Apparatus for Making Concrete Slabs

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A method and apparatus for making concrete slabs for use as building walls and other purposes. The slabs have a textured surface formed by partially embedding a multiplicity of elements in a shallow layer of fine granulated material supported in the bottom of the slab form. The slab making apparatus comprises a self-contained, self powered machine movable along the edges of the form and having conveyors means operable to distribute concrete mix gradually onto the layer of textured aggregate without disturbing the latter and while compacting and smoothing the top surface of the slab with a vibrating flat plate flush with the upper edge of the slab form. All necessary power is generated on board the apparatus.

15 Claims, 20 Drawing Figures
Fig. 20

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APPARATUS FOR MAKING CONCRETE SLABS

This invention relates to the production of concrete slabs and more particularly to an improved method and mechanical apparatus for producing textured concrete slabs particularly suitable in constructing "tilt-up" building walls.

A particularly rapid and economic mode of erecting industrial and office buildings makes use of concrete slabs constructed on the ground adjacent the place of use followed by tilting the slabs to an upright position in alignment with one another and joining the adjacent edges together to form a continuous building wall. Various proposals have been advanced for providing the exterior surfaces of these slabs with decorative effects. Among these proposals has been different modes of utilizing colored and textured aggregate on the bottom-most layer of the slabs prior to pouring the concrete mix and so as to partially embed concrete the aggregate in the mix while leaving its outer surface exposed and free of cement. Such attempts have been accompanied by many problems and a high percentage of slab rejects owing to the serious difficulties experienced in achieving uniform and acceptable results. Not only does the layer of aggregate become displaced during the pouring of the mix but the mix tends to pass through the layer of aggregate in some areas and not in others. In consequence of these and other defects produced in the slab product, very costly reworking of the textured surfaces by expert technicians is often necessary. This involves removal of defective areas to a suitable depth followed by hand patching and reconstituting of the defective areas in an attempt to match adjacent textured surfaces.

In view of the foregoing and other shortcomings and disadvantages commonly experienced in the equipment and methods of manufacturing tilt-up wall slabs, there is provided by this invention a highly reliable, improved technique as well as a self-powered, self-contained apparatus for practicing this technique. The improved slab making apparatus makes provision for the manufacture of slabs having patterned and textured surfaces without need for skilled workmen or reworking the decorative surfaces. Beautifully textured exterior surfaces of a great variety of patterns and designs are readily obtained by arranging the textured aggregate material in the bottom of the form and separated from one another by a shallow layer of granular material, such as sand. Thereafter, reinforcing steel is suitably supported on chairs in known manner without disturbing the ornamental layer.

The invention slab making apparatus is supported along the opposite lateral edges of the slab form with its propulsion cables suitably anchored, as to the rear edge of the form. The apparatus is completely self-contained and self-powered utilizing motor generator units mounted thereof and generating the power to operate all controls, winch means for advancing the apparatus along the form, conveyor means for distributing the mix, for energizing vibrating compactors for the mix, and for performing other useful and necessary operations. The mix flows from a supply hopper at one end of the screw onto a conveyor belt for transfer laterally into the form at any of numerous delivery points along the conveyor. The mix diverter means may and preferably does control the operation of an adjacent vibrator secured to the frame and effective to vibrate the frame and, in particular, a smoothing plate flush with the top edge of the slab form. The activation of a selected vibrator only when the associated mix diverter is in open position avoids non-uniform and excessive vibration of the mix which can cause settling and migration of the mix away from a smoothed area as well as stratification of the aggregate and other undesirable results. The screw includes an operating station on board the apparatus positioned to provide the operator with a good view of the operation and equipped with control consoles for operating all components. The apparatus includes power means for temporarily elevating the apparatus out of contact with the slab as well as propulsion means for advancing the apparatus along either a single form or a series thereof. Also provided is means for periodically flushing parts of the apparatus tending to become contaminated with cement mix as well as means for circulating cooling air over the various components and means for controlling the operation of engine driven equipment for generating both direct and alternating current power needs.

