

Oct. 5, 1937.

C. W. WOOD

2,094,974

CONCRETE PLACING AND FINISHING MACHINE

Filed July 8, 1935

5 Sheets-Sheet 1

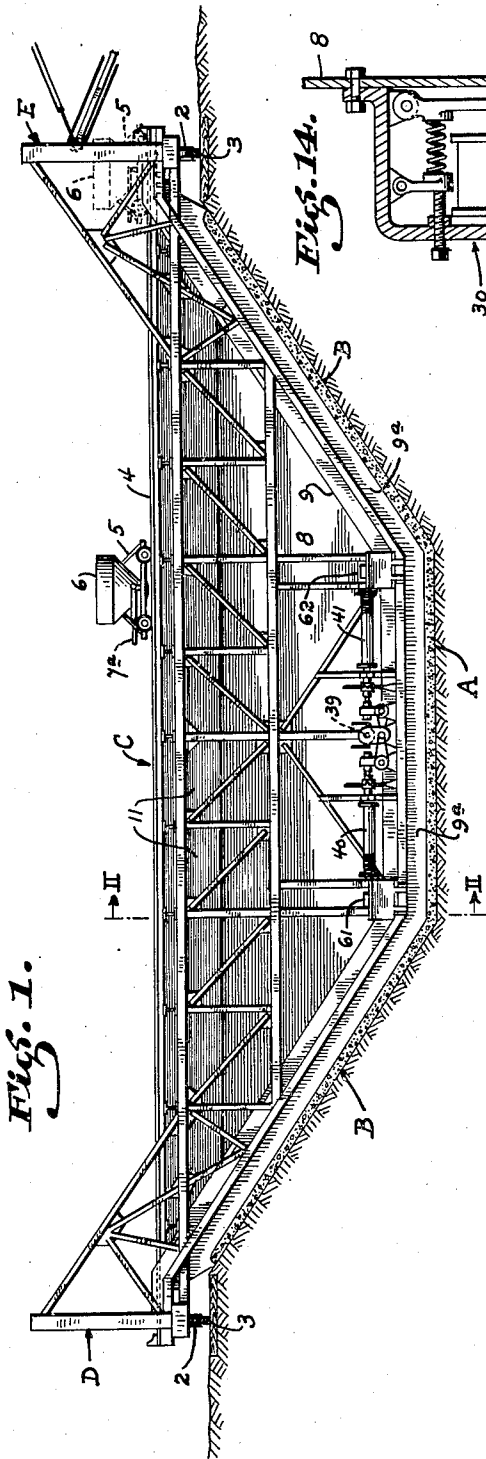
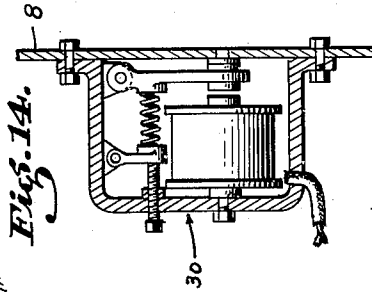
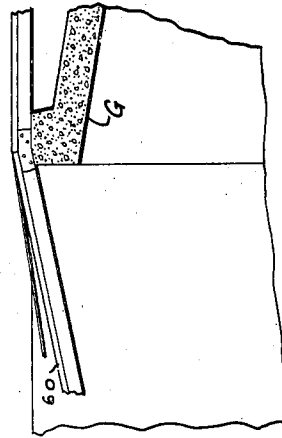
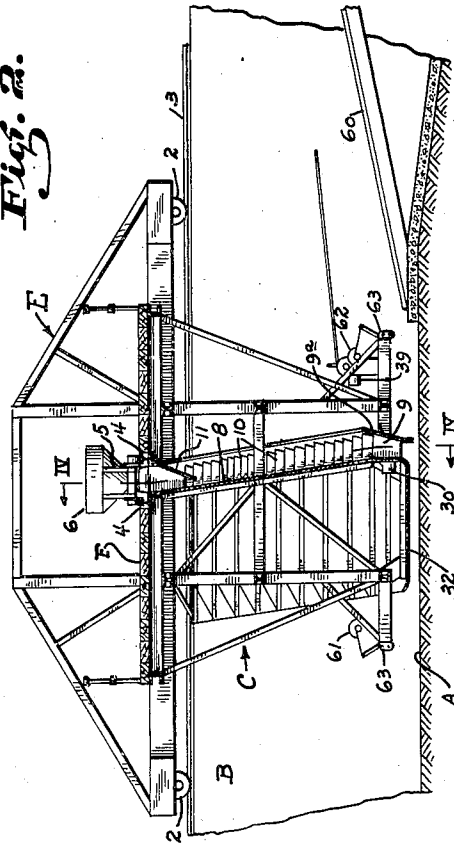


Fig. 2.



