June 5, 1934. B. J. UKROPINA 1,961,260

CONCRETE PIPE MACHINE

Filed Sept. 29, 1931 6 Sheets-Sheet 1

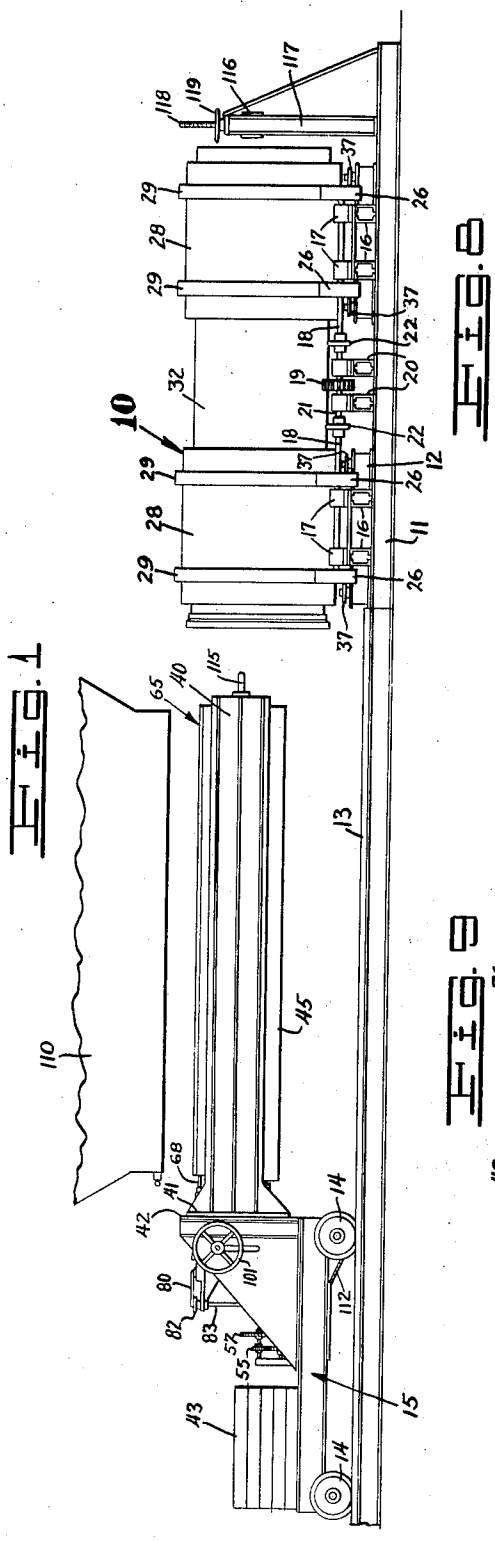


FIG. 1

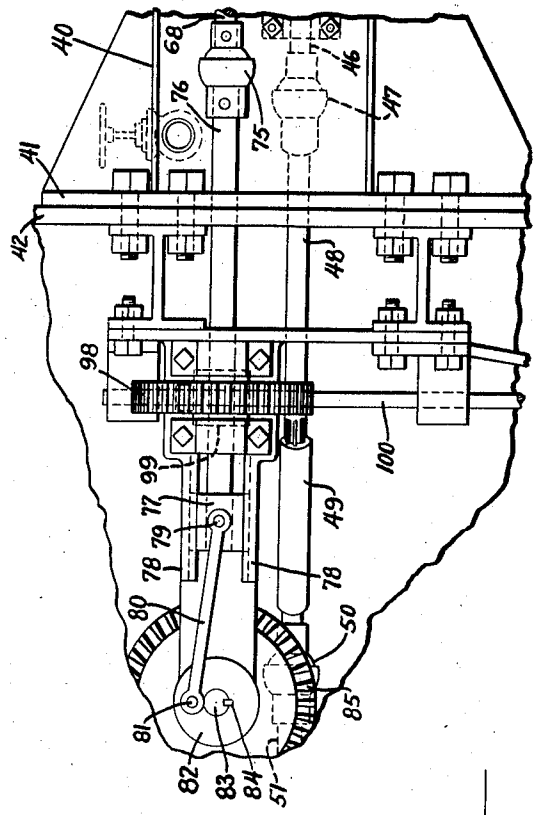


FIG. 2

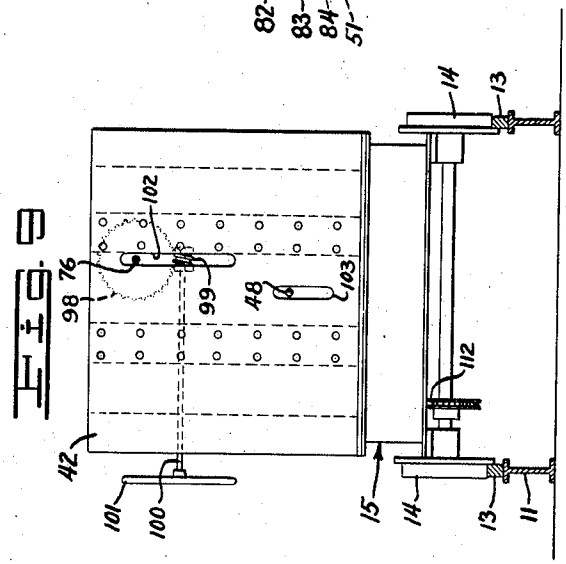


FIG. 3

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CONCRETE PIPE MACHINE

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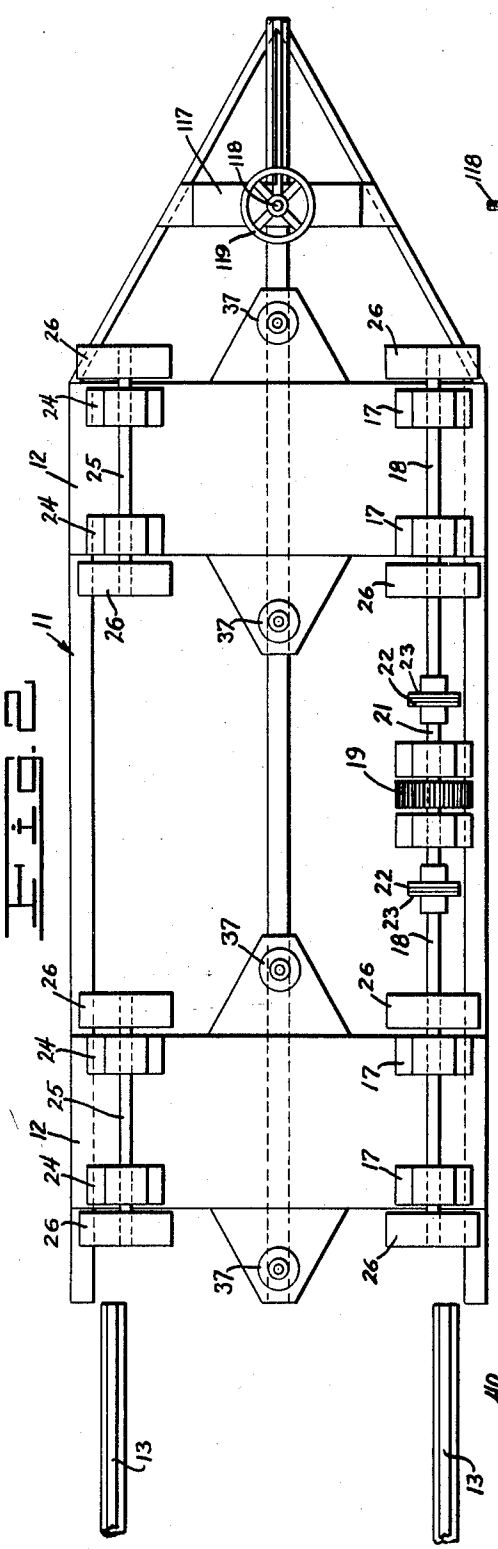