Preferably, the forms for constructing slabs for an entire story of a building are arranged in alignment with one another along the outer periphery of the building site. The apparatus propulsion cables are attachable to successive slab forms thereby enabling the apparatus to advance itself from one form to another until all slabs for a given story have been poured.

Accordingly, the primary object of the present invention is to provide an improved method and apparatus for manufacturing high quality concrete slabs.

Another object of the invention is the provision of an improved method of constructing both small and massive concrete slabs in a form having a relief-type textured surface of uniform high quality.

Another object of the invention is the provision of a self-contained self-powered apparatus for use in the manufacture of concrete slabs featuring improved means for distributing the mix from the hopper to any selected area of the slab.

Another object of the invention is the provision of a self-powered self-propelled slab making apparatus designed for support in part by a wide area striking plate resting on the surface of freshly levelled mix and in part on the edge of the slab form and including a plurality of power-driven vibrators cooperating with the smooth striking or bottom plate of the apparatus to level the slab while compacting the mix in the immediate vicinity of freshly poured quantities thereof.

Another object of the invention is the provision of a self-powered self-contained slab making apparatus having an operating station equipped with controls for virtually all operations.

Another object of the invention is the provision of a power-operated concrete slab forming apparatus having conveyor belt means operating in conjunction with selectively activated barriers operable to transfer mix from any point along the conveyor to a designated area of the slab under construction.

Another object of the invention is the provision of slab making apparatus having means for advancing it along the form of a slab under construction together with power means for elevating the apparatus out of contact with the slab when not in use to distribute mix.

These and other more specific objects will appear upon reading the following specification and claims and upon considering in connection therewith the attached drawing to which they relate.
Referring now to the drawing in which a preferred embodiment of the invention is illustrated:

FIG. 1 is a fragmentary perspective view of a preferred embodiment of the invention slab making apparatus in use;

FIG. 2 is a fragmentary perspective view showing a detail of the foot controls for the apparatus propelling winch;

FIG. 3 is a fragmentary perspective view showing details of a mix diverter gate;

FIGS. 4 and 5 are top plan views of the control consoles positioned to either side of the operator's station;

FIG. 6 is a top plan view of the apparatus proper with parts broken away;

FIG. 7 is a rear elevational view of the apparatus;

FIG. 8 is a transverse sectional view taken generally along line 8—8 on FIG. 7;

FIG. 9 is an end elevational view taken from the left hand end of FIG. 7;

FIG. 10 is a fragmentary transverse sectional view on an enlarged scale taken generally along line 10—10 on FIG. 7;

FIG. 11 is a fragmentary view showing the adjustment at the upper end of one of the adjustable crown braces;

FIG. 12 is a side elevational view of one of a pair of skid members supporting the opposite ends of the screw on the edge of the slab form;

FIG. 13 is a top plan view of the skid shown in FIG. 12;

FIG. 14 is a fragmentary front elevational view showing certain structural details and the struts for lifting the apparatus out of contact with the slab;

FIG. 15 is a fragmentary transverse view downstream of an open mix diverter gate;

FIG. 16 is a fragmentary transverse sectional view on an enlarged scale through the edge of the conveyor belt opposite the diverter gates;

FIG. 17 is a fragmentary perspective view of one end of the mix conveyor;

FIG. 18 is a fragmentary perspective view on an enlarged scale showing the apparatus propulsion cable at its point of entrance into one end of the screw;

FIG. 19 is a fragmentary view showing means for controlling tension of the conveyor belt and

FIG. 20 is a schematic view of essential components of the hydraulic and the electrical control system.

