4 and 25 the lengths of which are such that they may carry the mass of concrete molded between them during the time required for the setting of said concrete.

In a modification, the machine described with reference to the drawing may be simplified inasmuch as the nose-piece 13 may be formed in one with the member 4, while the smoothing member 16 is omitted with the hopper 31. In this case, the hopper 32 will have to have a larger size so as to feed the concrete, on one hand, over the nose-piece 14 and, on the other, over the upper part of the rotary member 4. Thus, the front nose-piece 13 will distribute a part of the concrete inside the trench, said concrete being smoothed through the lower part of the member 4, while the upper surface of the latter will then mold and smooth, in cooperation with the member 25, the upper part of the pipe.

The embodiment illustrated is intended for use in the construction of pipes of a circular cylindrical shape. However, it should be understood that it is possible to use a similar machine in the execution of concrete structures of tubular shape that do not assume a circular cylindrical cross-section. As a matter of fact, in the case where it is desired to execute pipes of an oval, elliptical or the like cross-section, it is sufficient to resort to members 4 and 25 having a corresponding cross-section, while the rotary movement of the members 4 and 13 is replaced by a vibratory movement executed either transversely or axially with reference to the pipe, said vibratory movement providing for a smoothing of the concrete.

In certain cases where a perfect smoothing of the concrete is not required, the member 4 as also the member 25 may be secured rigidly to the frame 1.

Various structural modifications may be brought to the above described machine. Thus, the spindle 8, instead of being driven by a belt, may be driven by any kind of transmission gears, whether wheels, chains or the like.

Similarly, the driving unit may be constituted either by an electric motor or an internal combustion engine, and a coupling mechanism may be provided to allow the driving of the wheels 2 through the driving unit 18.

As a further modification, the races 3 may be constituted by the actual ground and the wheels 2 may be replaced by caterpillars or else by shoes. In this latter case, the machine may be drawn by any type of tractor.

In the embodiment illustrated, the machine is adapted to construct a pipe that is only partly embedded inside the ground. However, it should be understood that it is possible to use a similar machine for the construction of pipes that are entirely embedded inside the ground. In this case, the wheel 2 should be located at a predetermined height above the molding and smoothing members, said height depending on the depth of the trench. In order to allow resorting to a single machine for constructing pipes, buried at different depths inside the ground, it is sufficient to provide a mechanism that makes it possible to adjust the level of the frame 1 with reference to the wheels 2.

On the other hand, in the embodiment illustrated, the support forming the partial outer mold or shell of the structure, is constituted by the actual trench 33. However, it is obvious that this support may be constituted by an actual shell made of iron or wood, that may be laid over the ground and over which the frame 1 may be adapted to move. Such a manner of operating may be of interest for the construction of elongated parts having a comparatively restricted length, say 10 to 20 meters.

What I claim is:

1. A machine for molding concrete pipelines at least partly embedded in the ground over a trench formed in said ground having a cross-section corresponding to the shape of the lower part of the structure, said machine comprising a wheeled frame adapted to move over the trench with its wheels to either side thereof, a rotary spindle extending longitudinally of the frame in parallelism with the longitudinal direction of the trench, means carried by the frame for causing the rotation of said spindle, an elongated member rigid with said spindle and having a cross-section corresponding to the shape of the inner surface of the concrete structure, a nose-piece secured to the front end of the rotary spindle, a smoothing member rigid with the frame, means for pouring concrete over said nose-piece, said concrete being distributed by the nose-piece over the inner surface of the trench and being smoothed by the smoothing member, and means for pouring concrete over the elongated member to form the upper part of the pipeline.

2. A machine for molding concrete pipelines at least partly embedded in the ground over a trench formed in said ground and having a cross-section corresponding to the shape of the lower part of the structure, said machine comprising a wheeled frame adapted to move over the trench with its wheels to either side thereof, a rotary spindle extending longitudinally of the frame in parallelism with the longitudinal direction of the trench, means carried by the frame for causing the rotation of said spindle, an elongated member rigid with said spindle and having a cross-section corresponding to the shape of the inner surface of the concrete structure, a nose-piece secured to the front end of the rotary spindle, a smoothing member rigid with the frame, means for pouring concrete over said nose-piece, said concrete being distributed by the nose-piece over the inner periphery of the trench and being smoothed by the smoothing member, a further smoothing member carried by the frame over the rear part of the elongated member and cooperating therewith to form a temporary mold for the concrete and means for feeding concrete over the front end of the elongated member and to said temporary mold.

3. A machine for molding concrete pipeline structure at least partly embedded in the ground over a trench formed in said ground and having a cross-section corresponding to the shape of the lower part of the structure, said machine comprising a wheeled frame adapted to move over the trench with its wheels to either side thereof, a rotary spindle extending longitudinally of the frame in parallelism with the longitudinal direction of the trench, means carried by the frame for causing the rotation of said spindle, an elongated member rigid with said spindle and having a cross-section corresponding to the shape of the inner cross-section of the concrete structure, a nose-piece secured to the front end of the rotary spindle, a smoothing member rigid with the frame, means for pouring concrete over said nose-piece, said concrete being distributed by the nose-piece over the inner surface of the trench and being smoothed by the smoothing member, a further smoothing member carried by the frame over the rear part of the elongated member and cooperating therewith to form a temporary mould for the concrete, means for feeding concrete over the front end of the elongated member and to said temporary mould, and vibratory means each mounted on a smoothing member and each actuating one of the two smoothing members.

4. A machine for constructing an integral, elongated concrete pipeline structure at least partially embedded in the ground comprising a fixed lower support member having the configuration of the lower portion of the structure to be constructed, a displaceable frame positioned above and parallel to said lower support member, at least one hopper means, including an outlet, for holding a concrete mixture to be distributed, said hopper means being secured to said frame, a smoothing member suspended from said frame by flexible strip members, said smoothing member being positioned adjacent the outlet of said hopper and in spaced relationship with said fixed lower support member, means for vibrating said smoothing member, said means being operatively connected to said smoothing member and being supported on said frame, a rotatably mounted elongated member positioned between said lower support member and said smoothing member, said elongated member being in spaced relationship with said support member and said smoothing member, said smoothing member and said elongated member forming in combination a temporary support means for the upper portion of the structure to be constructed, a shaping member including a conical portion integral with a cylindrical portion having a diameter equal to the diameter of the base of said conical portion, said shaping member being positioned in front of said rotatably mounted member, a rotary spindle extending longitudinally of the frame and operatively connected thereto and parallel to said lower support member, said rotatably mounted member and said shaping member being mounted at the respective ends of said spindle, a gutter shaped smoothing member suspended from said frame and positioned between said rotatably mounted member and said shaping member, and an actuating means for causing the vibration of said gutter shaped smoothing member, said actuating means being operatively connected to said spindle and to said smoothing member.

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