FIG. 2

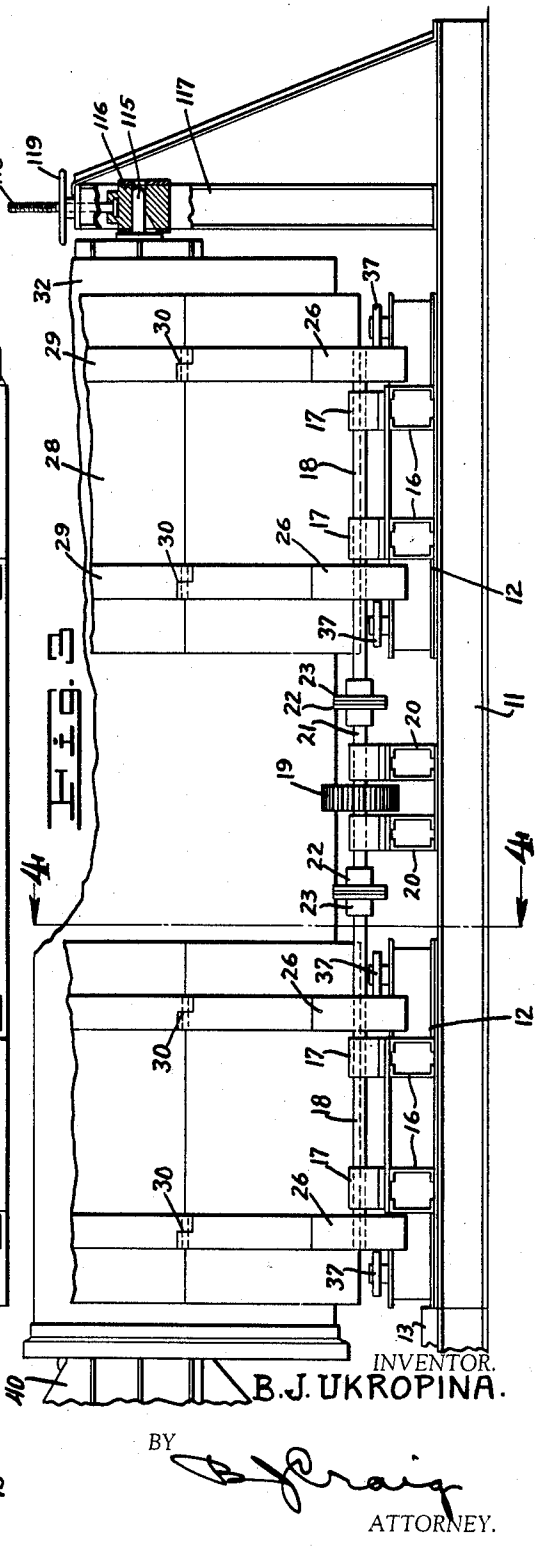


FIG. 3

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CONCRETE PIPE MACHINE

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FIG. 4

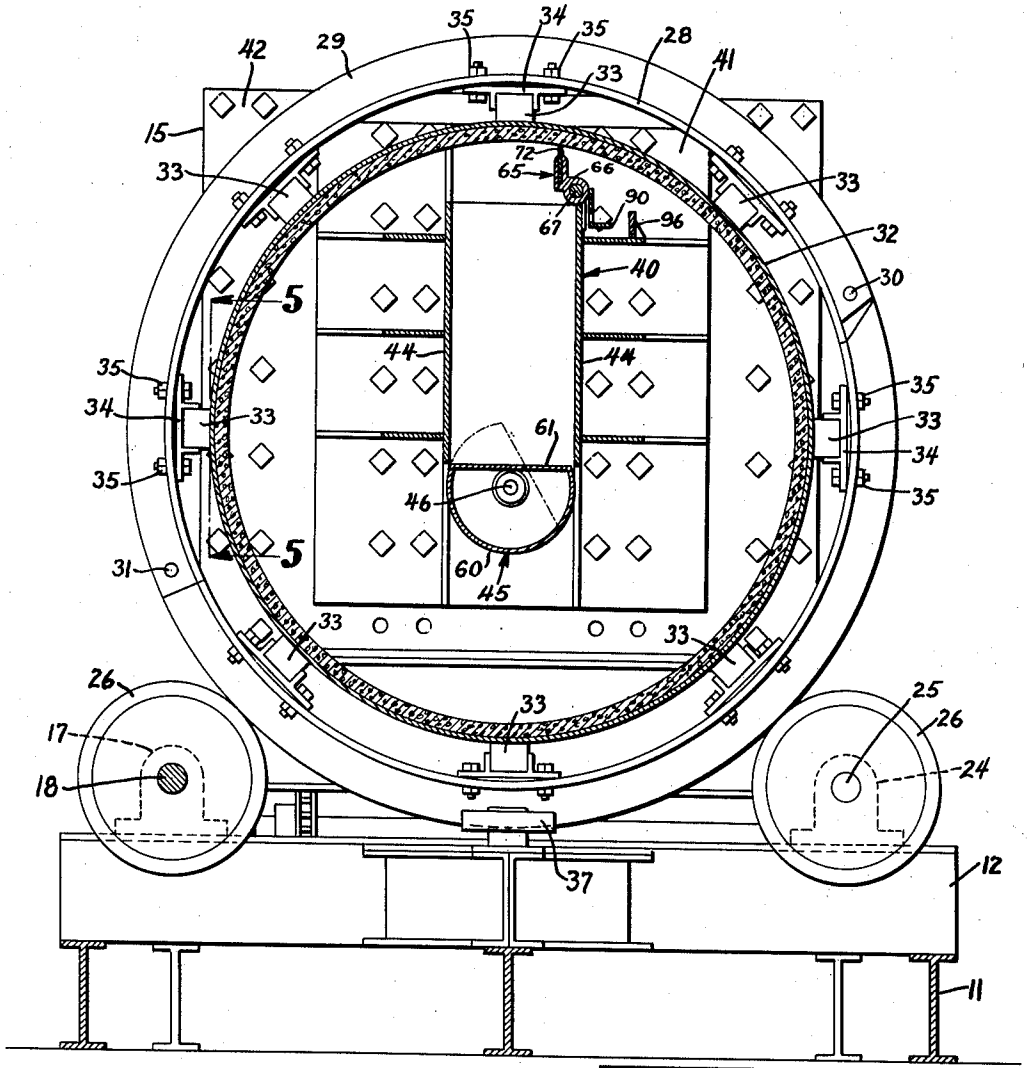


FIG. 10