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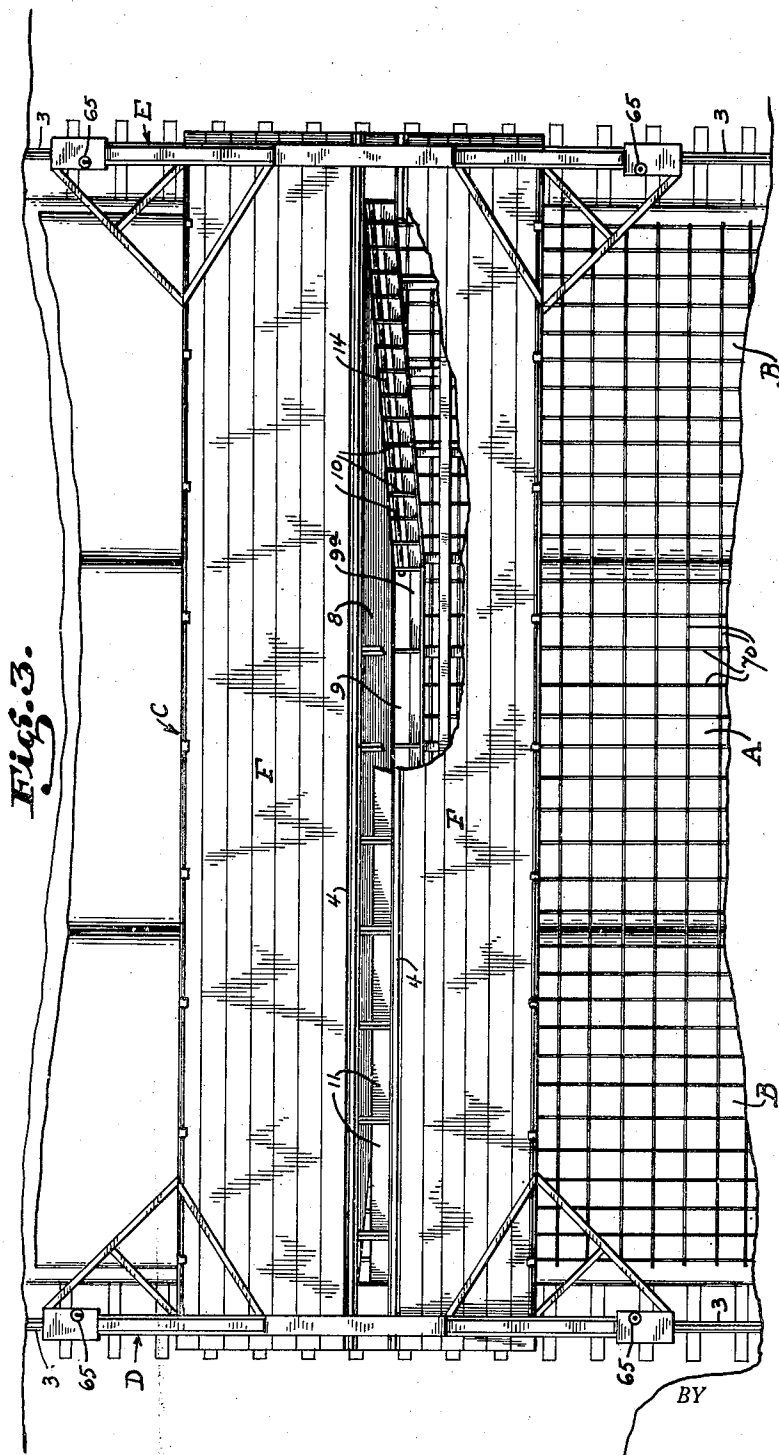
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