June 17, 1969 H. W. GODBERSEN 3,450,011

CONCRETE FINISHING MACHINE

Filed July 3, 1967 Sheet 1 of 3

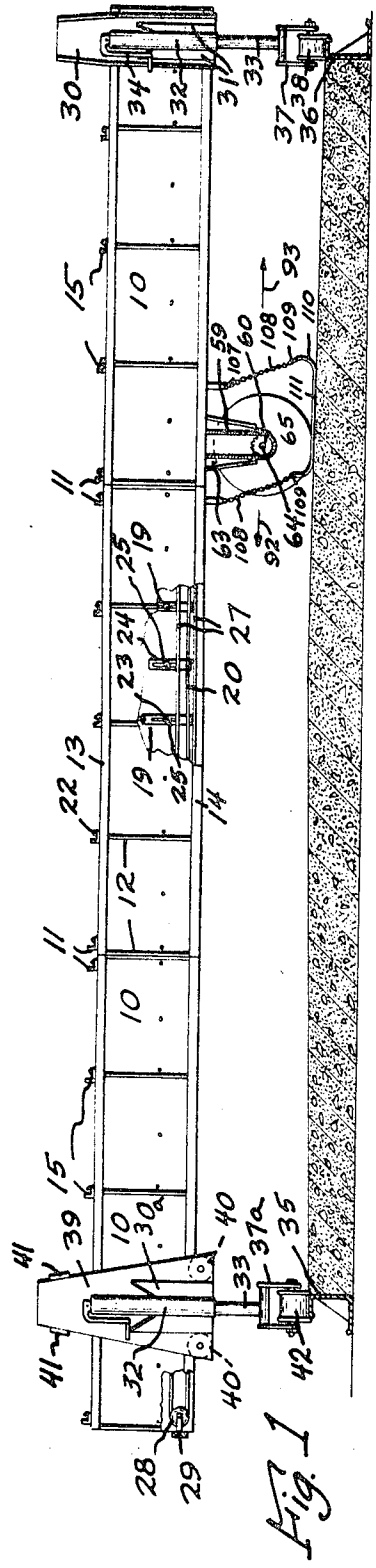


Fig. 1

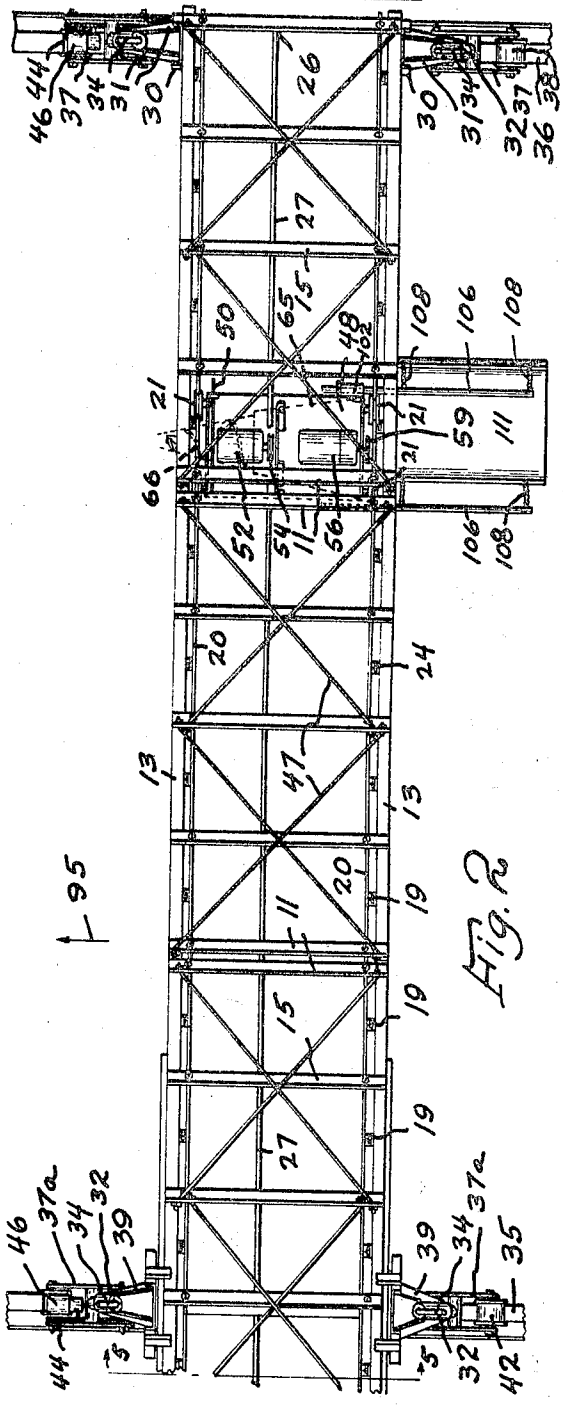


Fig. 2

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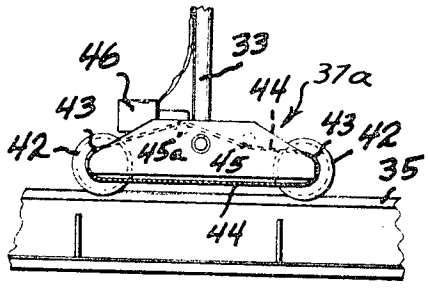