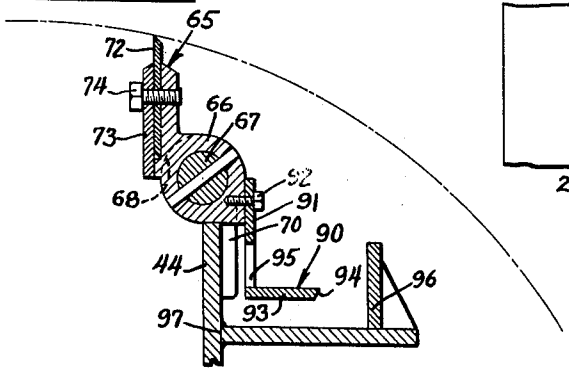
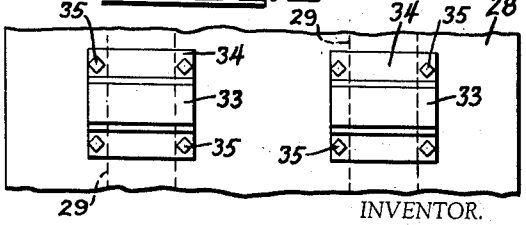


FIG. 5



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CONCRETE PIPE MACHINE

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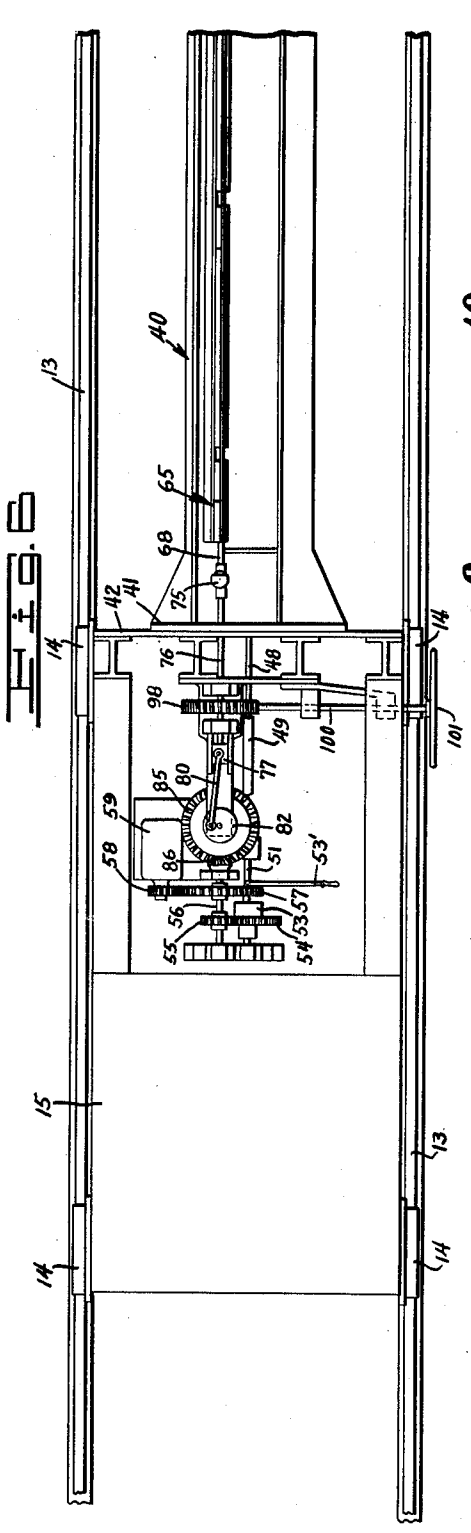