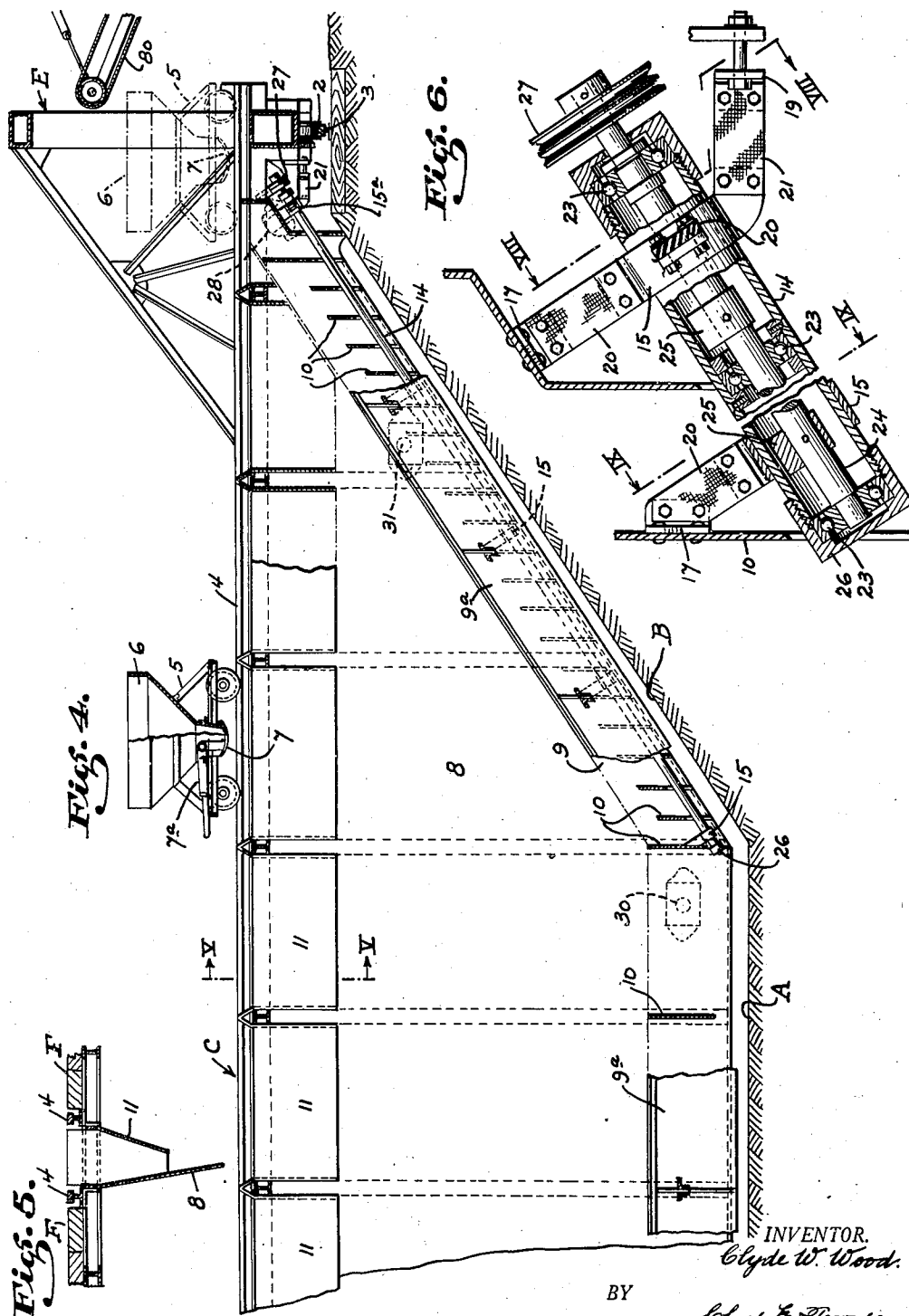
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5 Sheets-Sheet 3



