June 17, 1958 E. D. ROWE 2,839,278

VIBRATING DEVICE

Filed Aug. 24, 1953 2 Sheets-Sheet 1

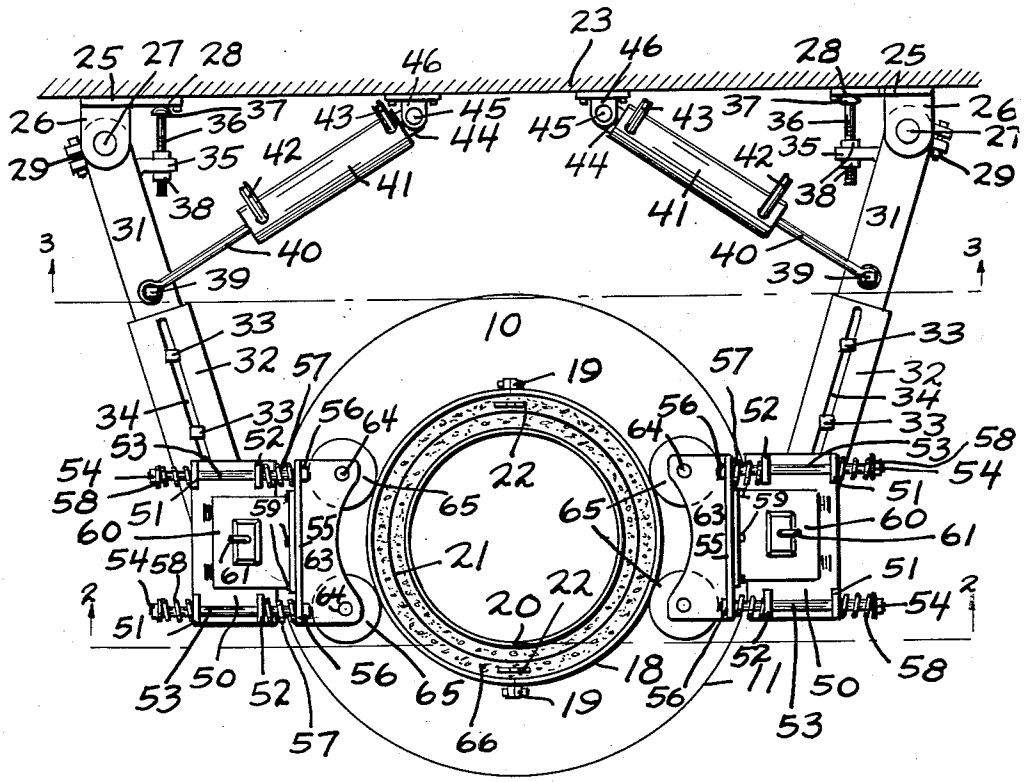


Fig. 1

INVENTOR.
Ernest D. Rowe
BY
Sam J. Slotky
ATTORNEY

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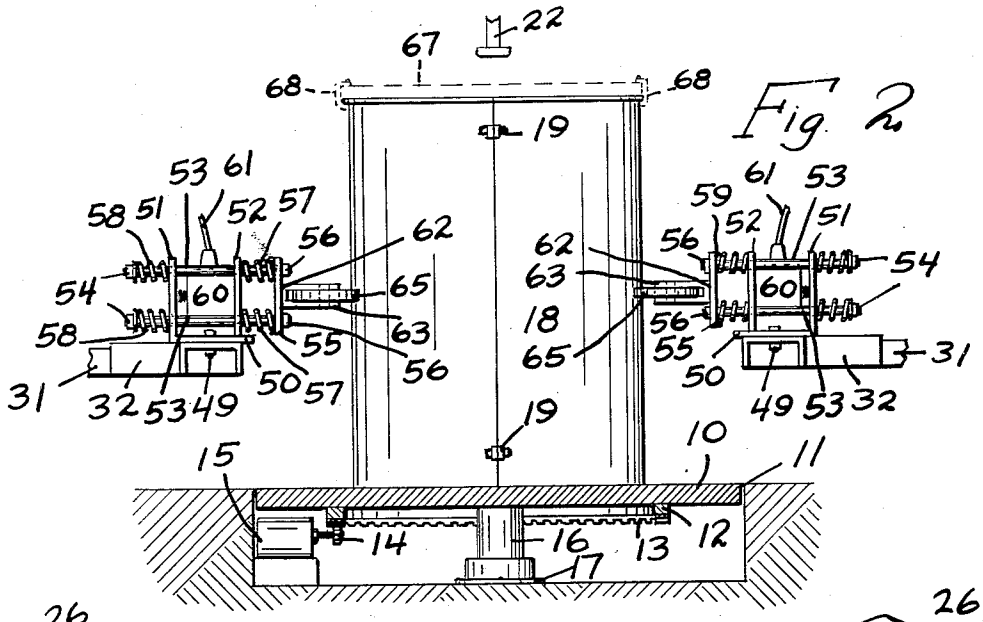