Referring more particularly to FIGS. 1, 6, 7 and 14, there is shown a preferred embodiment of the invention concrete mix distributing, levelling and compacting apparatus, designated generally 10, having a rigid frame 11 formed of suitable structural steel components welded or otherwise secured together. Frame 11 is generally rectangular in cross section and has an overall length somewhat in excess of one transverse dimension of the slab to be constructed, as 12 to 35 feet. Usually and typically, apparatus 10 advances along the side of the building under construction with the slab forms arranged in a row along the exterior sides of the building. Accordingly, the invention apparatus usually advances along the inner and outer lateral edges of the slab forms while the mix is being poured and prior to tilting the completed slabs into their upright installed positions. However, it will be understood the apparatus may advance along the opposite transverse edges if this mode of use should be desirable for any reason. It will be understood that the screw frame has a length adequate to build the widest slab for which it is suitable but may be used in constructing substantially narrower slabs.

Frame 11 is made sufficiently strong and rigid to resist downward bowing between its points of support on the edges of the slab form. Assisting the frame in countering the tendency to bow there is provided at least two pairs of adjustable "crown" control tie rods 12, 12 best shown in FIGS. 7 and 14. The inner ends of these rods are rigidly welded or otherwise secured to the central lower portion of the main frame and diverge outwardly and upwardly therefrom to adjustable anchorages at either side and close to either end of the main frame. FIG. 11 is a fragmentary detail of the adjustment at the upper ends of each of these tie rods 12 which comprises a nut 13. This nut may be tightened along the threaded end of rod 12 as necessary to counteract any downward bowing of the main frame and so as to maintain the continuous smooth surface of the bottom or striking plate 14 underlying the entire lower side of the main frame (FIG. 8) in a level plane. The sides and tops of the main frame are also preferably enclosed by panels most of which may be hinged to the main frame or detachably secured thereto by suitable fast action fasteners to provide ready access to components housed therewithin.

The opposite ends of main frame 11 are supported on a pair of detachable skids 18 the details of which are illustrated in FIGS. 12 and 13. Each skid acts as stop controlling the level of the top surface of the slab and includes a main body of thin strip material, as one-fourth plate, having its forward end secured to a nose casting 19 provided with a draft eyelet 20. A bracket 21 secured crosswise of the rear end of the skid is threaded to support a pair of clamping cap screws 22 which can be tightened against the rear face of the lower longitudinal main frame member. The nose shoe 19 is notched at 23 to engage over a similarly shaped concrete mix levelling shoe 24 (FIG. 9). It will be understood that skids 18 lie substantially flush with the lower smooth surface of the screed bottom plate 14 and that they ride along the upper edge of the rigid slab form members 25. Each skid preferably includes a guide roller 19a having its periphery positioned to ride against the outer vertical edge of the slab form. Owing to the thinness of skids 18, they may be shifted laterally toward or away from one another when set screws 22 are loosened thereby to accommodate the apparatus for use with slab forms of different widths.

The means employed for advancing apparatus 10 along the slab form members 25 will now be described with reference to FIGS. 1, 6 and 9. Rigidly secured to the interior of main frame 11 at the mid portion of its rear wall are a pair of independent motor-driven cable winches 28, 29 each driven by its own reversible electric motor 30, 31 through appropriate speed reduction means. Separate cables 32, 33 secured to the respective winches pass over suitable pulleys mounted on the main frame forwardly of the winches and then laterally toward the opposite ends of the main frame and over respective pulleys 34, 35 (FIGS. 9 and 14). The outer end of each cable passes over a single sheave pulley 36 and then rearwardly to its point of attachment with eyelet 20 of the associated one of the skid shoes 18. Sheave pulley 36 is attached by a cable connector 37 to a selected one of a group of eyelets 38 mounted in an anchor plate 39 secured to each forward corner of slab form 25 in the manner best shown in FIGS. 1 and 9.
From the foregoing it will be evident that the operation of winch motors 30,31 in one direction is effective to store cable on the winches thereby pulling the forward towards the anchor blocks 39. Likewise the operation of the winch motors in the opposite direction dispenses cable from the winch drums in order that the cable may be pulled out and attached to the anchor block 39 of another slab form for use in advancing the apparatus forwardly from the far end of that form.

