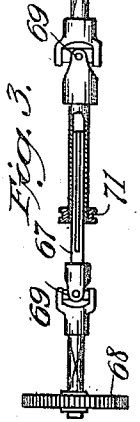
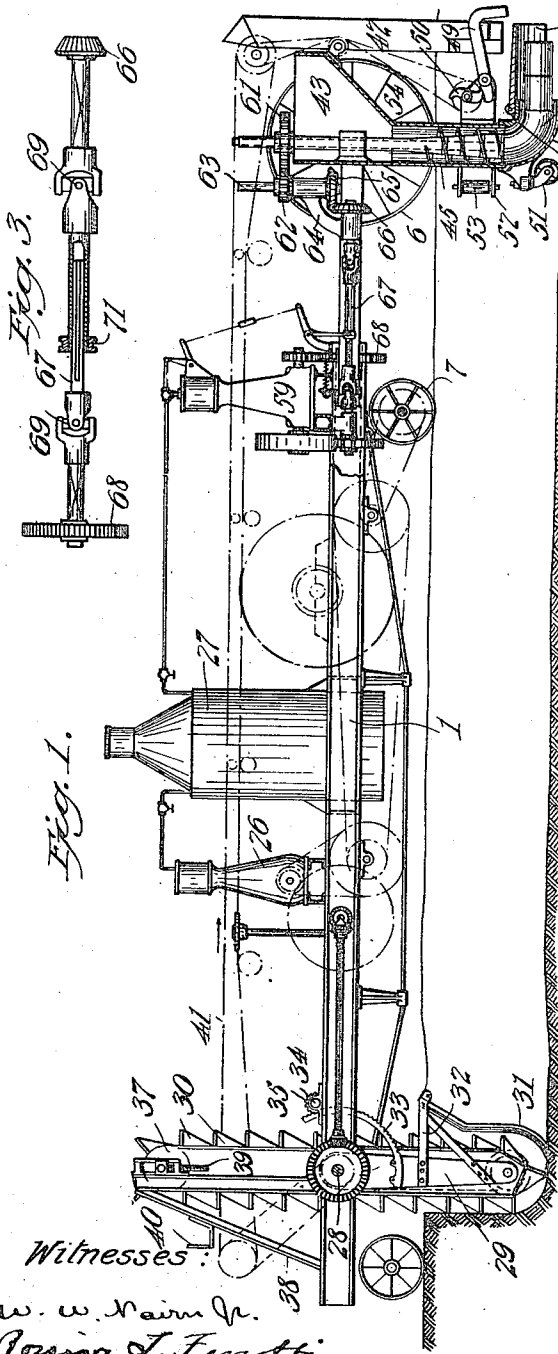


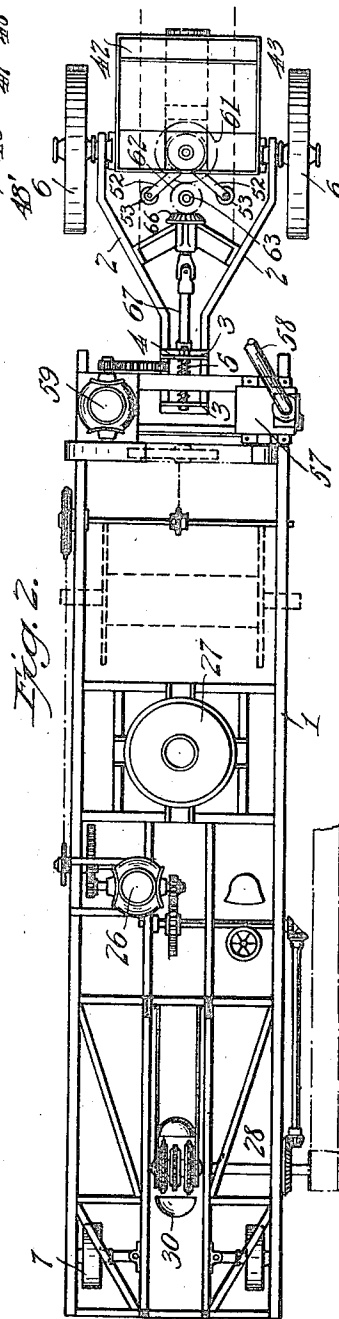
J. H. CARR & A. C. ROUTHE.
 CONTINUOUS CONCRETE PIPE MACHINE.
 APPLICATION FILED SEPT. 17, 1912.

