United States Patent

[11] 3,601,870

[72] Inventor **Cordis W. Jones**
Salina, Kans.

[21] Appl. No. **7,610**
[22] Filed **Feb. 2, 1970**
[45] Patented **Aug. 31, 1971**

[73] Assignee **Hastings Dynamald Corporation**
Hastings, Nebr.

[54] **STINGER CONTROL**
4 Claims, 6 Drawing Figs.

[52] **U.S. Cl.** ..... **25/41 R,** 192/116.5, 340/244 R, 259/1, 25/131 SD
[51] **Int. Cl.** **B28b 7/00**
[50] **Field of Search** ..... 25/41 T, 41 J, 41 R, 32, 118 D, 118 R, 1 R, 131 P, 131 SC, 131 SD, DIG. 22; 192/116.5; 340/244 R; 259/1

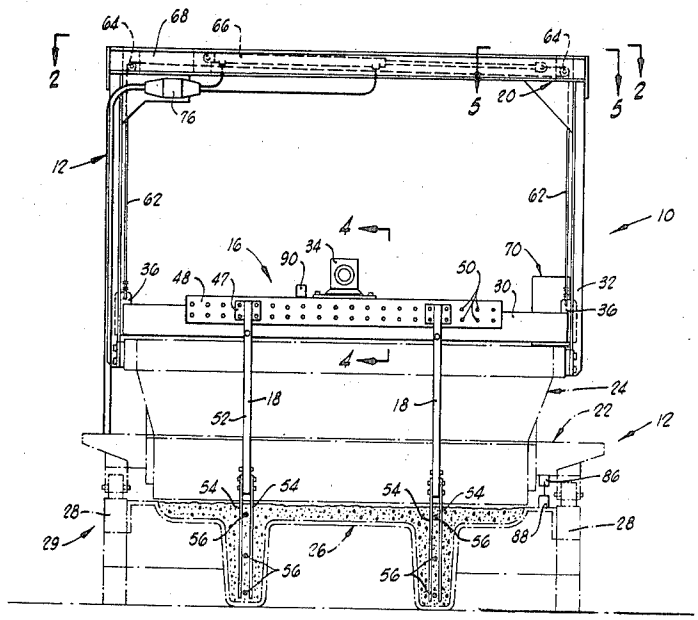
[56] **References Cited**

UNITED STATES PATENTS

3,217,375 11/1965 Kinnard ..... 25/41 R
2,574,213 11/1951 Jerner 25/32

Primary Examiner—J. Spencer Overholser
Assistant Examiner—Dewalden W. Jones
Attorney—John H. Widdowson

ABSTRACT: This invention is a stinger control device for use with a moving apparatus for placing and form pouring of concrete. It is used with an apparatus having a supporting structure, a concrete distribution hopper and means to move and control same when in operation moving over concrete forms. The stinger control device of this invention is mounted on the concrete placing and form pouring apparatus, and in operation compacts the placed concrete in the form. More particularly, the stinger control device includes a probe extending downwardly from the hopper and has apparatus to position same within the form and vibrate same. There is a control to withdraw the probe automatically upon contact with the form or a foreign object therein or upon reaching a bulkhead within the form.