Fig. 3

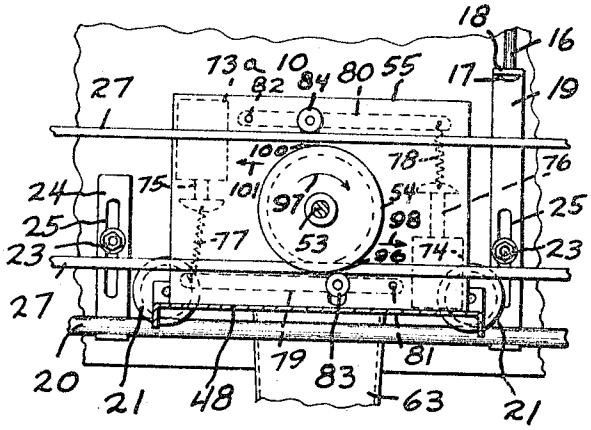


Fig. 4

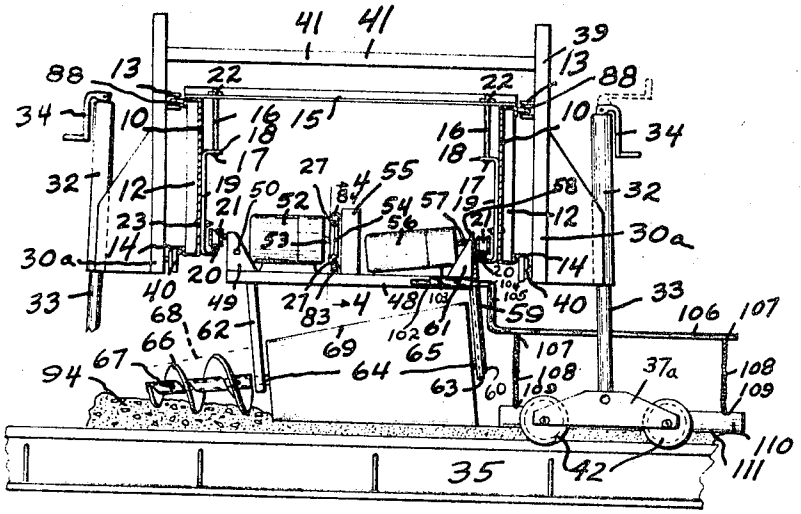


Fig. 5

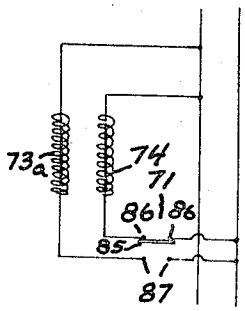


Fig. 7

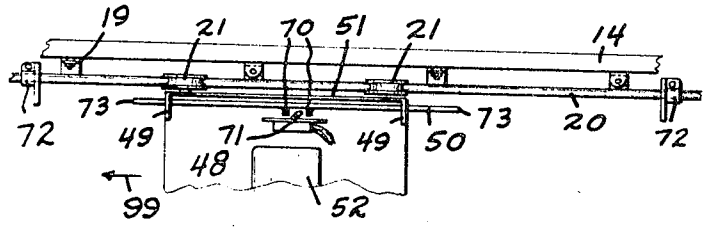


Fig. 6

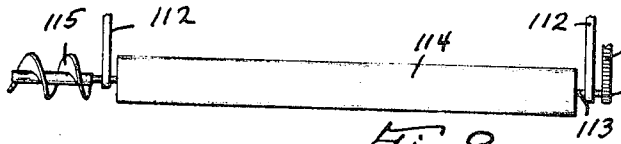


Fig. 8

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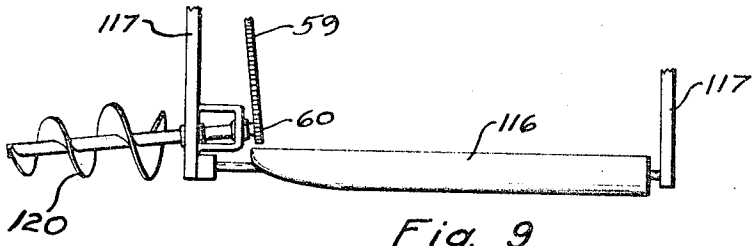


Fig. 9

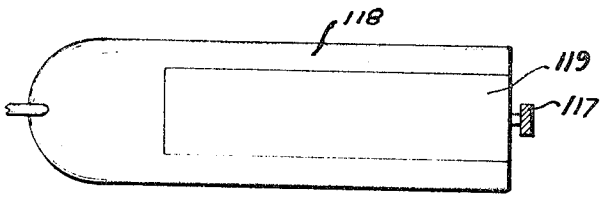


Fig 10

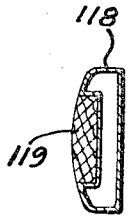


Fig 11

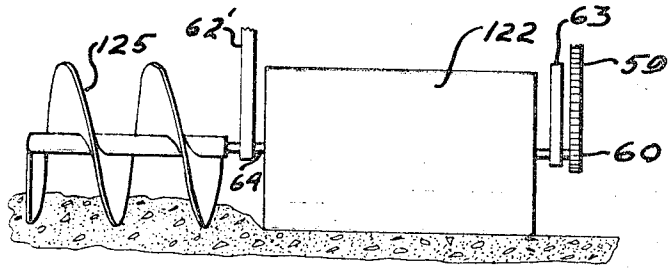


Fig. 12

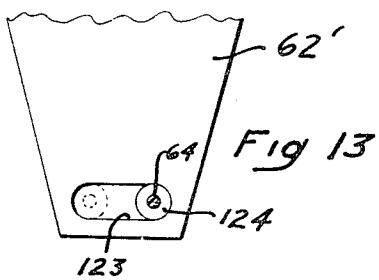


Fig 13

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3,450,011

CONCRETE FINISHING MACHINE

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Int. Cl. E01c 19/42
U.S. Cl. 94—45 11 Claims

ABSTRACT OF THE DISCLOSURE

A concrete finishing machine, utilizing a traveling carriage to transport a finishing member transversely over a slab of concrete. Several forms of finishing members may be used, and an auger type smoothing member is used to provide preliminary smoothing and leveling of the concrete in advance of the finishing member.

My invention relates to a concrete finishing machine.

An object of my invention is to provide a machine of this type which will efficiently finish off the surface of a concrete roadway or the like.

A further object of my invention is to provide a machine which will smoothly prepare the upper surface of the concrete and wherein the heavier particles such as the aggregate and the like will be forced downwardly into the cement.

A further object of my invention is to provide a revolving structure which will finish off the concrete in the manner stated while the entire machine is moving in the direction of the roadway.

A further object of my invention is to provide adjusting features for adjusting to the crown or the shape of the roadway.

A further object of my invention is to provide an adjustable auger arrangement which works in conjunction with the revolving structure to provide more efficiently the aforesaid smooth surface.

A further object of my invention is to provide an adjustable supporting arrangement which besides acting as a carriage structure will readily conform to the various widths of the tracks or rails upon which the machine operates.