Fig. 2

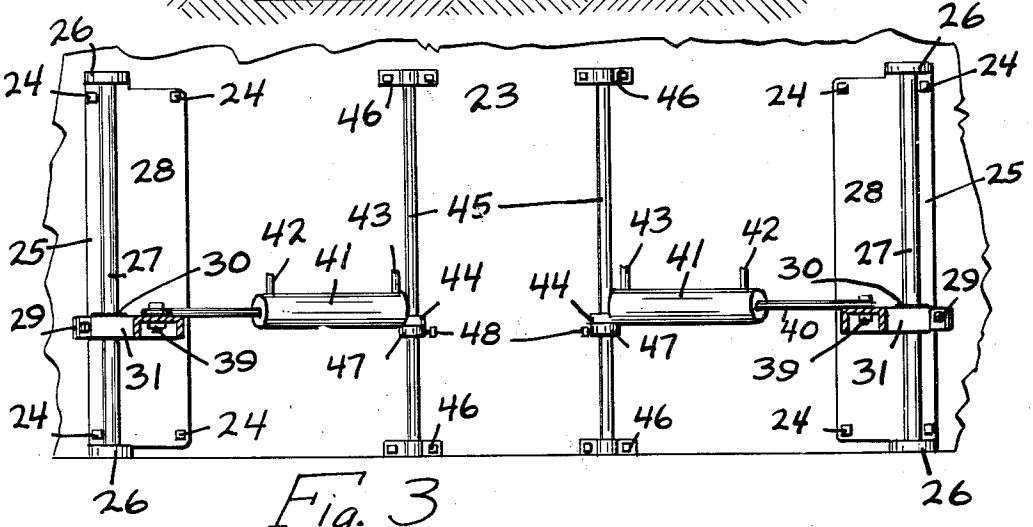


Fig. 3

INVENTOR.
Ernest D. Rowe
BY
Sam J. Slotky
ATTORNEY

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VIBRATING DEVICE

Ernest D. Rowe, Canton, S. Dak.

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1 Claim. (Cl. 259—72)

My invention relates to an apparatus for forming concrete pipe.

An object of my invention is to provide an apparatus for forming a superior type of concrete pipe by means of the use of the device about to be explained, this apparatus utilizing the combined functions of tamping and vibration and also spinning, such spinning involving the use of centrifugal forces for impacting the material while in its plastic state to thereby provide a strong and rigid concrete structure.

A further object of my invention is to provide this apparatus which includes the additional advantages of providing a stronger pipe due to the fact that the operation can be performed on a drier mix, since a relatively drier mix will provide such a stronger pipe.

A further object of my apparatus is to provide a better class of pipe, the spinning action being provided in most cases.

A further object of my invention is to provide an adjustable mechanism which will accommodate pipe of different diameters or contours, which operates efficiently, and which can be adjustably moved or positioned vertically corresponding to conditions encountered.

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, as hereinafter more fully set forth, pointed out in my claim, and illustrated in the accompanying drawings, in which:

Figure 1 is a plan view of the device or machine by which my process is applied,

Figure 2 is an end sectional view taken generally along the lines 2—2 of Figure 1, and

Figure 3 is a sectional view of Figure 1 taken along the lines 3—3 thereof.

My invention contemplates the provision of a process and apparatus whereby the ultimate strength of concrete pipe can be materially increased, resulting in a better pipe for the purpose, and providing further advantages which will be apparent.