FIG. 6

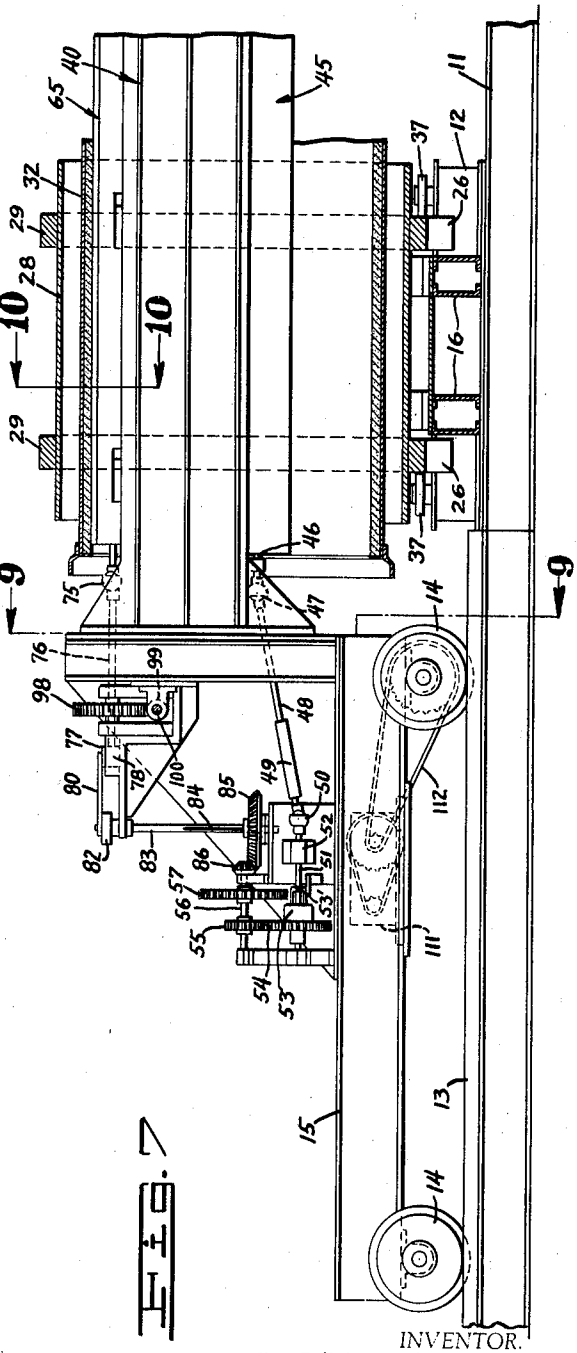


FIG. 7

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Fig. 13

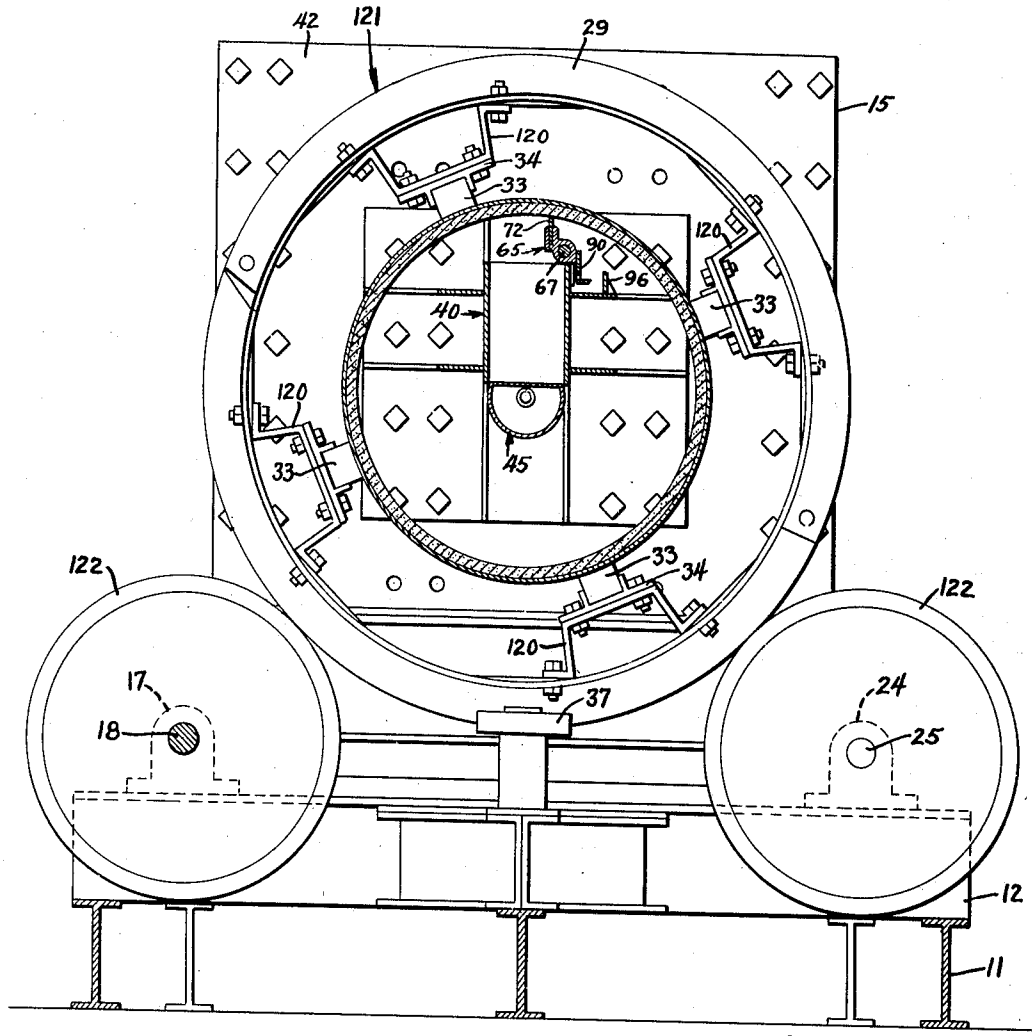


Fig. 11

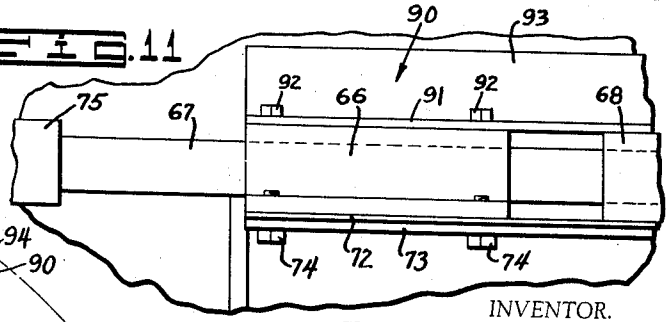
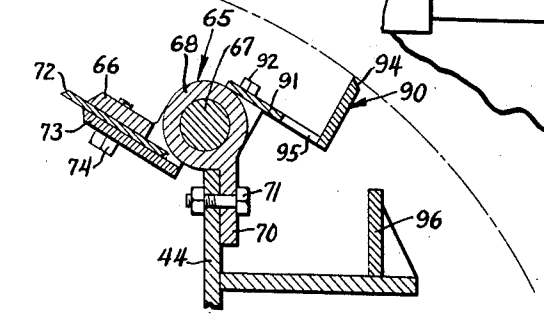