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Fig. 7.

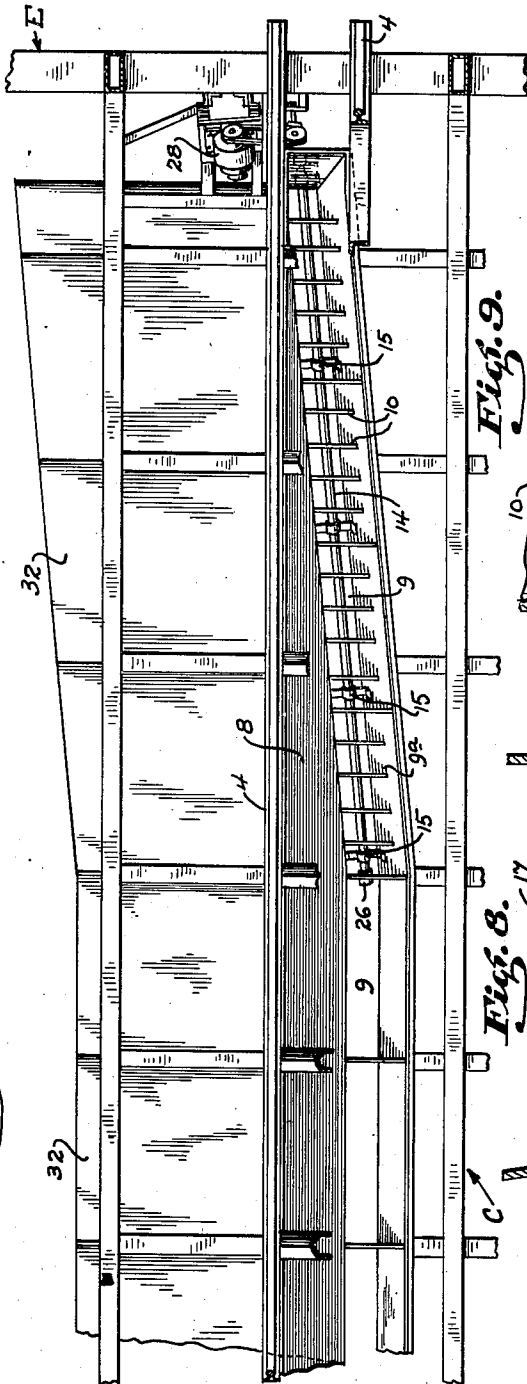


Fig. 9.

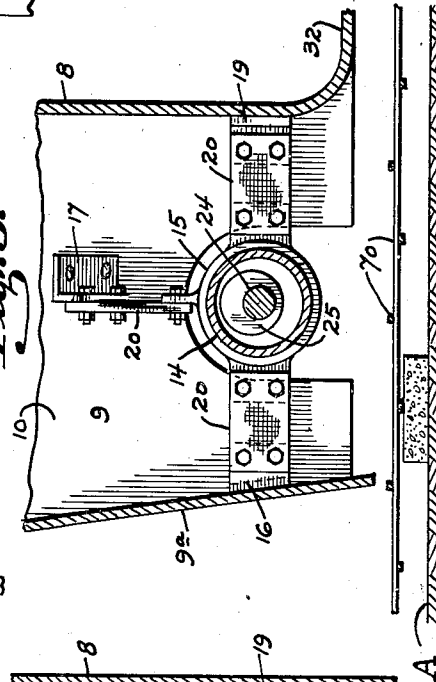
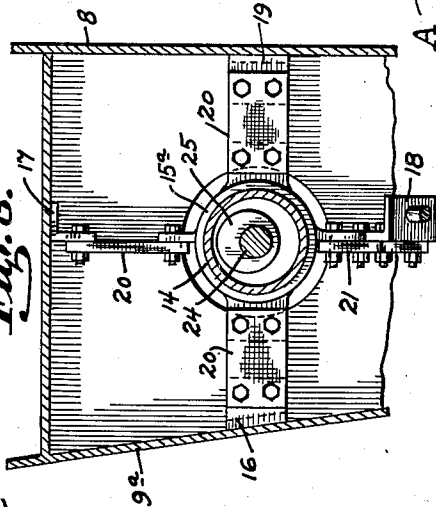


Fig. 8.



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Fig. 10.

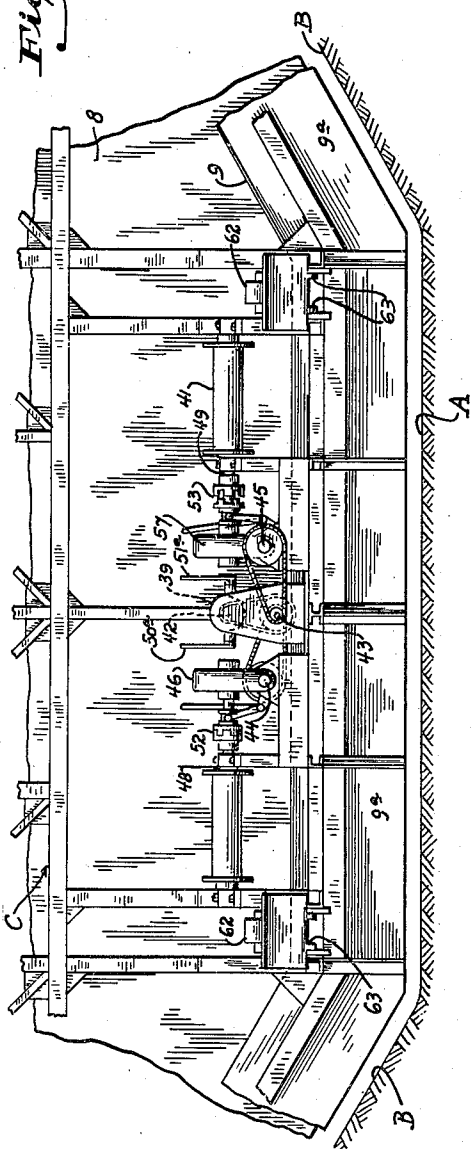


Fig. 12.