PATENTED AUG 31 1971

3,601,870

SHEET 1 OF 2

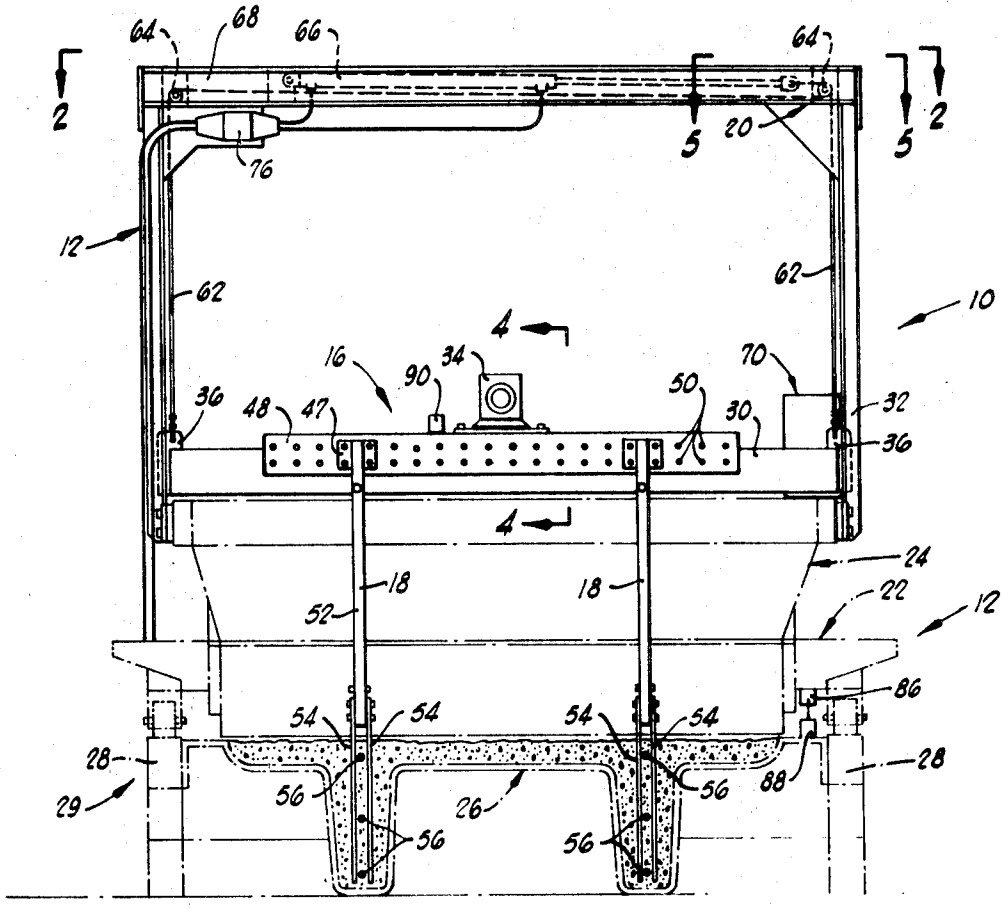


FIG. 1

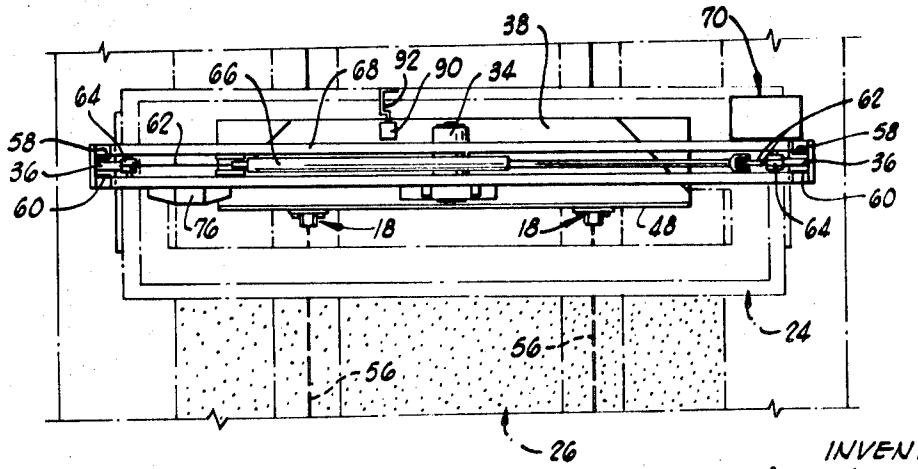


FIG. 2

INVENTOR
CORDIS W. JONES

BY John H. Wildman
ATTORNEY

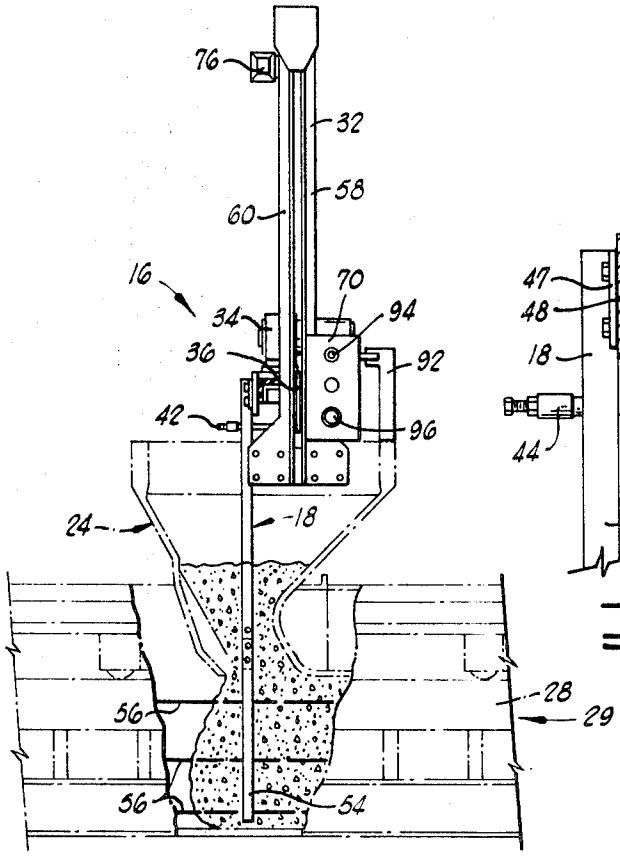


FIG. 3

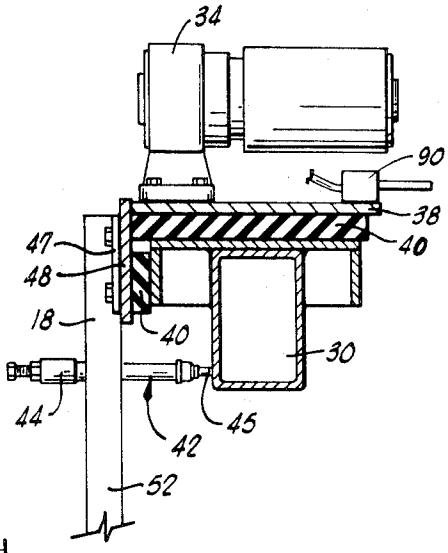


FIG. 4

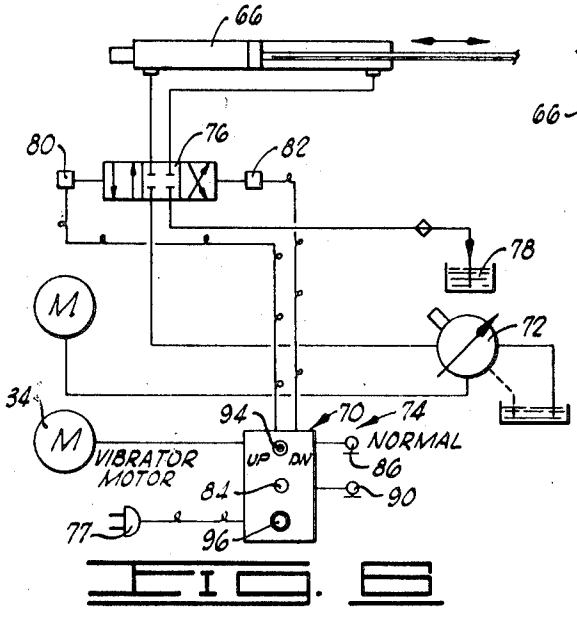


FIG. 6

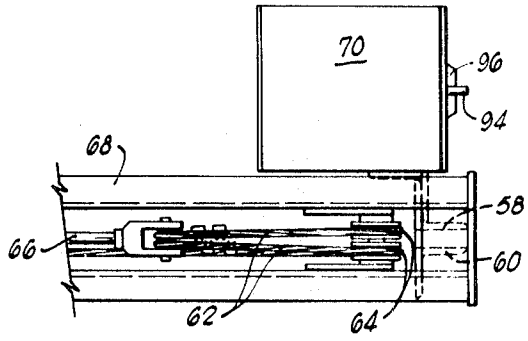


FIG. 5

INVENTOR
CORDIS W. JONES

BY John H. Widdowson
ATTORNEY

STINGER CONTROL

Numerous devices and methods are known to the prior art to compact concrete after being placed in a form. However, these devices are operable on the surface of the placed concrete, and have relatively little penetration into the concrete or are of the probe type with a greater penetration, but are not easily adaptable to a continuous pouring-type operation.