A further object of my invention is to provide an efficiently operating reversing arrangement which will provide means whereby the revolving structure and its carriage will be automatically reversed at the end of its transverse travel.

A further object of my invention is to provide a sectional arrangement which can be adapted to various road widths, and to provide a device which can be powered by simple means.

With these and other objects in view, my invention consists in the construction, arrangement, and combination of the various parts of my device, whereby the objects contemplated are attained, and illustrated in the accompanying drawings, in which:

FIGURE 1 is a forward side elevation of the machine,

FIGURE 2 is a plan view of FIGURE 1,

FIGURE 3 is an enlarged detail of one of the carriage supports,

FIGURE 4 is an enlarged sectional view taken generally along the line 4—4 of FIGURE 5,

FIGURE 5 is an enlarged sectional end view taken substantially along the line 5—5 of FIGURE 2,

FIGURE 6 is a detail of the reversing mechanism,

FIGURE 7 is a schematic diagram of the electrical circuits,

FIGURE 8 is a view showing one variation in the type of finishing member,

FIGURE 9 is an elevational view showing another alternative finishing member,

FIGURE 10 is a detailed bottom plan view showing the finishing member of FIG. 9,

FIGURE 11 is an end view of the device of FIG. 9,

FIGURE 12 is an elevational view showing still another alternative finishing member, and

FIGURE 13 is an end elevational view of the front support of the finishing member of FIG. 11 showing the bearing support.

My invention contemplates the provision of a concrete finishing machine having a variety of advantages as mentioned in the objects hereinabove and which will now be explained.

I have used the character **10** to designate vertically positioned side plates which are adapted to extend laterally across a roadway to be finished, there being three such sections as shown in FIGURE 1 for providing the longest span. The machine is designed to use one, two, three or more sections. These sections terminate at the angle members **11**, so that by the use of varying members of sections, any width of roadway can be accommodated.

Vertical braces **12** are secured to the members **10**. The members **10** terminate in the upper track portions **13** and the lower track portions **14**, these track portions being in perfect alignment when the sections are all bolted together as shown.

Added angle portions **15** are fixed between the members **10**. Passing through the members **15** (see FIGURE 5) are the lengthened bolts **16** having heads **17** received under the flange portions **18** of the straps **19**. To these straps are secured a pair of lengthened round rods **20** upon which the rollers **21** travel for moving and supporting the carriage structure to be described.

The bolts **16** are threadably engaged with the nuts **22** which can be used to adjust the members **19** to any desired height thereby providing that the bars **20** will match the crown of the roadway, which crown is usually highest at the center.

The bolt and nut arrangements **23** (see FIGURES 1 and 5) are used to additionally tighten the support straps **19** after the conformation has been pre-set. The additional straps **24**, which are shorter than the straps **19**, and spaced between them, are used to further stabilize and brace the arrangement after it has been properly set, the slots **25** permitting of adjustment in both straps **19** and **24**.

A V-belt member **27** is secured as at **26** (see FIGURE 2) to one end of the framework and is shown partially broken away in FIGURE 2. This belt member passes over the pulley **28** attached to the other end **29** of the framework (see FIGURE 1), and thence returns to the attached point **26**, thus having an upper run and a lower run.

Support members **30** are suitably secured to the sides of the unit at one end thereof. Plates **31** are affixed to the support members **30** and carry the vertically positioned tubes **32**. The support posts **33** are slidably journalled within the tubes **32** to provide for vertical adjustment of the framework as described in a manner well known in the art by handles **34**. The turning handles are suitably attached to threaded rods or the like within the tubes **32** so that rotation of the handles will provide the desired height between the supporting tracks and the framework.

The tracks upon which the machine travels are indicated by the characters **35** and **36** and are of the approximate shape as shown. Trucks **37** upon which are journalled the rollers or wheels **38** for rolling along the track **36** are fixed to the lower end of the posts **33** for movement of the machine.

The other side of the support structure is substantially the same as the stationary support structure with the exception that the support members **39** are modified from

members **30** (see FIGURE 1). These members carry posts **33** in tubes **32** which are mounted on plates **30***a* similar to the plates **31**. However, additional rollers **40** which are journalled to the members **39** are used. These rollers are adapted to roll along the track portion **14**, the members **39** being braced across the top by the straps **41**.