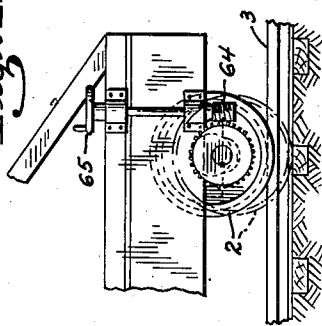
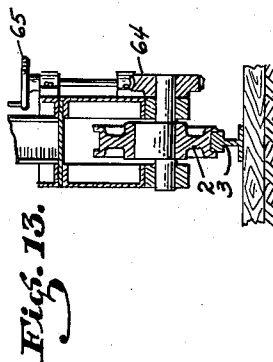
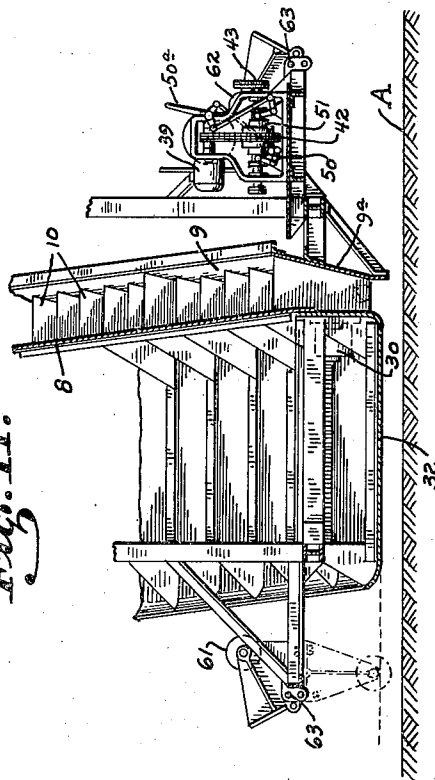


Fig. 11.



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UNITED STATES PATENT OFFICE

2,094,974

CONCRETE PLACING AND FINISHING
MACHINE

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Application July 8, 1935, Serial No. 30,416

3 Claims. (Cl. 61—63)

This invention relates to a concrete placing and finishing machine and especially to a machine which is intended for placing concrete in the bottom and sides of an irrigation ditch, canals, and the like.

The building of irrigation ditches, certain types of canals and like structures involves the following main operations. First, surveying and straightening to determine location, position and grade; secondly, excavating to remove the major portion of the material, followed by trimming or finishing to substantially exact dimensions; third, placing in the bottom and sides of the ditch reinforcing steel; and, fourth, depositing and finishing the concrete with which the ditch is lined and in which the reinforcing steel is to be embedded.

The present invention relates to the last operation, to-wit, that of depositing and finishing the concrete; the object being generally to improve and simplify the operation of placing and finishing the concrete ditches of the character described; to provide a machine whereby the labor of depositing or finishing the concrete is reduced to a minimum and whereby the concrete forming the sides and bottom of the ditch is poured simultaneously so as to avoid the formation of joints between the same; to provide a machine comprising a frame extending crosswise of the ditch and to be supported by wheels running on rails laid one on each side of the ditch and parallel thereto; to provide a hopper extending from end to end of the frame to receive the concrete and from which the concrete is delivered to the sides and bottom of the ditch; to provide deflectors to insure uniform distribution of the concrete and to retain the concrete in place, particularly when ditches are provided with sloping sides; to provide means for subjecting the concrete to a tamping and vibrating action to increase its density as it is being placed; to provide means for regulating the thickness of the concrete as it is being placed and for smoothing or troweling the surface thereof; to provide means for delivering concrete at different points throughout the length of the receiving hopper; and, further, to provide means for propelling the machine longitudinally of the ditch at a uniform rate of speed as the concrete is being placed, and one end faster than the other when rounding curves.

The concrete placing and finishing machine is shown by way of illustration in the accompanying drawings, in which—

Fig. 1 shows a long section of an irrigation ditch with the machine mounted therein;

Fig. 2 is a cross section taken on line II—II of Fig. 1;

Fig. 3 is a plan view of the machine, said view being partially broken away;

Fig. 4 is an enlarged longitudinal section of one end of the machine taken on line IV—IV of Fig. 2;

Fig. 5 is a long section on line V—V of Fig. 4;

Fig. 6 is an enlarged longitudinal section of the concrete tamping and vibrating mechanism;

Fig. 7 is a plan view of Fig. 4, parts of said view being broken away;

Fig. 8 is a cross section taken on line VIII—VIII of Fig. 6;

Fig. 9 is a cross section taken on line IX—IX of Fig. 6;

Fig. 10 is a front view of the central lower portion of the machine showing the mechanism whereby the machine is propelled;

Fig. 11 is an enlarged cross section similar to Fig. 2, showing the lower portion of the concrete distributing hopper and the plate whereby the depth or thickness of the layer of concrete deposited is controlled and whereby the surface of the concrete is smoothed or troweled;

Fig. 12 is a side elevation of one of the wheels by which the frame of the machine is supported;

Fig. 13 is a cross section taken at right angles to Fig. 12;

Fig. 14 is a sectional view of one of the electric vibrators.