1,153,599.

Patented Sept. 14, 1915.
 2 SHEETS—SHEET 1.



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Fig. 4.

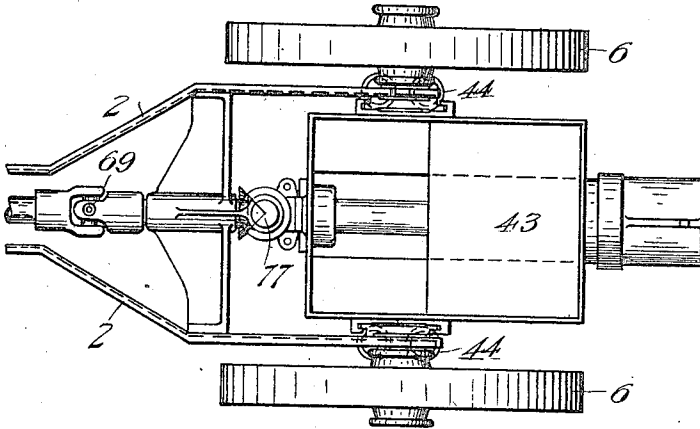


Fig. 9.

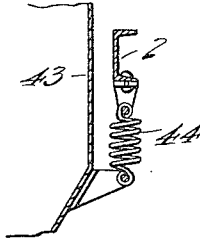


Fig. 7.

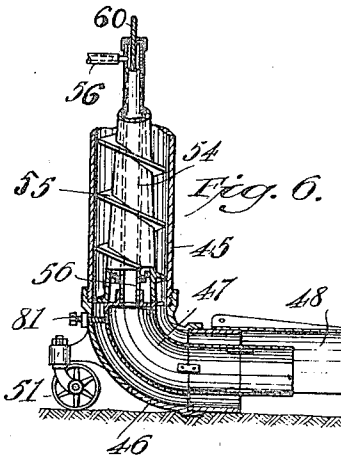
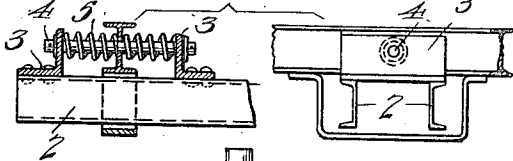


Fig. 6.

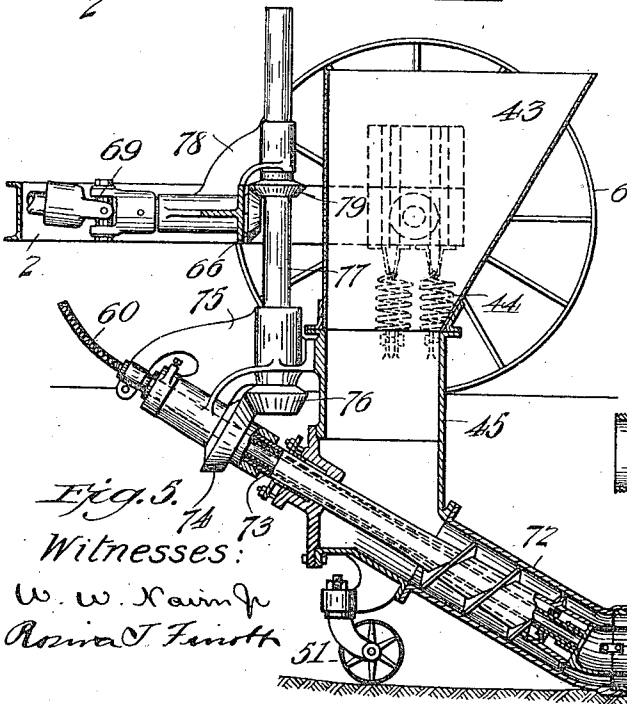
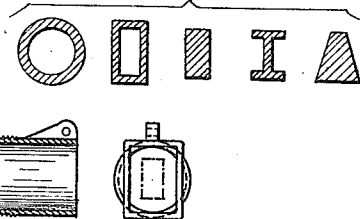


Fig. 5.

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Fig. 8.



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UNITED STATES PATENT OFFICE.

JOHN H. CARR, OF ALHAMBRA, AND ALBERT CLARENCE ROUTH, OF LOS ANGELES,
CALIFORNIA.

CONTINUOUS CONCRETE-PIPE MACHINE.