The trucks **37***a* at this end include the rollers **42** journalled thereon, these rollers including sprockets **43** over which the sprocket chains **44** pass (see FIGURE 3). The chain **44** also passes over an idler sprocket **45** and drive sprockets **45***a*. Certain of these carriages, preferably at least one at each end of the machine as shown best in FIGURE 2, are powered by electric motors **46** which are suitably geared to drive the sprockets at **45***a* thus propelling the entire arrangement along the tracks **35** and **36**. Certain additional bracing **47** may be provided to make the structure more rigid.

The carriage for my finishing member includes a platform **48** (see FIGURES 5 and 6), having ears **49**. The rod **50** is slidably journalled in openings in these ears so that it can be moved from one side to the other. Projections **70** are provided on the rod embracing a toggle switch **71** mounted on the platform **48**. Adjustable stop members **72** are fastened to the bar **20** near either end thereof to provide limits of travel. These stop members are adapted to be engaged by the ends **73** of the rod **50**. Such engagement slides the rod to operate the switch for a purpose to be explained hereinafter. A flange **51** is affixed to the ears **49** and carries the rollers **21**. A motor **52** which may be either electrically or hydraulically driven and having a suitable gear-driven arrangement therein, drives the shaft **53** on which is fixed a V-pulley **54**. This pulley is adapted to engage the V-belt **27** at either side as will be described.

The finishing member **65** is supported on the carriage by a front support **62** and rear support **63** in which is journalled the finishing member shaft **64**. This member may be of frusto-conical shape as shown in FIGURE 5 or of variant shapes as will hereinafter appear. The finishing member may be driven by a motor **56** mounted on brackets **61** and driving the finishing member from the drive sprocket **58** through the chain **59** to the driven sprocket **60**. Also attached to a lengthened extension of the shaft **64** may be the helical and tapered conveyor-like auger member **66**. A set-screw at **67** fastens the auger member adjustably on the shaft **64**. The character **68** indicates by dotted lines that the outer periphery of the member **66** is normally a continuation of the periphery **69** of the cone-like member **65**, except when the auger-like structure **66** is adjustably positioned inwardly or outwardly.

A solenoid member **73***a* and a further solenoid **74** are mounted on a frame **55** on the platform **48**. These solenoid members have plungers **75** and **76** attached to the springs **77** and **78** which are secured to the levers **79** and **80** pivoted at **81** and **82**. A roller **83** is journalled on the lever **79** and a roller **84** on the lever **80**. These rollers are adapted to engage the V-belt **27** respectively below and above the pulley **54**. To actuate either solenoid, the toggle switch **71** includes a contact member such as **85** which will bridge either the contacts **86** or **87** (see FIGURE 8). When either solenoid is actuated, it will pull its respective lever, thereby causing its roller to press the V-belt **27** against either the top or bottom of the pulley **54** to produce motion as is more fully described hereinafter. Rollers **88** are suitably journalled to the members **89** at either side of the device for providing a smooth rolling action (see FIGURE 5).

The machine operates in the following manner. The various rollers or wheels **38** and **42** will ride along the tracks **35** and **36**. It should be noted that the members including the trucks **37***a* and support members **39** are adjustable so that the spacing between the tracks **35** and **36** need not be a standard amount.

The finishing member **65** and the helical auger structure **66** with the supporting structure therefor will also move in either direction **92** or **93** (see FIGURE 1), on the rollers **40** and **88**. During such travel, the finishing member will finish off the surface of the cement, and the helical member **66** will also force the thickened material at **94** (see FIGURE 5) to be partially smoothed off, with the aggregate being forced downwardly. The member **66** can be adjustably positioned as desired to provide a greater or lesser depth of concrete. The adjustment of the member **66** along the shaft **64** will thus allow the exact desired amount of concrete to be left in front of the finishing member **65**. Also, due to the fact that the apex of the frusto-conical member and of the helical member is always positioned forwardly, the cone will be always traveling forwardly into the work.