Referring to the drawings in detail, and particularly Figs. 1, 2, and 3, A indicates the bottom and B the sloping sides of a ditch which is to be lined with concrete. Extending crosswise of the ditch is a central frame C, the shape of which conforms to the cross sectional shape of the ditch.

The central frame is supported by a pair of end frames D and E and these are, in turn, provided with wheels 2 running on tracks 3 placed one on each side of the ditch and extending parallel thereto. Extending from end to end of the frame is a platform F, see Figs. 2 and 3. Supported by said platform is a pair of rails 4—4 which are provided for the reception of a carriage 5, carrying a hopper 6, into which concrete is delivered as will hereinafter be described. The hopper 6 is provided with a dumping gate 7 manually controlled by a lever 7a, and as the carriage can be moved from end to end of the platform concrete may be discharged therefrom at any point longitudinally of the platform.

There is an open space between the rails 4—4 through which the concrete passes when dis-

charged from the hopper 8 and extending from one side of this open space to the bottom of the frame is a plate 9 which directs the concrete from the open space between the rails down into a hopper generally indicated at 9. The plate 8 extends from end to end of the frame C, its upper edge being parallel with the rails 4 and its lower edges being parallel to the sloping sides and the bottom of the ditch; there being sufficient clearance between the lower edges of the plate to permit the concrete deposited in the hopper to flow out freely as the machine advances along the ditch.

The hopper 9 extends from end to end of the machine, the rear wall of the hopper being formed by the plate 8 and the front wall of the hopper by a plate shown at 9a. This plate extends upwardly a suitable distance. The lower portion of it runs parallel to the bottom of the ditch and the sides of it run parallel to the sloping sides B-B of the ditch. Numerous deflecting plates 10 are secured between the plates 8 and 9a, particularly where the sides of the hopper follow the sloping sides B-B of the ditch, while comparatively few deflecting plates connect the plate 9a and the rear plate 8 where the hopper is horizontally disposed and runs parallel to the bottom A of the ditch. The plate 8 is disposed on an angle with relation to a vertical line taken through the machine so that it forms a sloping surface to one side of the hopper formed by the plates 8 and 9a, hence when concrete is discharged by the carriage 5 into the open space formed between the rails it will first strike a deflector plate 11 and then the sloping surface of the plate 8 which will direct it into the hopper 9. The numerous deflecting plates 10 will retain the concrete along the sloping sides and in actual practice the concrete will be maintained so that the pockets formed between the plates 10 will be substantially full. Any tendency for the concrete to run down the sloping sides is thus avoided and a uniform deposit can be insured as the concrete is being deposited or laid.

In order that all buoyancy may be eliminated and the proper density of concrete insured, means are provided for tamping or vibrating the concrete as it is being deposited. The means are best shown in Figs. 4, 6, 7, 8 and 9. This mechanism comprises a tube 14 which extends parallel to the sloping sides of the ditch from a point above the upper edge thereof to a point adjacent the horizontal bottom section A. The tube is centrally positioned between the plates 8 and 9a forming the hopper and it extends through slots formed in the plates 10. Bearing brackets 15 surround the tube at suitable intervals and these are secured to brackets 16, 17, 18, and 19 through means of rubber straps 20. The uppermost bracket 15a is similarly secured, but in addition thereto, there is a rubber strap 21 to secure the tube against endwise movement in the hopper. Mounted within the tube is a number of anti-friction bearings, such as shown at 23, and extending through said bearings and the upper end of the tube is a shaft 24 on which is mounted a series of unbalanced weights 25. The lower end of the tube is closed by a cap 26 to exclude foreign material and so is the upper end, but the shaft 24 extends through the upper cap and it carries a pulley 27 whereby the shaft 24 is driven at a suitable speed. An electric motor 28, or the like, is mounted on the frame to function as a driving member. The shaft is driven at a fairly high revolution and as a series of unbalanced

weights are placed thereon a vibratory motion will be set up in the concrete passing through the hopper and through the plates 10 and a tamping and vibrating action is thus obtained which materially increases the density of the concrete as it is being deposited or laid. Two electric vibrators of the type shown in Fig. 14 are placed at the points indicated at 30 in the lower portion of the plate 8 and one at each end of the plate as indicated at 31.