Referring now more particularly to FIGS. 1, 6, 14 and 15, there will be described the means herein provided for distributing concrete mix to any one of numerous selected zones of a slab under construction. A mix supply hopper 42 (FIG. 14) at one end of the main frame is supplied with mix from a supply source and customarily the discharge chute 43 of a transit mixer. Hopper 42 overlies one end of a belt conveyor 44 supported at one end on an idler pulley 45 and at the other end on a driven pulley 46 (FIG. 14). Conveyor belt 44 extends the full length of the forward face of the apparatus and is in frictional driving contact with drive pulley 46 (FIG. 17). Belt 44 is driven by a motor 67 and speed reduction gearing 68 best shown in FIG. 6.

Referring to FIG. 16, it will be observed that the upper and lower runs of the conveyor belt between its supporting pulleys are supported by a series of idler rollers 48. Its forward lateral edge includes a resilient guard flap 50 having its lower edge bearing against the top surface of the belt. This flap is supported by rigid bracket means 51 which includes inverted L-shaped tubular members 52 along its outer side telescoping over rods 53 rigidly secured to the side of the conveyor frame. Cap screws 54 threaded into members 52 bear against the top of rods 53 and provide convenient means for adjusting the height of the guard flap 50 to accommodate wear and the like.

The discharge of mix from hopper 42 onto the conveyor belt at any desired rate is controlled by a gate 54 (FIG. 8) operatively connected by lever means 55 pivoted to the hopper at 56 and connected to a hydraulic operating cylinder 57. The controls for this cylinder will be described presently.

The distribution of the mix from the conveyor belt is controlled at the election of the operator by a series of diverter gates 61 (FIG. 6) aligned with one another and, when closed, forming a sidewall extending along the inboard edge of conveyor belt 44. FIG. 6 shows all gates closed except the one closest to hopper 42. Each gate is pivotally supported on the main frame by a vertical pivot pin 62 and includes a rigidly connected operating lever 63 projecting rearwardly into the apparatus. Lever 63 is connected to a hydraulic operating cylinder 65 pivoted to a bracket 66 fixed to the main frame. The lower edge of the gate is provided with a resilient guard flap 68 which is adjustable toward and away from the conveyor belt by any suitable means.

When gates 61 are closed and aligned with one another they cooperate with the guard fonce on the other side of the conveyor belt in maintaining the mix on the belt to a selected point of discharge. However, when any gate is pivoted to its open position, is the gate closest to the hopper in FIG. 6, it will be evident that the gate acts to divert the mix off the inner side of the conveyor belt at a point closely spaced to the forward edge of the apparatus on the forward side of the mix levelling shoe 24 (FIG. 15).

On occasion, cement mix tends to seep past the guard flanges and to reach the underside of the conveyor belt where it can accumulate in the tongues and grooves and interfere with the operation of the conveyor. To minimize these difficulties there is provided means for flushing away mix from the underside of the belt, comprising a flushing water pipe 70 having a nozzle directed across the underside of the belt as it approaches drive pulley 46. This jet flushes away any mix from the pulley and the inner surface of the belt. Desirably the water flushing operation is controlled by a timer operating in the manner to be described in connection with the apparatus control facilities and operating to carry out the flushing operation for a suitable interval on a cyclic basis.

The conveyor belt is also preferably provided with suitable take-up means shown in FIG. 19 for adjusting the belt tension. For this purpose, a pair of journals for pulley 45 are slidably supported between guide ways 72 and secured to adjustable rods 73. The latter extend through cross members interconnecting guide ways 72 and are adjustable lengthwise of the guide ways by nuts 74.