I have used the character 10 to designate a circular platform positioned within a suitable opening 11 in the base or ground portion of a building in which the apparatus is contained, and attached to the platform 10 is the ring 12 to which is attached the ring gear 13 meshing with the smaller gear 14 which gear 14 is driven by means of the small motor 15, the platform 10 being secured to the centrally positioned inner cylindrical member 16 which is secured as at 17, this arrangement serving to support the platform 10, it being understood that other types of support could be used as well.

I have further used the character 18 to indicate the outer split form for forming the outer surface of the concrete pipe, this member being bolted together at 19, and I have used the character 20 to indicate the inner vertically positioned cylindrical form for forming the inner diameter of the pipe, the character 21 indicating the

usual cylindrical wire mesh used for strengthening the form. I have further used the character 22 to indicate the tamping devices which are commonly employed for tamping the concrete and which reciprocate vertically and pass downwardly into the annular area between the forms 18 and 20, so that as the table 10 rotates the tamping operation is performed, this tamping device being more or less well known in the art, and therefore not requiring a full description herein, these tamping members being gradually moved upwardly as the forms are filled with cement.

The character 23 indicates a wall positioned at a spaced distance from the platform 10 and firmly secured to the wall 23 at 24 are a pair of vertically positioned supports 25 having the upper and lower portions 26 in which portions 26 are journaled the vertically positioned rods 27, the members 25 having the inwardly extending plate portions 28.

Bolted at 29 to the rods 27 are the clamps 30 to which clamps 30 are welded the channels 31, the channels 31 received within the further larger channels 32, and attached to the inner channels 31 are the bolts 33 which are received within the slots 34, the slots 34 being provided in the channels 32, the expanding heads of the bolts 33 serving to adjustably lock the channels 31 and 32. Attached to the channels 31 are the lugs 35 through which threadably engage the threaded bolts 36 having the rounded heads 37, the bolts 36 being locked by means of the nuts 38.

Pivotally bolted at 39 to the channels 31 are the piston rods 40, which piston rods pass within the air cylinders 41 where they are attached to suitable reciprocating pistons therein, and communicating with the cylinders 41 are the pipes 42 and 43 which pass to a suitably controlled air pressure source so that air under pressure can be injected into the air cylinders 41 through either of the pipes 42 or 43.

Attached to the cylinders 41 are the lugs 44 which are journaled upon the vertical shafts 45 which are secured within the brackets 46 which brackets 46 are suitably attached to the wall 23. The collars 47 are secured to the bars 45 by means of suitable set screws 48.

Pivotally secured by means of the bolts 49 toward the ends of the channels 32 are the plate members 50, these plate members 50 being attached to the vertically positioned flat bars 51 and 52, and passing through the bars 51 and 52 are the lengthened horizontally positioned rods 53, which terminate in the nuts and washers 54, the rods 53 also passing through the further horizontally positioned plates 55, and terminating in the nuts 56, it being noted that the rods 53 pass freely through the various members 51, 52, and 55.

Positioned between the plates 55 and the bars 52 are the coiled helical springs 57 and positioned between the bars 51 and the members 54 are the further coiled helical springs 58.

Securely and rigidly attached at 59 to the plates 55 are the electromagnetic vibrators 60, having the wire leads 61 passing thereto, the vibrators 60 being of the usual electromagnetic type in which a rapid vibration is set up due to the electromagnetic impulses applied against suitable diaphragms and the like.

Welded at 62 to the plates 55 are the substantially U-shaped horizontally positioned members 63 in which members are journaled on the vertically positioned shafts 64, the circular discs or rollers 65.

For forming the pipe, the following process is used. The molds 19 and 20 are positioned vertically as shown, and the cement 66 is poured between the molds by means of any suitable device, and then the tamping members 22 are started, the vertical reciprocating action of which

will tamp the concrete; and at the same time the motor **15** is started at a low speed so that during the rotation of the mold the concrete will be tamped uniformly about the periphery thereof. The tamping members **22** are gradually raised as the operation proceeds.