1,153,599.

Specification of Letters Patent.

Patented Sept. 14, 1915.

Application filed September 17, 1912. Serial No. 720,816.

To all whom it may concern:

Be it known that we, JOHN H. CARR and ALBERT CLARENCE ROUTH, citizens of the United States, residing, respectively, at Alhambra, county of Los Angeles, and State of California, and at Los Angeles, in the county of Los Angeles, and State of California, have invented certain new and useful Improvements in Continuous Concrete-Pipe Machines, of which the following is a full, clear, and exact specification.

Our invention relates to pipe forming and laying machines and has for its object the provision of an apparatus whereby pipes, brick, curbs, etc., may be continuously formed.

A further object of the invention is to provide means for digging a ditch, forming pipes and simultaneously laying them in the ditch, and covering them with the dirt removed in forming the ditch.

Other objects of the invention are to provide means for preventing collapse of the formed pipe while it is in a "green" state; to provide means whereby electric wires may be placed within the pipes simultaneously with their formation; to provide means for permitting the apparatus to adjust itself to irregularities in the surface of the ground without disturbing the alignment of the pipes; to provide for effectually carrying the machine around curves, and to generally improve and simplify the construction and arrangement of the parts of a pipe-forming and laying apparatus whereby the efficiency and durability of the same will be increased.

The invention is illustrated in the accompanying drawings and consists in certain novel features particularly pointed out in the claims following the detailed description.

In the drawings, Figure 1 is a side view, partly in section, of an apparatus embodying our invention; Fig. 2 is a plan view of the same with parts omitted; Fig. 3 is an enlarged sectional elevation of the main driving shaft; Fig. 4 is an enlarged detail plan view of the pipe laying carriage or truck; Fig. 5 is an enlarged vertical longitudinal section of the rear truck, showing a modified arrangement of the pipe molding elements; Fig. 6 is an enlarged section of the pipe molding mechanism shown in Fig. 1; Fig. 7 shows a section and a side view of

a part of the support for the rear truck; Fig. 8 shows various forms of pipes or tiles which may be produced in the machine; and Fig. 9 is a detail view of the hopper support.

The apparatus consists primarily of a forward truck composed of longitudinal and transverse I-means or channel bars 1 and a rear truck composed of forwardly converging side bars 2 and transverse bars or braces 3 connecting the same. The bars 3 at and near the front extremities of the side bars 2 are disposed in front and in rear of the rear-most transverse bar of the front truck and a connecting rod or pin 4 carried by said bars 3 plays through the web of said transverse bar. Springs 5 are coiled around said rod 4, as shown in Fig. 7, thereby providing a flexible connection between the two trucks so that while the rear truck will be drawn by the front truck sufficient play will be permitted to prevent disjuncting or breaking of the pipe and to enable the rear truck to ride over an uneven surface of the ground. The rear truck is equipped with ground wheels 6 which are carried by stub axles fitted in the rear ends of the side bars 2 and the front truck is supported by ground wheels 7 which are arranged adjacent the front and rear ends of the truck to run on the ground at the opposite sides of the ditch.

For imparting motion to the machine we have illustrated in the drawings a steam engine, 26, steam being supplied by a boiler 27 on the truck, but the particular type of motor employed is immaterial. Any suitable mechanism as shafts and gearing may be provided for operating the ground wheel 7 and thereby causing travel of the machine and the line of travel will be determined by the manipulation of the steering wheel 16. The engine 26 also actuates a train of gearing through which rotary motion is imparted to a shaft 28 mounted transversely on the front truck near the front end thereof. On its inner end, in the central longitudinal line of the machine, the shaft 28 carries one or more pulleys or sprocket wheels around which and similar pulleys or sprocket wheels at the lower end of a frame 29 depending from the truck, are trained belts or sprocket chains whereby the said lower pulleys or sprocket wheels will be rotated. The frame 29 is pivotally mounted on the shaft 28. The said lower pulleys or sprocket wheels actuate an endless chain of