Fig. 12



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FIG. 14

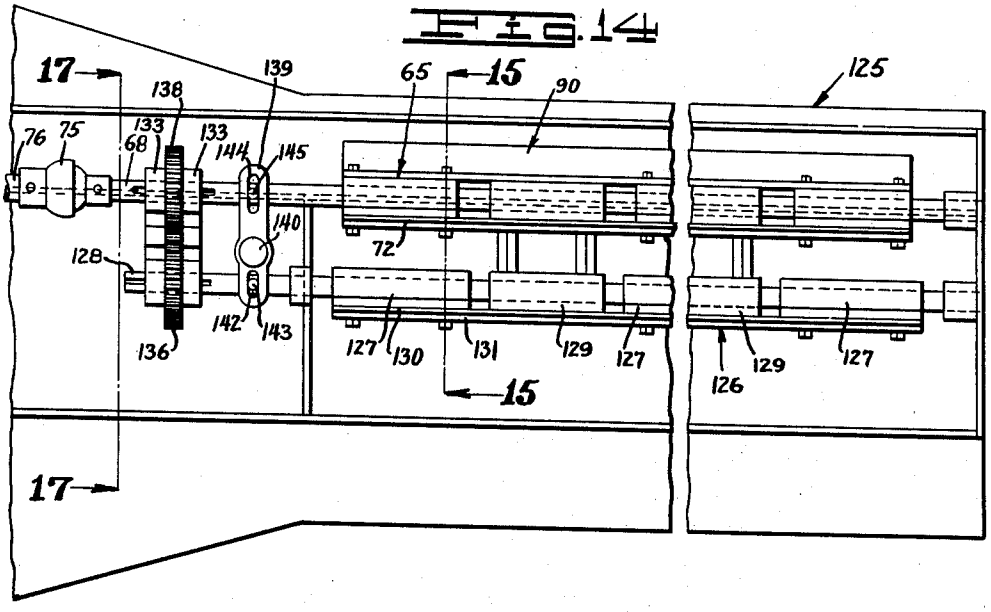


FIG. 16

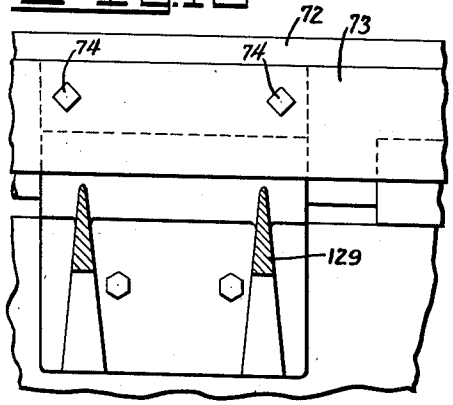


FIG. 15

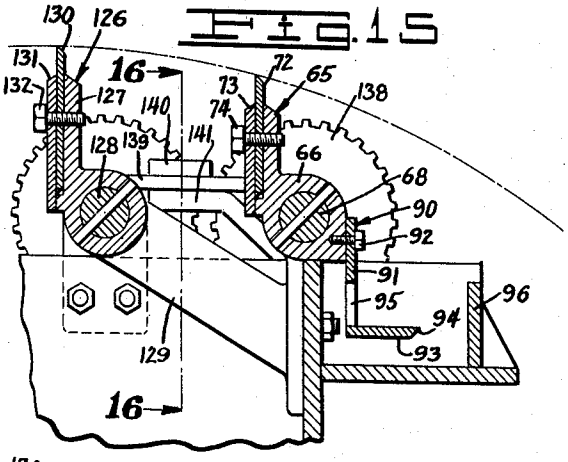
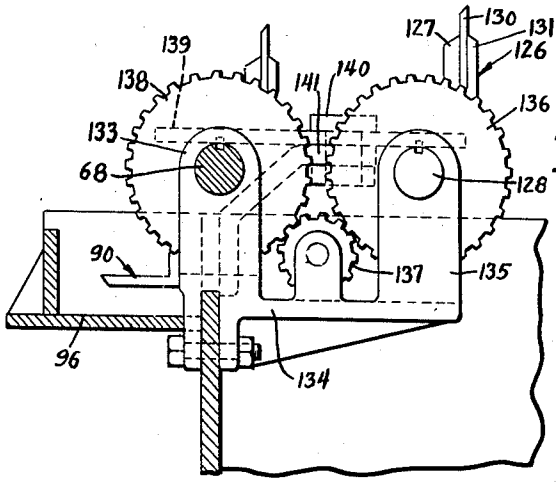


FIG. 17



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Patented June 5, 1934 1,961,260

UNITED STATES PATENT OFFICE

1,961,260

CONCRETE PIPE MACHINE

Bozidar J. Ukropina, Los Angeles, Calif.

Application September 29, 1931, Serial No. 565,784

5 Claims. (Cl. 25—30)

This invention relates to a method and apparatus for centrifugally lining metal shells with concrete.

A general object of my invention is to provide an improved method of lining a metal cylinder with plastic material.

Another general object of my invention is to provide an improved apparatus for centrifugally lining a metal shell with concrete.

A further object of the invention is to provide a pipe forming apparatus including rotatable, spaced, split drums which are adapted to engage a metal shell and spin the same.

An additional object of the invention is to provide a centrifugal pipe machine including a driving mechanism and including means for receiving molds of varying diameters and wherein the molds for use of pipe of various diameters will always operate about the same axis.

A further object of the invention is to provide a centrifugal pipe machine including a novel concrete bucket.

Another object of the invention is to provide a concrete pipe machine having a concrete discharging bucket therein having a novel valve for controlling the passage of concrete from the bucket.

A further object of the invention is to provide a centrifugal pipe machine including a novel structure for smoothing the inside of a freshly formed pipe.

A further object of the invention is to provide a novel means for collecting and removing the slurry from the inside of a centrifugally made pipe.

An additional object of the invention is to provide a novel means for mounting and operating the charging member of a centrifugal concrete pipe machine.

Other objects of the invention will be apparent from the following description taken in connection with the accompanying drawings wherein:

Fig. 1 is a side elevation of a machine embodying the features of my invention.

Fig. 2 is a top plan view showing the base of the mold carrier.

Fig. 3 is an enlarged fragmentary side elevation of the parts shown in Fig. 2 showing the mold and mold drums in operative position.