Referring to FIGS. 6 and 7, it is pointed out that all power for operating the apparatus is generated by a pair of engine-driven generator sets mounted directly on the apparatus near its opposite ends. The a.c. generator 75 is mounted near the left-hand end whereas the d.c. generator is mounted near the right hand end of the main frame 11. Fuel for the two engines driving these generators is stored in a tank 78. Another tank 79 contains a supply of flushing water as, for example, for the water employed in jet 70 to flush the underside of the conveyor belt. Other portions of the water are used in a hose 80 and directed onto any part of the apparatus in need of cleaning. This hose can also be used on occasion to add water to the mix if this becomes desirable for any reason.

An important feature of the invention apparatus is the provision of a plurality of independently operable electro-mechanical vibrators. These may be of any well-known construction. The apparatus herein shown and suitable for constructing slabs 34 feet in width includes four such vibrators (FIGS. 6 and 7) rigidly secured to main frame 11 at suitable points along its length. Typically, vibrators 85 are rigidly connected to frame 11 along its forward upper side. Vibrators 85 are herein arranged for operation independently of one another with each preferably being coordinated for activation with either one of an adjacent pair of mix diverting gates 61. The control means for accomplishing this will be described presently, it being now pointed out that the vibrators are activated as either of the pairs of gates is opened in order to concentrate the action of that vibrator to the portion of the mix then being diverted into the slab form. The forward wall and bottom plate of the apparatus immediately adjacent the activated vibrator receives by far the greater portion of the vibration and this is transmitted directly into the mix then being poured. This mode of operation is found highly effective in expediting the escape of air and the compaction of freshly poured mix while avoiding excessive vibration, stratification of the aggregate. In particular, this mode of operation avoids slump of previously levelled mix away from the bottom wall 14 while adjacent portions of the slab are being poured and levelled.
For various reasons it is sometimes desirable to lift the apparatus out of contact with the upper edge of the slab form and from the slab itself. This is accomplished by means of hydraulically operated extendable and retractable struts comprising a pair of cylinders 88 (FIGS.1, 7 and 14) mounted vertically at either end of the main frame. The upper ends of these cylinders are pivoted to extensions projecting from either ends of the frame and their lower ends are provided with large area self-adjusting foot pads 89 engageable with the ground. Normally, struts 88 are retracted leaving the apparatus resting directly on the upper edges of slab form 25. However, at either the end or between mix pouring operations, or while awaiting the arrival of additional mix it is desirable to lift the apparatus out of contact with the slab. This is done by operation of controls presently to be described for extending struts 88 sufficiently to lift the apparatus clear of the forms.

Other auxiliaries present on the equipment include a pair of motor driven air cooling fans 90, 90 (FIGS. 6, 8 and 9) mounted in the opposite ends of the main frame and operating to draw air into the main housing through the mid portion of its front wall and to circulate it over the motor generators and other operating equipment before exhausting it outwardly through the housing ends.

The operator’s control station includes a seat 93 preferably located at the mid length of the apparatus between a pair of control consoles or panels 94, 95. Each of the latter is provided with control switches and various instruments useful in keeping the operator advised of conditions of the various components, generators and control equipment. The operator’s station also includes a pair of foot-operated controls 96, 96 controlling the operation of the two winch motors 30, 31. Thus, if the operator wishes to advance the he presses downwardly on both foot pedals, whereas if he wishes to apply greater pulling force to one end than the other he depresses the appropriate one of the foot controls.

CONTROL AND OPERATION

The control and operation of the apparatus will be best understood by reference to FIG. 20 showing schematically both the electrical and hydraulic controls for many of the components. To avoid unnecessary duplication, FIG. 20 includes the operating controls for only one pair of typical mix diverter gates 61 and the single vibrator associated with this pair of gates. Each of the other pair of gates and the vibrator operatively associated therewith operate in the same manner and are connected in parallel with the pair of gates shown in FIG. 20.