Prior to the above described operation, the air lines **42** are opened which will cause the carriages having the members **50**, **65**, etc., to travel toward the cylindrical surface of the outer form **19** until the disks **65** contact this outer surface as shown, the disks thereby being in snug abutment therewith. The pivotal mounting at **49** will allow the disks to contact the surface uniformly regardless of the position of the carriage or regardless of the diameter thereof, the slots **34** and bolts **33** also permitting the carriage member to be positioned inwardly or outwardly corresponding to the diameter so that as a result any size of pipe can be formed. After the position of the disks **65** are set, the adjusting bolts **36** are used, the heads of these bolts bearing against the plates **28**, and with the lock nuts **38** securing the bolts in fixed position, so that the carriage will be unable to travel any further inwardly. The reason for setting the arms **31** and **32** so that they will not pass inwardly beyond the stop member limits is to provide means by which the spring action about to be described will be within the range of the springs when the vibratory action is provided, since otherwise the spring action would be partially absorbed by the carriage members etc., which would reduce the efficiency of the springs when applying the vibratory action.

The electric current is then applied through the leads **61** whereupon the rapid vibration set up by the vibrator **60** will be applied through the disks **65** and into the annular mass of concrete, and I have found that the provision of the tamping operation working in unison with the vibratory action results in a much higher quality of concrete pipe as far as strength, etc. is concerned, by providing impaction of the coarser aggregate matter in the mold and by further providing a more efficient physical and chemical action therein. Since the vibratory members **60** are rigidly attached to the plates **55**, and since the various springs **57** and **58** are resiliently supported between the portions of the carriage described, the vibrating action will float freely thereby allowing the disks to transmit the action as explained.

It will be noted that the disks **65** contact the mold as it is slowly rotated as above explained, whereupon the vibration is transmitted radially into the mold, vibrating the entire mass of the mold and concrete. If desired raceways can be cut on the outer mold **19** to provide a track for the disks to travel on, although this is not essential, it being understood that the disks can travel along the outer surface wherever applied. Also it will be noted that the carriage carrying the disks can be raised or lowered so that the vibration can be applied at different positions vertically either as the process proceeds, or for other reasons, this feature being provided by loosening the clamps **30** which will allow the arms **31** to be raised or lowered, and also by raising the cylinders **41** by securing the collars **47** at any selected vertical position, it being understood also that other similar arrangements could be employed.

I have further found that in providing a still more efficient class of concrete pipe; that after the tamping and vibrating action is applied, by spinning the mold rapidly, the centrifugal action directed radially from the center will cause further efficient impaction of the concrete mass within the mold, thereby resulting in a relatively more

efficient type of pipe, being much stronger, etc., and for accomplishing this result, the motor **15** is operated at a rather high speed so that the mold will rotate rapidly at the same time that the vibrating action is being applied as above stated, and I have found that this additional step in the process provides means whereby a very strong pipe can be formed from a drier mix, and I have further found that by use of the centrifugal action thus imparted the inner portions of the mold will separate from the inner core **20** thereby not requiring a collapsible inner core when the completed pipe is removed from the forms, although it will be understood that an inner collapsible form can be used if desired.

When the mold is spun at a relatively high speed, I provide a capping member indicated by the dotted lines character **67**, being secured by means of the clamps **68** to the top of the mold so that when the rapid spinning action is applied, the concrete will not be whirled, or centrifugally urged out of the top of the mold.

After the process is completed, the air is allowed to enter through the pipes **43** which will swing the arms **31** outwardly so that the mold can be removed and separated from the pipe for curing, etc.

I have found that rotation of the mold at approximately 150 R. P. M. will form an efficient pipe, however the rotational speed will vary according to the diameter of the mold, it being understood that any speed can be used.

It will be understood that certain modifications could be made in the structure and process of my invention, without departing from the essential spirit of the invention and it will be noted that I have provided the various advantages mentioned in the objects of my invention with other advantages being readily apparent.

Some changes may be made in the construction and arrangement of the parts of my invention without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claim any modified forms of structure or use of mechanical equivalents which may be reasonably included within their scope.

I claim as my invention:

A vibrating mechanism for vibrating a rotating mass comprising carriages, means for imparting vibratory action to said carriages, said carriages having discs journalled thereto, said discs being adapted to contact said rotary mass, a platform upon which said mass is mounted, arms to which said carriages are pivoted, supports upon which said arms are pivoted, means for adjustably positioning said carriages on said arms, said carriages including vertical plate members, the means for vibrating the carriages also vibrating said plate members attached thereto, said carriages including vertically positioned bar portions, springs positioned adjacently to said bar portions and said plates for providing a resilient vibrating action, said discs being attached to said plates.

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