These vibrators may be of any suitable construction and are sufficiently powerful to set up vibration in the entire plate 8 and in the frame as a whole, such vibration being depended upon to cause a free flow of concrete through the hopper and also to vibrate a plate 32, see Fig. 11, whereby the thickness of the layer of concrete deposited is regulated and the surface thereof is smoothed or troweled. This plate is secured to the lower edge of the plate 8 and extends rearwardly a suitable distance, and as the machine advances it regulates the thickness of the concrete deposited and it smooths the surface thereof.

It has previously been stated that the machine is propelled lengthwise of the ditch as the concrete is being laid and finished. This is accomplished by providing an electric motor which is mounted directly on the frame. This motor is indicated at 39 and it drives a pair of winch drums 40 and 41. Through a reduction gear drive generally indicated at 42, it drives a shaft 43 and this shaft, in turn, drives a pair of shafts, indicated at 44 and 45, said shafts through reduction gears indicated at 46 and 47 driving shafts 48 and 49 upon which the winch drums 40 and 41 are secured. The shaft 43 is provided with two friction clutches which are best illustrated at 50 and 51 in Fig. 11. The clutch 50 controls the drive to the shaft 44 and clutch 51 the drive to the shaft 45. The clutches 50 and 51 are controlled by the levers indicated at 50a and 51a, hence by manipulating one or another of these levers it is possible to slip one clutch or the other so as to permit one of the winch drums 40 or 41 to be driven at a higher rate of speed than the other; this being essential when the machine is rounding a curve. Clutches, such as shown at 52 and 53, see Fig. 10, are mounted on the shafts 48 and 49. These are jaw clutches and are normally engaged. The only time they are disengaged is when it is desired to let the drums 40 and 41 run free as will be hereinafter described.

In actual practice a pair of long cables will be employed, one fastened to the drum 40 and the other to the drum 41. The opposite ends of the cables are fastened to a dead-man or anchor means of any suitable character. With the cables thus fastened it is possible to move the machine along the rails 3-3 at a slow but uniform rate of speed by means of the power derived from the motor 39, as this will through the several reduction drives provided drive both of the drums 40 and 41 at the same rate of speed, causing the cables to gradually wind about them and the machine to be slowly advanced. In rounding curves it is only necessary to slip one or another of the clutches 50 and 51 so that one end of the machine will advance at a greater speed than the other.

When a long line of ditch is being lined with concrete the machine will at one time or another reach the dead-men or anchor means employed and it will be necessary to advance them. After

they have been advanced the cables will have to be unwound from the drums 40 and 41 and it is in that instance that the jaw clutches 52 and 53 are released so as to permit the cables to freely unwind and after they have been unwound to be re-engaged.

In building irrigation ditches it often happens that siphons are placed therein. When this is the case the siphons are usually built prior to the final excavating and finishing of the irrigation ditch sections connecting the same, hence as the machine advances while it is placing the concrete it will at some point or another encounter a siphon and when that happens it is necessary to lift the machine out of the ditch, move it over the siphon and again lower it on the opposite side thereof. A machine of this character is an enormous affair and its weight is proportional, hence the operation of lifting it over an obstruction would be a task. In the present instance this is quickly and easily accomplished and particular attention is directed to Fig. 2.

In this figure, G indicates one end of a siphon which has been built and placed in the ditch. The machine has reached the siphon and it is, accordingly, necessary to elevate the machine and to move it over the siphon and to again lower it on the opposite side thereof. To accomplish this, inclined rails are temporarily placed between the bottom of the ditch and the top of one end of the siphon, as indicated at 60. During elevating of the machine the side rails 3—3 can not be depended upon as the wheels 2 will leave the side rails the moment the inclined rails 60 are reached. To support the machine and guide it while passing up the incline 60, pairs of caster wheels are employed as shown at 61 and 62. These are pivotally secured to the frame at 63 and they normally assume the position shown in full lines in Fig. 11. When they are to be utilized in passing over the siphon the machine is first raised a given distance by means of the wheels 2, see Figs. 12 and 13; that is, the axles of the wheels 2 are mounted in eccentrics such as shown at 64. A hand operated worm gear is provided, as at 65, which when operated will swing the eccentrics downwardly and thereby elevate the frame of the machine. When the preliminary raising of the machine has been accomplished sufficient clearance has been provided to permit the casters to be swung about their pivots 63 into a vertical position below the frame. They are here secured and when secured the machine is ready to be supported by the inclined rails 60 and propelled upwardly over the same and then over the siphon and down similar center rails at the opposite side of the siphon to again commence its work. The machine employed in pulling the machine up the tracks and over the siphon is the motor driven drums 40 and 41 previously referred to. After the machine reaches the opposite side of the siphon the casters are swung back to the position shown in Fig. 2, the wheels 2 are turned to normal position, the adjustable wheels 2 may also be employed for slightly raising or lowering one or both ends of the machine to maintain it on an exact grade and to increase or decrease the thickness of the concrete being placed.