In one preferred specific embodiment of the stinger control device of this invention, a means is provided to hold a probe assembly over the hopper of a concrete placing and form pouring apparatus and a probe control system to insert the vibrating probes through the hopper and into the form when concrete is being placed. The support member includes side and top members which support and guide the probe assembly when lifted from the normal operating position. The probe assembly is supported on a beam positioned with ends held in the side members of the support member and raised therein by a lifting apparatus. The lifting apparatus preferably has cables attached to the ends of the beam and to a hydraulic cylinder operated from the concrete placing and form pouring apparatus by the probe control system. The probe assembly preferably has a vibrator mounted on a support member which is mounted on the beam and isolated therefrom by a resilient vibration isolating material. The vibrator support member is shaped to attach a plurality of probes in various positions generally extending downward. The probes are sufficiently rigid to transmit vibration from the vibrator through the upper portion of the concrete in the form and dissipate same in the lower region thereof by the more flexible portions of the probes, thus compacting the placed concrete.

One object of the stinger control device of this invention is to overcome the aforementioned disadvantages of the prior art devices.

Another object of the stinger control device of this invention is to provide a means adapted for use with a concrete placing and form pouring apparatus for compacting concrete as it is placed in normal operation.

Yet another object of the stinger control device of this invention is to provide a means of properly compacting the bottom portion of concrete placed in a form, thus permitting the use of drier and harsher concrete mixes in the concrete structure.

Yet another object of the stinger control device of this invention is to provide a concrete compacting device with a variable degree of vibration operable with a concrete placing and form pouring apparatus in the making of prestressed concrete beams having extended bed-type forms separated by partitions.

One further object of the stinger control device of this invention is to provide a concrete compacting device operable in conjunction with a concrete placing and form pouring apparatus as it moves in the concrete placing operation and the apparatus pausing in forward motion upon the withdrawal or insertion of the probes or stopping upon encountering of any obstruction in the form.

Various other objects, advantages, and features of the invention will become apparent to those skilled in the art from the following discussion, taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a front elevational view of a preferred specific embodiment of the stinger control device of this invention mounted on the hopper of a concrete placing and form pouring machine, the latter shown in outline;

FIG. 2 is a top plan view of the machine as shown in FIG. 1;

FIG. 3 is a side elevational view of the stinger control device of this invention mounted on a concrete placing and form pouring apparatus the latter shown in outline and having portions thereof removed for clarity;

FIG. 4 is a sectional view of the probe and vibrator support member taken on line 4—4 of FIG. 1;

FIG. 5 is a sectional view of one end of the support member taken on line 5—5 of FIG. 1; and

FIG. 6 is a schematic diagram of the control system for the stinger control device.

The following is a discussion and description of preferred specific embodiments of the stinger control device of this invention, such being made with reference to the drawings whereupon the same reference numerals are used to indicate the same or similar parts and/or structure. It is to be understood that such discussion and description is not to unduly limit the scope of the invention.

Referring to the drawings in general and in particular to FIG. 1, the stinger control apparatus, shown generally at 10 is mounted on a concrete placing and form pouring apparatus, generally indicated at 12. The stinger control device 10 includes a probe assembly supporting structure 14, probe assembly 16, with probes 18 and a lifting apparatus 20. The concrete placing and form pouring apparatus 12 includes a form supporting structure 22, hopper 24 and form 26 and adjacent rails 28 defining a form bed 29.