The hydraulic system includes a hydraulic fluid storage tank 100 connected to the inlet of pressurizing pump 101 the outlet of which has suitable pressure relief valve R for returning excess fluid to tank 100. The high pressure side of pump 101 extends to the inlet of a manually operated three-way valve 103 normally in its full line position to supply pressurized fluid to a main distributing line 104. When raised to its upper or alternate position, valve 103 supplies pressurized fluid to each of the manually operated four-way valves 105 controlling operation of the associated lifting strut 88, of a type commonly known as center tandem type. It will be apparent that the struts can be extended to lift the apparatus when the operating handle for either or both valves 105 is elevated and that they retract when these operating controls are depressed to reverse the flow of fluid. The struts are locked in any desired position by placing the valve control in its neutral position thereby trapping the fluid within the opposite ends of the strut cylinders. In this position, the pressurized fluid supplied to either valve is bypassed to the next or to the return flow line depending on the location of the valve 105 relative to the return flow line.

The pressurized fluid distribution line 104 also extends to the manually operated four-way valve 107 controlling the operation of the hopper gate cylinder 57. This valve operates in the same manner just described in connection with valve 105.

Each cylinder 65 for operating an associated mix diverter gate 61 is controlled by an individual electrically actuated four-way valve 108. These valves include solenoids at their opposite ends for shifting the flow control spool in one direction or the other depending upon which solenoid coil is activated. When neither solenoid is activated the valve spool occupies the neutral position shown in FIG. 20 leaving gate 61 locked in the position occupied when the solenoid is de-energized.

The operation of the gate control valves 108 is controlled by a two-position manual switch 110 located on one of the operator’s consoles 94, 95 and normally in neutral position. If shifted in one direction designated “open,” the right hand solenoid is energized to supply pressurized fluid to the left hand end of the gate operating cylinder 65 thereby opening gate 61. However, if switch 110 is shifted to its opposite or “closed” position, the left hand solenoid is operated and the gate is closed.

Simultaneously with the energizing of valve 108 to open the associated gate 61, relay 112 is energized to complete a power circuit to a power relay 113 for the particular mix vibrator 85 associated with the pair of gates shown in FIG. 20. When relay 113 is closed by relay 112, it arms a power circuit incorporating a timer control switch 115 for vibrator 85. However, the vibrator is not actuated unless switch 116 located between relay 113 and the vibrator is closed in one of its two closed positions, i.e., in its “automatic” position, or in its “manual” position. Assuming that master switch 117 and timer switch 115 are closed and that switch 116 is closed in its “automatic” position, it will then be evident that deactivation of relays 112 and 113 energizes vibrator 85 which operates on an intermittent cycle governed by the setting of the adjustable timer 115. The timer may be set to keep the circuit closed for any suitable period as, for example, 20 seconds to 2 minutes and inactive for a variable full period between active periods. Under certain operating conditions it may be desirable to operate the vibrator independently of the clock control. This is achieved by closing switch 116 in its “manual” position thereby energizing vibrator 85 as long as the operator wishes and independently of either timer 115 or the position of any gate valve.

Automatically flushing the conveyor belt with water periodically is accomplished by a water pump motor 118 under the control of a master switch 119 and a cycling timer control switch 120. This switch is likewise in circuit with a two position switch 121. When the latter switch is closed to its automatic position, timer 120 controls the cyclic operation of the water pump whereas, when in its alternate or manual position, the water pump can be energized for any period necessary to accomplish the flushing operation.
It will be understood that console panels 94,95 include various other control switches, instruments, and pilot lights usable in a conventional manner to control the operation of the two motor generator sets 75,76, cooling air fans 90, conveyor motor 67 and other auxiliaries.

It will be understood that the operation of the winch motors 30,31 is controlled entirely manually through foot pedal operated switches 96,96' each controlling the association of a winch motor 93,93' to the associated one of the winch motor 31,31'.

Manually operated reversing switches determine whether the winch rotates clockwise or counterclockwise.