The direction of travel of the machine will be directed along the roadway in the direction of the arrow **95** (see FIGURE 2), and as the machine travels in this direction, the conical member, etc. will be traveling from one side to the other of the entire framework. As this motion progresses, the conical member will operate continuously, and will reverse its direction automatically due to the structure shown principally in FIGURES 4 and 6, and as will now be explained.

It will be noted that the pulley **54**, which is being constantly rotated or driven, is situated between the stationary V-belt structure **27**. The solenoid **73***a* has been actuated in the configuration of FIGURE 4 which pulls the lever **79** upwardly and which causes the small roller **83** to force the V-belt **96** upwardly to firmly engage the pulley **54**, which is rotating in the direction of the arrow **97**. Due to this engagement with the stationary V-belt **27**, the entire carriage carrying the finishing member will be moved in the direction of the arrow **98**. The finishing member will therefore be driven in this direction until the end **73** of the rod **50** strikes the right-hand member **72** as viewed in FIGURE 6, whereupon the rod **50** will be pushed in the direction of the arrow **99**. This engagement will cause one of the projections **70** to throw the toggle switch **71** over to the reverse direction, whereupon (see wiring diagram, FIGURE 7) the solenoid **74** will be actuated, and the lever **80** will be brought downwardly to cause engagement of the small roller **84** with the belt at **100**. Thus even though the direction of rotation of the pulley **54** is not changed, the carriage will then travel in the direction of the arrow **101**, it being noted that actuation of one solenoid de-activates the other.

As a result the to and fro lateral travel of the finishing member is automatically effected as the machine travels forwardly along the roadway.

In addition to a finishing member, it may be desirable to provide for a float to further finish the concrete. In order to accomplish this end, I provide a pair of socket members **102** attached to either side of the carriage or platform **48**. Engaging the socket members **102** are the machine screws **103** which are adapted to adjustably secure horizontal rods **104** extending into the integral vertical portions **105** and the further horizontal integral portions **106**. Attached to the integral portions **106** at **107** are chains **108** which are attached at **109** (see FIGURES 1 and 5) to the curved portions **110** and a float pan **111** which can be made of metal or any other suitable material and which is adapted to drag along the surface of the concrete to assist in finishing off the same in the proper manner.

As illustrated in FIGURE 8, my device may also be used as a mechanical straight edge. To accomplish this, I provide a pair of supports **112** attached to the carriage or platform **48**, which operates in the same manner as the device previously described. A shaft **113** is driven by the chain **59** through the sprocket **60**, and is journalled in the supports **112**. The hollow cylindrical finishing member **114** is attached to the shaft **113** and is driven thereby. Although in most applications, it is not necessary, the shaft **113** may also carry an auger member **115**. Also, if desired, the shaft **113** and the

above described shaft **64** can be positioned slightly off-center of the true center of the frusto-conical member, or the cylindrical member, so that as these members rotate they will provide a slight impacting effect against the concrete.

The device illustrated in FIGURE 8 and described above will provide the same effect as a mechanical straight edge for levelling and finishing concrete. This type of straight edge is ordinarily hand operated and in most cases is required by specifications to be ten feet long. By providing a small diameter roller **114** of that length, I have been able to produce results fully equivalent to those accomplished with a ten foot hand operated straight edge.

Several additional variations of my device are possible. In FIGURES 9 and 10, I illustrate one modification in which I use a non-driven float **116** suspended on supports **117** which are similar to the previously described supports in that they are carried by the platform **48**. The float **116** is preferably formed with a metal base **118** with a wooden insert **119**. This insert is preferably of a type of wood such as redwood which will not rot readily. An auger **120** is provided to provide initial levelling. This auger may be driven by a chain **59** through a sprocket **60** as previously described.

I have also discovered that a frusto-conical shape for the finishing member is not required. Thus, I can use a cylindrical member **122**. This member is supported in practically the same manner and is driven in the same manner as the frusto-conical finisher. In order to achieve the best finish, it is necessary to modify the front support **62'** slightly. This is done by providing a slotted opening **123** (FIG. 13) in that member. A slidable bearing carrier **124** is slidably mounted in that slot. The shaft **64** is then journalled in the bearing in that carrier. The rear bearing in the support **63** is one which will allow some angular movement of the shaft. While this sliding bearing provides the best finish, the device also works well with an axis slanted permanently to either side.