Fig. 4 is an enlarged section taken on line 4—4 of Fig. 3.

Fig. 5 is a section taken on line 5—5 of Fig. 4.

Fig. 6 is a top plan view of a bucket carrying mechanism.

Fig. 7 is a side elevation of the parts shown in Fig. 6 and also showing a portion of the mold.

Fig. 8 is an enlarged fragmentary top plan view of the bucket carriage.

Fig. 9 is a section taken on line 9—9 of Fig. 7.

Fig. 10 is an enlarged fragmentary section taken on line 10—10 of Fig. 7.

Fig. 11 is a top plan view of the parts shown in Fig. 10.

Fig. 12 is a view similar to Fig. 10 showing the device in a different position.

Fig. 13 is a view similar to Fig. 4 showing the employment of a different sized mold and mold drum.

Fig. 14 is a fragmentary top plan view of a bucket showing a modified form of knife mechanism.

Fig. 15 is an enlarged section taken on line 15—15 of Fig. 14.

Fig. 16 is a fragmentary section taken on line 16—16 of Fig. 15, and

Fig. 17 is a fragmentary section taken on line 17—17 of Fig. 14.

Referring to the drawings by reference characters, I have shown my invention as embodied in a machine indicated generally at 10. As shown this machine includes a supporting frame 11 on which suitable frame work 12 for supporting the mold driving apparatus is mounted.

On the supporting frame 11 I also mount suitable tracks 13 on which wheels 14 on a car 15 operate.

The frame 12 includes transverse members 16 on which I arrange suitable bearing supports 17. On one side of my apparatus I arrange shafts 18 in the supports as clearly shown in the drawings and these shafts are driven from a gear 19 which is mounted on suitable transverse supports 20.

The gear 19 includes a shaft 21 to which flanged couplings 22 are secured and these flanged couplings 22 are in turn connected to flanged couplings 23 secured on the shafts 18. The bearing members 17 are removably mounted on their supports, as by bolts, and the construction is such that by loosening the bearing supports 17 and the coupling flanges 23 the shafts 18 may be readily removed for a purpose to be described presently

At the side of the frame opposite the shafts 18, I mount bearing supports 24 removable like the supports 17 and shafts 25. The shafts 18 and the shafts 25 have wheels 26 mounted thereone. Each of these wheels includes a central portion and a rubber peripheral tire portion

which may be similar to the rubber tires employed on motor vehicles.