From the foregoing, it will be evident that the described apparatus functions in a highly efficient manner to deposit and concentrate or compact freshly poured concrete mix about the reinforcing supported within the slab forms as the machine propels itself along the slab forms. One operator remains seated at the operating station and manipulates the controls as expedient while one or more other operators observe the operation using the walk ways 98,99 extending along the forward or rear sides of the slab forms 25. The mix may be delivered to any point crosswise of the front of the machine simply by manipulating the controls of the control switch for the appropriate one of the diverter gates 61 without need for stopping the conveyor belt or adjusting the hopper gate. Excess amounts of mix delivered to one zone are readily distributed forwardly of the apparatus by the smoothing and levelling scree board 24. The mechanical vibrators assure uniform and thorough compaction of mix underlying the flat bottom 14 of the apparatus.

The apparatus advances from one slab to another normally arranged in end to end relation along the sides of the building. When the slabs along one side have been poured, the machine is advanced through a quarter turn utilizing the propelling cables individually and in concert as may be appropriate and by anchoring the forward ends of these cables to suitable anchorages in the path of advance and as necessary to turn the machine through an angle of 90°.

As will be readily recognized from the foregoing the flat bottom 14 which, as shown, is substantially coextensive with the main frame and underlies and supports all major components of the described slab making apparatus and has an area many, many times greater than that of skids 18. In consequence the entire apparatus virtually floats on the mix with skids 18 cooperating with the slab forms 25 to provide stops limiting the height of the top surface of the slab and actually determining its level. Accordingly, the weight of the apparatus greatly aids the action of the vibrators in compacting the mix as it is levelled and struck off.

While the particular method and apparatus for making concrete slabs herein shown and disclosed in detail is fully capable of attaining the objects and providing the advantages hereinafore stated, it is to be understood that it is merely illustrative of the presently preferred embodiment of the invention.

We claim:

1. A unitary self-powered self-propelled concrete mix distributing, levelling and compacting apparatus of a size manned by crewmen normally stationed on board while making large area concrete slabs suitable for a vehicle highway or tilt-up building structures, said apparatus having a unitary rigid main frame, a long wide large-area smooth-surfaced generally planar bottom plate immovably secured to the underside of said main frame adapted to rest in direct contact with the top surface of the slab and extending the full width of said slab and underlying said apparatus so as to support the major portion of the weight thereon of the underlying concrete mix, power generating means mounted on said frame for supplying the mechanical and electrical power requirements of said apparatus, said apparatus including support means mounted substantially flush with the lower surface crosswise of the opposite ends of said bottom plate and positioned to bear against the top edges of side forms for the concrete slab and cooperable therewith to limit and fix the surface level of the slab as substantially the full weight of said apparatus is supported on the mix by said bottom plate, power operated mix distributing means mounted on said main frame along the front thereof above said bottom plate extending lengthwise of said bottom plate for distributing mix to the front of said bottom plate along the length thereof and including mix receiving hopper means for supplying mix to said distributing means, and power-driven means mounted on said main frame above said bottom plate for advancing said apparatus along said slab while supported in major part on the surface of the underlying concrete mix.

2. Concrete slab making apparatus as defined in claim 1 further including a plurality of heavy duty vibrator means rigidly secured to said main frame at spaced apart points along the length thereof and effective to vibrate said flat bottom plate to expedite distribution and compaction of the mix in the zone underlying and contiguous to each energized vibrator means, and operator controlled means for selectively activating and deactivating said vibrator means.

3. Concrete slab making apparatus as defined in claim 2 characterized in that said means for activating said vibrator means includes means for operating said vibrator means on an intermittent programmed cycle.

4. Concrete slab making apparatus as defined in claim 2 further including timer controlled means for operating selected ones of said vibrator means independently of other of said vibrator means.

5. Concrete slab making apparatus as defined in claim 2 characterized in that said means for activating said vibrator means is operatively associated with means for distributing cement mix to different selected delivery zones along the length of the advance side of said main frame.

6. Concrete slab making apparatus as defined in claim 5 characterized in that said means for activating said vibrator means includes cycling timer means for periodically activating and deactivating the operation of selected vibrator means during a period when concrete mix is being distributed and compacted in the zone of influence of said selected vibrator means.