The probe assembly 16 includes a support beam 30 which is held in a vertical track by the supporting structure 12 by the side members 32 thereof and supports the vibrator 34 and probes 18. The ends 36 of the support beam 30 are within the track of the side members 32 of the supporting structure 12 and are attached to the lifting apparatus 20. The supporting beam 30 moves in the vertical direction to raise and lower the probes 18. The vibrator 34 and probes 18 are mounted on an isolated vibration member 38 mounted on the support beam 30 by a thickness of resilient vibration-isolating material 40, preferably a rubberlike sponge material. The probes 18 depend from the vibration member on the side which in operation normally faces the direction of motion of the concrete placing and form pouring apparatus 12. The amount of vibration transmitted to the probes 18 is adjustable by means of a rigidity adjustment 42, which causes the mechanical connection between the probes 18 and the supporting beam 30 to become more or less rigid. Here the rigidity adjustment 42 is a micrometerlike adjusting extendable brace having the body 44 of same attached to the probes 18 and extendable member 45 against the support beam 30. A rigidity adjustment 42 is desirable to compensate for the depth of the particular form being used, and the particular concrete mixture used so that the proper amount of compaction is achieved. The probes 18 are fitted with an attaching mount 47 and attach the vibration member 38 preferably by means of bolting to an overhanging member 48 containing a plurality of uniformly spaced holes 50 therethrough. The probes 18 are substantially one extended piece 52 which passes through the hopper 24 and have flexible end portions 54 on the lower end which in operation pass beside the stringers 56 of the concrete beam. The probes 18 are adjustable in spacing by placing them in different holes 50, and are adjustable in length by changing the end portions 54 which are preferably bolted to the extended piece of the probe 52.

The supporting beam 30 has ends 36 which extend between the two segments 58 and 60 of the side members 32 of the supporting structure 12. Also, the ends 36 have a cable 62 attached which is used by the lifting apparatus 20 to raise and hold the probe assembly 16. Preferably, the cable 62 of the lifting apparatus 20 passes over pulleys 64 on each end of the supporting structure 12 and is arranged to be drawn by a hydraulic cylinder 66, raising or lowering the probe assembly 16 upon command by the control system. The pulleys 64 and hydraulic cylinder 66 are mounted in the upper segment 68 of the support structure 12.

The control system of the stinger control apparatus 10 includes a control box, generally indicated at 70, a hydraulic pump 72 with associated motor and apparatus, preferably the powering source of the concrete placing and form pouring apparatus 12, a series of microswitches 74, a control valve 76 and the hydraulic cylinder 66. In normal operation the stinger control 10 is driven from the hydraulic system of the concrete placing and form pouring apparatus by the pump 72. The vibrator 34 and electrical control system is preferably powered by standard 110 volt AC power 77. The hydraulic

cylinder **66** is connected to the control valve **76** which is connected to the pump **72** and the hydraulic fluid storage **78**. Preferably, the pump **72** drives the system of the concrete placing and form pouring apparatus **12** which propels it; thus, when the probe assembly **16** is raised, the forward motion is stopped or slowed momentarily until the probe assembly **16** is in the raised position. Then hydraulic fluid returns to the propulsion system and the apparatus **12** proceeds. Solenoid **80** actuates the control valve **76** raising the probe assembly, and a solenoid actuates the control valve lowering same. The solenoids **80** and **82** are connected to the control box **70** and are operated therefrom. The probe assembly **16** can be raised or lowered by the operator at any time by using the switch **84**. The switch **84** raises the probe assembly **16** or lowers it and places the stinger control apparatus **10** in automatic operation. In normal operation the probe assembly is lowered into position when the pouring operation is started at one end of a form then raised automatically at the separating bulkheads in the form. This is done by the microswitch **86**, which is positioned inside of the rails **28** of the form bed **29** and actuated by a block **88** placed thereon. The block **88** is positioned to raise the probe assembly **16** before it contacts the bulkhead of the form **26**, and the control system is preferably designed to maintain the probe assembly **16** in the raised position until the switch **86** moves from the block **88**, as normal in a continuous pouring-type operation where one begins upon completion of another. In the event some obstruction is encountered in the form **26** by the probes **18**, the microswitch **90** is activated; it is placed on the vibrator support member **38** and touches an arm member **92** extending from the upper rim of the hopper **24**. When an obstruction is hit by the probes **18**, the vibrator support member **38** is moved sufficient to activate the microswitch **90**; in such event, the probe assembly **16** is raised immediately and forward motion of the concrete placing and form pouring apparatus is stopped and must be restarted by the switch **84**; this allows for the obstruction to be removed. The vibrator **34** is operated independent of the position of the probe assembly **16** by a switch **94** and is adjustable as to the amount of vibration by a rheostat-type adjustment **96**. Precise adjustment of the degree of vibration is necessary to provide proper compaction of the concrete and prevent separation of the ingredients of the concrete.