In this device, it is obvious that as the finishing member is pulled laterally, the bearing carrier **124** will slide to one end of the opening. The slight variation of the shaft from perpendicular to the lateral line of travel results in a smoothing operation which is much superior to that achieved when the member **122** is pulled across the concrete in a direction perpendicular to its axis. It will also be apparent that with such a cylindrical finishing member, an auger **125** can also be used. This auger can be either driven by the same axle as the drum, similar to the auger in the frusto-conical conformation, or driven by a separate shaft as illustrated in FIG. 9.

Having thus described my invention in several embodiments, I am aware that many and extensive variations therefrom are possible without departing from the spirit or scope of the invention as limited only by the following claims.

I claim:

1. A concrete finishing machine comprising an elongated framework adapted to be positioned transversely of a concrete surface to be finished, means for moving said framework in a direction substantially at right angles to the length of said framework, a carriage movably mounted on said framework, means for moving said carriage along the length of said framework, said carriage, including a cement engaging finishing member attached thereto, the axis of said cement engaging finishing member being generally horizontal and being positioned in substantially the direction of travel of said framework, an auger member having a helically arranged blade attached adjacently to the forward end of said cement engaging member on an axis substantially transverse to the length of said framework, drive means on said carriage for rotatably driving said auger member.

2. The structure of claim **1** wherein said cement engaging member is generally frusto-conical in shape and is rotatably driven by said drive means, said auger member being adapted to travel into cement material ahead of said substantially frusto-conical member and to assist in finishing off said cement, said auger member also being of conical shape.

3. The structure of claim **2** and wherein said auger member and said frusto-conical member are mounted on a common axis, said auger member being adjustable along said axis to allow a desired amount of concrete to be positioned in front of said frusto-conical member.

4. The device of claim **1** in which said finishing member is a non-driven metal float member having a wood insert therein.

5. The structure of claim **1** in which said finishing member is a non-driven float member suspended from said carriage by flexible supporting means.

6. The structure of claim **1** wherein said finishing member is a drum means rotatably mounted on said carriage on a substantially horizontal axis of rotation, the horizontal axis of said finishing member being not coincident with its axis of rotation.

7. In a concrete finishing machine having a mobile frame, said frame including a carriage movable across said frame and transversely to a longitudinal concrete slab, a rotatable finishing member journalled on said carriage, the axis of said finishing member lying in a position other than perpendicular to the line of travel of said carriage across said frame.

8. The structure of claim **7**, wherein said finishing member is cylindrical in shape and elongated so that its diameter is small compared with its length.

9. The device of claim **2**, in which said length is at least ten feet.

10. The device of claim **7**, in which said finishing member is rotatably journalled in a front support and a rear support, both of said supports being fixed to said carriage, said front support being formed with a slotted opening therein, front bearing means for said cement engaging member slidably mounted in said slotted opening whereby the axis of rotation of said cement engaging member is changed upon movement of said carriage along said framework, said finishing member being substantially cylindrical in shape.

11. A concrete finishing machine comprising an elongated framework adapted to be positioned transversely of a concrete surface to be finished, means for moving said framework substantially perpendicular to the length of said framework, a carriage movably mounted on said framework for motion longitudinally thereof, drive means on said carriage adapted to drive said carriage including a pulley on said carriage, belt means having an upper run and a lower run attached to said framework, an upper roller movably mounted on said carriage adjacent said pulley and in position to engage said upper run and a lower pulley similarly mounted to engage said lower run whereby each pulley is adapted to press its corresponding run into driving contact with said pulley, solenoid means engaged with each roller, an electrical circuit connected to said solenoid for operation thereof, and means for automatically reversing the travel of said carriage including a control rod slidably engaged with said carriage, stop members attached to said framework, said control rod including a pair of spaced apart projections, a reversing toggle switch attached to said carriage, and being adapted to control said solenoid through said circuit, said switch having an operation member extending between said projections whereby said switch is operated whenever either end of said control rod engages a stop member.

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