7. A mechanical scree board as defined in claim 1 characterized in that said power operated means for advancing said scree board along the slab comprises winch means mounted on said main frame and a pair of cable means thereon equipped with means for anchoring the outer end portions thereof to fixed deadman means forwardly of the advance edge of the slab under construction.

8. A mechanical scree board as defined in claim 7 characterized in that said winch means includes an independently operable winch for each of said cable means and control means operatively connected thereto for oper-
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9. Concrete slab making apparatus as defined in claim 1 further including a storage hopper for concrete mix supported on said main frame having a dispensing opening discharging onto said power operated means for distributing concrete mix, and a plurality of mix distributing means for delivering the mix to different zones of the slab crosswise of the advance side of said main frame.

10. Concrete slab making apparatus as defined in claim 9 further including a plurality of separate vibrator means a rigid with said main frame operable when activated to vibrate the same to aid in compacting mix beneath said bottom plate, and control means operatively connected to said mix distributing means and to an adjacent one of said vibrator means to activate said vibrator means and the adjacent one of said mix distributing means whereby freshly distributed mix is agitated to expedite compaction thereof and the escape of entrapped air.

11. A mechanical screed as defined in claim 10 further including an operator station on said main frame provided with separate control means for each of said plurality of mix distributing means.

12. Concrete slab making apparatus as defined in claim 1 characterized in that said means for distributing concrete mix includes a storage hopper for bulk mix carried by one end of said main frame and discharging onto conveyor belt means extending lengthwise along the forward side thereof, and a plurality of movable mix distributing means for transferring mix from said belt means selectively at different points distributed along said belt means.

13. A mechanical screed as defined in claim 12 characterized in that said movable mix transfer means comprises a plurality of separate barrier means normally aligned with one another along one lateral edge of said conveyor belt and cooperating to retain the mix on said belt means, and means for pivoting a selected mix transfer means to an open position extending crosswise of said belt means at an angle to cam the flow of mix off said belt means in the gap provided by pivoting said selected mix transfer to its open position.

14. A mechanical screed as defined in claim 12 characterized in the provision of walk ways for crew member carried by said main frame along the advance and trailing sides thereof.

15. A self-powered self-propelling concrete mix distributing, levelling and compacting apparatus for use in making large area concrete slabs on a horizontal support for said slabs and manned by an operating crew stationed on board said apparatus, said apparatus having an elongated rigid main frame, a wide area smooth surfaced bottom plate immovably secured to and underlying said main frame from side to side of said concrete slab and of sufficient size to rest on and virtually support the weight of said apparatus on freshly poured concrete mix, support means mounted on and extending transversely of the opposite ends of said bottom plate adapted to contact the top edges of forms for the slab and extending lengthwise of the opposite lateral sides of the slab and cooperating with said bottom plate to determine the height of the top surface of the slab, power driven means mounted on said apparatus for propelling the apparatus along the slab, power driven means carried by said rigid main frame to distribute concrete mix along the length of the forward edge thereof, power driven vibrating means mounted on said bottom plate operable to vibrate at least portions of said bottom plate to facilitate leveling and compaction of the mix in contact with the underside of said bottom plate, and power generating means mounted on said rigid main frame and including operator controlled drive connections to each of said power driven means regulatable from an operator control station mounted on said main frame.

* * * * *
UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,767,312 Dated October 23, 1973

Inventor(s) Charles B. Raymond and Bernard L. Just

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Claim 14, lines 1 and 2, delete "characterized" and insert therefor --further including--;
line 2, delete "in the provision of"
line 3, after "frame" insert --at least--;
line 3, delete "and";
line 4, delete "trailing";
line 4, change "sides" to --side--.

Signed and sealed this 16th day of July 1974.

(SEAL)
Attest:
McCoy M. Gibson, JR. C. Marshall Dann
Attesting Officer Commissioner of Patents