In the manufacture of the stinger control device **10** of this invention, it is seen that same is easily adapted for use with a concrete laying and form pouring apparatus **12** and is efficient in producing the desired result in compacting the concrete in the lower portion of the form **26**.

In the use and operation of the stinger control device **10** of this invention, it is seen that same provides a means of compacting concrete in the lower portion of the form **26** of a continuous pouring concrete type operation. The device **16** compacts concrete below the level that adequate compaction is achieved by surface vibration means. The device **16** is adapted to use with equipment used for laying concrete and continuous form pouring thereof.

As will be apparent from the foregoing description of the applicant's stinger control device, relatively inexpensive and highly efficient means has been provided to readily achieve compaction of concrete in continuous pouring type forms which was heretofore difficult to achieve. The stinger control device is simple to use, automatic in operation and has safety devices to prevent damage to itself or the concrete forms.

While the invention has been described in conjunction with preferred specific embodiments thereof, it will be understood that this description is intended to illustrate and not limit the scope of the invention, which is defined by the following claims.

I claim:

1. In a moving apparatus for placing concrete and form pouring thereof having a supporting structure, distribution hopper means movably mounted thereon, powering means therefor, and control means therefor, said apparatus communicable with a concrete form having means to receive concrete from said hopper means and for said apparatus to traverse, in combination therein and therewith the stinger control device of this invention for compacting of placed concrete, comprising:

a. a probe means mounted on said hopper means and having a probe extending therefrom,

b. means operably connected to said probe means to vibrate said probe in operation,

c. a lifting means operably connected to said probe means and operable to position said probe means in said form and withdraw same, and

d. probe control means operably connected to said probe means to automatically lift said probe upon contact of same with said concrete form upon movement of said apparatus for placing concrete in said form.

2. A stinger control device as described in claim **1**, wherein:

a. said probe means is mounted on said hopper means over the upper opening thereof,

b. said probe means has side members adapted to hold said probe and guide same in vertical movement,

c. said probe means has said lifting means operable to raise and lower said probe means vertically,

d. said lifting means has a cable means and a hydraulic cylinder means in combination attached to said probe means, and

e. said lifting means is operable by said control means of said probe means and operable by said powering means of said concrete placing and form pouring apparatus.

3. A stinger control device as described in claim **2**, wherein:

a. said probe means has a plurality of probes extending downward therefrom and held generally vertical with said probes in operation extending through said hopper means with ends thereof extending into said form,

b. said probe means has a vibrating means which in operation vibrates said probes and same being controlled by said probe control means, and

c. said probe means has a beam member held by said lifting means and said side members of said probe means and has a resilient vibration isolating support attached thereto supporting said probes, said vibrator means and rigidity adjusting means.

4. A stinger control device as described in claim **1**, wherein:

a. said probe control means is normally automatically operable to position said probes in said forms and vibrate same, withdraw said probes from said forms upon reaching the end portions thereof, and withdraw said probes from said forms upon reaching any obstructions therein,

b. said probe control means is operable to insert and withdraw said probes upon command by the operator of said concrete placing and form pouring apparatus, and

c. said probe control means is coupled to operate with said powering means and said control means of said concrete placing and form pouring apparatus in the normally forward motion thereof and to suspend temporarily said motion upon raising said probe means.