Mounted on the wheels 26 I show a pair of drums 28. Each of these drums 28 is shown as provided with a pair of tires 29. The drums and tires may be formed separately and the tires may be secured to the drums as by welding or otherwise. Each of the drums and tires comprises two sections which are hingedly connected as at 30 at one side and at the other side are locked together by a coupling mechanism 31.

A mold indicated at 32 is arranged within the spaced drums 28. The mold may be one capable of repeated use or it may be a shell which it is desired to permanently fill with concrete and where I refer to a mold it will be understood that I am not to be limited to any particular type of mold.

This mold 32 is engaged by relatively soft rubber blocks 33 (see Fig. 4) which are mounted on removable brackets 34 which are bolted to the drums 28 by bolts 35. The brackets 34 are so adjusted that the mold 32 turns about the axis of rotation of the drum 28 and the rubber support of the mold together with the rubber tires on the wheels 26 furnish a resilient support for the mold while it is in operation, thus allowing smooth running of the machine, and allowing the concrete to be uniformly compacted without jarring. Not only does this result in a better finished pipe with more even distribution of aggregates, but it also increases the life of the machine since the vibration of the heavy parts is reduced to a minimum.

The gear 19 may be driven from a suitable source of power such as an electric motor (not shown) and when this gear is rotated it will cause the drums 28 to rotate and consequently rotate the mold 32. To prevent longitudinal movement of the drums 28 I provide guide wheels 37 which are rotatably mounted on the frame 12 and are adapted to engage the outer faces of the drum tires 29.

In order to distribute the concrete or plastic material within the mold 32 I provide a bucket 40 which has an end plate 41 thereon which is adjustable and removably secured to an end plate 42 on the front portion of the car 15. This car 15 is provided with suitable counter weights 43 to balance the weight of the bucket 40.

The bucket comprises side members 44 which are shown as parallel, and end members, and the bottom of the bucket is closed by a rotatable valve 45 which is mounted on a shaft 46 connected through a universal joint 47 to a rod 48 which is provided with splines which engage corresponding grooves in a sleeve 49 to form a slip joint. The sleeve 49 is connected to a universal joint 50 which is driven by a shaft 51 supported in a bracket 52. This shaft 51 is connected with one portion of a clutch mechanism 53 having an operating lever 53'. The other portion of the clutch mechanism is driven by a gear 54 from a pinion 55 mounted on a shaft 56 which has a gear 57 thereon, which in turn is driven by a gear 58. The gear 58 is driven by a motor 59 which is preferably of the compressed air type although in some cases an electric motor may be employed if desired (see Figs. 6 and 7).

From the foregoing description it will be apparent that when the motor 59 is operated through the gears described, and the clutch 53, the valve 45 will turn to open and closed position. The valve 45 includes an arcuate portion 60 and a plane portion 61 and the construction is such that when the valve 45 is rotated as indicated by the dotted lines in Fig. 4, the concrete will be discharged from the bucket 44 uniformly throughout the entire length of the bucket, and since this bucket extends the full length of the mold 32, the concrete will be uniformly and simultaneously distributed within the mold when the valve 45 is rotated.

Mounted upon the upper portion of one of the sides 44 of the bucket I show a knife member indicated generally at 65. This knife member does not extend quite the full length of the bucket and comprises a body portion 66 which is secured to a shaft 67 mounted in bearings 68 which include plates 70 secured to the sides of the bucket by bolts 71. A knife 72 is engaged by a plate 73 which is held to the portion 66 by screws 74.

The shaft 67 is connected by a universal joint 75 with a shaft 76 which is connected to a crosshead 77 movable in guides 78. This crosshead 77 is connected by a pin 79 to a connecting rod 80 which is connected by a pin 81 to a disk 82. This disk 82 is secured to a shaft 83 by a key 84 and the construction is such that as the shaft 83 is rotated the shaft 76 will reciprocate thus causing the knife 72 to reciprocate.

The length of the knife 72 is less than the length of the pipe so that at no time does the knife engage the full length of the pipe but by reciprocating the knife the full length of the pipe is smoothed. By reciprocating the knife 72 any irregularities in the knife will not form grooves in the pipe thereby providing a very smoothly finished pipe.

The shaft 83 is provided with a spline 84 which is movable through a bevel gear 85 and this bevel gear is driven by a bevel pinion 86 which is driven by the shaft 56 previously mentioned.

The knife mechanism includes a water and slurry remover device indicated generally at 90. This device, as shown, is L-shaped and includes one portion 91 which is secured to the knife body by screws 92 and also includes an operating portion 93 which is beveled as at 94. This device is provided with drain apertures 95 through which the slurry passes to a trough 96 which is secured to the bucket at 97. This trough is disposed (as will be seen from Fig. 12) so that the apertures 95 in the slurry remover discharge into the trough. The trough 96 preferably has a slight slope towards the car 15.

I have already described the manner in which the knife is reciprocated. To rotate the knife I provide a shaft 76 with a worm wheel 98 to which the shaft 76 is splined and this worm wheel is driven by a worm pinion 99 mounted on a shaft 100 which is driven by a hand wheel 101. The shafts 76 and 48 move in slots 102 and 103 in the end plates as shown in Fig. 9.

In the use of my device with the parts in the position shown in Fig. 1, a charge of concrete is discharged from the hopper 110 into the bucket 40. The car 15 is then advanced by means of a motor 111 which may be an air motor and which drives the car through suitable drive mechanism 112 so that the bucket enters the mold which has previously been placed in position. To center the bucket I provide a shaft 115 thereon which fits a suitable bearing 116 adjustably mounted in the standard 117. This bearing 116 is mounted on a threaded member 118 so that it can be adjustably raised and lowered by means of a hand wheel 119. The gear 19 is then driven causing the drums to rotate the mold. The use of the rubber cushioning means and rubber tires eliminates un-

due vibration in the mold. The motor 59 is now running and the clutch 53 is operated thereby causing the shaft 46 of the valve 45 to rotate and allow the concrete to be uniformly and simultaneously distributed throughout the entire length of the mold. A reinforcing frame may have been placed in the mold if desired.