In actual operation it will be understood that when a ditch of this character is being built it will first be excavated by suitable machinery, the rails 3—3 are then laid down and surveyed to the exact grade of the ditch. In excavating, a trimming machine is next passed over the ditch

to bring the several surfaces to substantially exact dimensions. Such a machine forms the subject matter of my co-pending application entitled "Excavating machine", filed July 3, 1935, Serial Number 29,658; thereafter the rods forming the reinforcing steel are laid in position in the bottom and sloping sides of the ditch, as shown at 70, see Fig. 3, and when this is accomplished the concrete placing and finishing machine forming the subject matter of this application is placed in position and as it advances it passes over the reinforcing bars, which have been laid in place, and deposits and embeds these bars in concrete and it tamps and finishes the concrete. The sides and bottom of the concrete forming the lining of the ditch is poured as one unit, thereby avoiding seams between the sides and bottom of the ditch.

The work is rapidly accomplished and a uniform result as to thickness, finish, etc., is insured. While a carriage 5 containing a hopper 6 to receive and dump the concrete is illustrated, it should be understood that a container method of delivering concrete to the hopper may be employed. For instance, a tube may extend longitudinally of the frame having gates at different points from which the concrete could be discharged directly into the hopper, said tube being connected at one or both ends with pneumatic means or the like for delivering concrete thereto. Similar means may be employed for delivering concrete to the hopper of the carriage or an endless conveyor connected with the concrete mixer may be employed as indicated at 80, see Fig. 4, the carriage being run over to one end of the frame when the hopper is to be filled and being then run along the tracks to discharge the hopper where most needed, and while this and other features have been more or less specifically described and illustrated, I wish it understood that various changes may be resorted to within the scope of the appended claims. Similarly, that the materials and finish of the several parts employed may be such as the manufacturer may decide, or varying conditions or uses may demand.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:—

1. In a machine of the character described a frame adapted to be positioned crosswise of a ditch to be lined with concrete, said frame being supported by tracks laid one on each side of the ditch and parallel thereto, said ditch having a flat bottom section and sloping sides, a hopper extending from end to end of the frame, said hopper having a horizontal central section and connecting sloping side sections to conform to the cross sectional shape of the ditch, said hopper being open at the bottom and being spaced from the bottom and sloping sides of the ditch a distance substantially equal to the thickness of the concrete to be laid, means for delivering concrete to the hopper, plates extending crosswise of the hopper to prevent the concrete from running down the sloping sides thereof, said plates being slotted, a tube extending through the slotted plates, resilient means supporting said tube, means within the tube for transmitting a vibrating movement thereto and to the concrete surrounding the tube, and means for propelling the machine along the supporting tracks as the concrete is being laid.

2. In a machine of the character described a frame adapted to be positioned crosswise of a ditch to be lined with concrete, said frame being supported by tracks laid one on each side of the ditch and parallel thereto, said ditch having a

5 flat bottom section and sloping sides, a hopper extending from end to end of the frame, said hopper having a horizontal central section and connecting sloping side sections to conform to the cross sectional shape of the ditch, said hopper being open at the bottom and being spaced from the bottom and sloping sides of the ditch a distance substantially equal to the thickness of the concrete to be laid, means for delivering concrete to the hopper, plates extending crosswise of the hopper to prevent the concrete from running down the sloping sides thereof, said plates being slotted, a tube extending through the slotted plates, resilient means supporting said tube, a shaft journaled within the tube, a plurality of unbalanced weights on the shaft, means for driving the shaft to set up a vibratory motion in the tube and the concrete surrounding the same, and means for propelling the machine along the supporting tracks as the concrete is being laid.

10
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20 3. In a machine of the character described a frame adapted to be positioned crosswise of a ditch to be lined with concrete, said frame being

supported by tracks laid one on each side of the ditch and parallel thereto, said ditch having a flat bottom section and sloping sides, a hopper extending from end to end of the frame, said hopper having a horizontal central section and connecting sloping side sections to conform to the cross sectional shape of the ditch, said hopper being open at the bottom and being spaced from the bottom and sloping sides of the ditch a distance substantially equal to the thickness of the concrete to be laid, means for delivering concrete to the hopper, plates extending crosswise of the hopper to prevent the concrete from running down the sloping sides thereof, said plates being slotted, a tube extending through the slotted plates, resilient means supporting said tube, means within the tube for transmitting a vibrating movement thereto and to the concrete surrounding the tube, means for propelling the machine along the supporting tracks as the concrete is being laid, and a plate extending rearwardly of the hopper to smooth and trowel the concrete.

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