As the concrete is distributed it is leveled to the proper diameter by the knife 72. While this occurs the knife is caused to reciprocate back and forth thus causing the aggregates to be distributed uniformly. After the pipe is formed the hand wheel is rotated thus removing the knife from engagement with the concrete lining. The speed of the mold is then increased, thereby packing the concrete firmly in place. As the mold speed is increased the hand wheel 102 is further slightly rotated causing the slurry removing member 94 to remove the water and slurry from the inner surface of the rotating concrete. This slurry passes through the apertures 95 into the trough 96.

The mold is rotated at high speed until the concrete has been thoroughly packed and the water driven inward after which the mold is allowed to come to rest. The drums are opened and the mold removed after which another mold is inserted and the operation repeated.

When it is desired to form a smaller pipe and use the same size drums as for a larger pipe the brackets 34 are removed and extension brackets 120 secured in their place as clearly shown in Fig. 13. The brackets 34 are then secured to the extension brackets 120 and the drums are ready to receive a mold.

When smaller sized drums such as indicated at 121 are used in place of the drums 28 the wheels 26 are replaced by larger wheels such as indicated at 122 in Fig. 13. The diameter of the various wheels which are substituted for the wheels 26 are such that they maintain the axis of the various molds at the same level.

In Figs. 14, 15. 16 and 17 I have indicated a modified form of bucket generally at 125. This bucket is similar in all respects to the bucket 40 except that in addition to the knife member 65 I provide another knife mechanism which is indicated generally at 126.

The knife mechanism 126 comprises a body portion 127 secured to a shaft 128 which is mounted in bearings 129 secured to the bucket. A knife 130 is engaged by a plate 131 which is held to the portion 127 by bolts 132.

The shaft 68 of the knife mechanism 65 is positioned in spaced bearings 133 on a bracket 134 which is secured to the bucket and which extends towards the opposite side of the bucket where other spaced bearings 135 are provided in which the shaft 128 is positioned.

Positioned between the bearings 135 and keyed to the shaft 129 by a suitable spline I provide a gear 136 which meshes with an idler gear 137 which in turn meshes with a gear 138. The gear 138 is mounted on the shaft 68 between the bearings 133 and is connected to the shaft by a suitable spline. Thus it will be apparent that when the hand wheel 101 is rotated to turn the shaft 76 and the shaft 68 the shaft 128 will be similarly turned.

For reciprocating the knife mechanism 126 I provide a rocker arm 139 which is pivotally connected as at 140 to a bracket 141 which is mounted on the bucket. Adjacent one end the rocker arm 139 is provided with a slot 142 in which a pin 143 secured to the shaft 128 is positioned. Adjacent the opposite end of the rocker arm I provide a slot 144 in which a pin 145 secured to the shaft 68 is positioned. Thus it will be apparent that when the shaft 68 is reciprocated the shaft 128 will also be reciprocated.

The knife 72 of the knife mechanism 65 is preferably shorter than the knife 130 of the knife mechanism 126 so that it requires more longitudinal movement than the knife 130 when operating to smooth a pipe. The greater movement of the knife mechanism 65 is provided for by positioning the pivot 140 closer to the shaft 128 than the shaft 68. By having the knives 72 and 130 travel different distances a much smoother finish is acquired on the interior of the pipe.

From the foregoing description it will be apparent that I have provided an improved concrete pipe forming machine which is simple in construction and highly efficient in use.

Having thus described my invention, I claim:

1. In a machine for centrifugally manufacturing concrete articles, means to support a mold, a bucket, means to support said bucket for movement into and out of said mold, said bucket having an open bottom, a valve for said opening and having an arcuate portion and having a flat portion, said flat portion being of a length corresponding to the width of the open bottom of said bucket, means to rotate said valve to allow the contents of said bucket to be discharged, a knife member carried by said bucket, a knife on said member, means to reciprocate said knife member and means to rotate said knife member, a slurry remover mounted on said knife member and adapted to actuate when said knife is inactive and a trough for slurry mounted on said bucket and beneath said slurry remover.

2. In a machine for centrifugally manufacturing concrete articles, a mold, a bucket in said mold, a knife carried by said bucket, means to reciprocate said knife, and a slurry remover mounted on said knife.

3. In a machine for centrifugally manufacturing concrete articles, a mold, a bucket in said mold, said bucket having a rotary valve, means to move said valve to allow the contents of said bucket to be discharged, a knife carried by said bucket, means to reciprocate said knife and means to rotate said knife and a slurry remover mounted on said knife.

4. In a machine for centrifugally manufacturing concrete articles, a mold, a bucket, means to support said bucket for movement into and out of said mold, a knife member carried by said bucket, means to reciprocate said knife member and means to rotate said knife member, a slurry remover mounted on said knife member and adapted to actuate when said knife member is in one position to remove slurry and a trough for slurry mounted on said bucket and beneath said slurry remover.

5. In a machine for centrifugally making concrete articles, a mold, a bucket, said bucket being elongated and having an open side extending substantially the full length of said bucket, a valve for closing said open side, means to support said valve about an axis extending longitudinally of said open side, said valve including an arcuate portion and a lateral non-arcuate portion, said latter portion in one position causing an opening to be produced between it and one of walls of the open side and means to rotate said valve.

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