excavator buckets 30 which are disposed to travel downward and cut into the earth on the front run of the chain whereby each bucket will take up only a small quantity of dirt and the machine may be operated under a light power, the action of the buckets assisting the propelling power. Immediately in rear of and conforming closely to the run of the excavator buckets is a scraper or scoop 31 which keeps the bottom of the ditch clean and prevents the dirt loosened by the buckets being thrown therefrom. The scraper is connected with the frame 29 by a link 32 so that the relation of the excavator to the scraper will be fixed. Segmental racks 33 are secured to the frame 29 and extend upward and rearward therefrom, as shown in Fig. 1. Upon the truck is a shaft 34 carrying pinions 35 which mesh with the racks 33 so that the frame 29 may be swung upwardly on the shaft 28 as a pivot and thereby readily adjusted so as to permit the excavator buckets which travel around the lower end of 29 to cut to any desired depth. It will be understood of course that only that portion of the endless conveyer beneath the pivot 28 of frame 29 is swung with the frame 29, the frame work 38 supporting the upper portion being rigidly mounted on the truck. A suitable wheel or other form of handle may be provided at the outer end of the shaft 34 to facilitate the operation of the same. A tension roller 37 is provided at the upper end of a frame 38 erected on the truck and an adjusting screw 39 is mounted on said frame and engages the bearing of the roller 37 so that the excavator chain may be kept sufficiently taut to operate successfully.

The dirt taken up by the buckets is deposited in a transverse chute 40 at the upper end of the frame 38, which preferably has a screen bottom. The chute is preferably inclined toward the side of the truck so that any rocks or hard substances taken up by the buckets will be projected beyond the side of the truck while the finer screened dirt will be delivered to a conveyer 41 extending longitudinally of the truck at the side of the same and driven directly by the shaft 28 through the belt connection as shown in dotted lines Fig. 1. The excavator extends to and delivers into the upper end of a chute 42 at the rear end of the rear truck through which it falls to settle over and at the sides of pipe placed in the ditch. The chute 42 is supported by and upon the rear side of a hopper 43 which is hung upon and between the rear ends of the side bars 2 by springs 44, as shown most clearly in Figs. 5 and 9, so that the hopper and the pipe laying devices carried thereby will remain at a uniform level and in a constant relation to the bottom of the ditch notwithstanding irregularities in the surface on which the supporting wheels run. Concrete or other material is placed in the hopper and passes therefrom through the spout 45. In Figs. 1 and 6, the lower end of the spout is secured to an elbow 46 which is intended to move along the bottom of the ditch and contains a mandrel or former 47 around which the pipe is shaped. A shield 48 is secured to the end of the elbow and projects rearwardly therefrom over the extremity of the mandrel and under the chute 42 to prevent the dirt falling directly upon the green pipe and crushing the same. This shield 48 may be secured to the elbow in any preferred manner, but is here shown as pivoted thereto as at 48'. Tampers 49 are pivoted in suitable supports above the shield 48 and are adapted to gently pack the dirt at the sides of the pipe. The tampers are actuated by cams or tappets 50 disposed above their forward ends and geared to the conveyer 41. To partly support the weight of the hopper and the pipe mold a roller 51 is mounted on the elbow to run in advance thereof on the bottom of the ditch. To guide the hopper and the rear truck, forwardly projecting arms 52 are provided on the spout and vertically disposed rollers 53 (Figs. 1 and 2) are fitted between said arms to bear against the side walls of the ditch and thereby cause the rear truck to follow the line of the ditch, the side walls of the ditch being shown in dotted lines in the rear of Fig. 2.

The mandrel and elbow may have any desired cross-sectional outline so that the product may have any desired form and a few typical shapes are shown in Fig. 8. The mandrel will be dispensed with when solid articles are to be made but will preferably be employed as the most general use of the machine will be in the manufacture of continuous pipe. The mandrel fits directly against the lower end of a compressor and feeder 54 which consists of a preferably conical sleeve having a spiral blade 55 formed around its outer surface and fitting closely to the wall of the spout 45. It will be readily understood that if the sleeve be rotated, the blade will force the plastic material to the lower end of the spout thereby compressing it between the spout and the cone and driving it out over and around the mandrel. As the pipe passes over the mandrel it will partly dry and as it leaves the mandrel and the surrounding elbow tube it will be left in its position in the bottom of the ditch. An air tube 56 extends centrally through the cone and communicates with the interior of the mandrel to supply compressed air to the interior of the pipe whereby the green pipe will be prevented from collapsing under the weight of dirt over it and the thorough drying and hardening of the pipe will be expedited. The compressed air is supplied by a pump 57 on the front

truck through a pipe 58 leading into the upper end of the tube 56 and the pump is driven by an engine 59 on the truck. If so desired, an electric conductor 60 may be fed through the air tube to be incased in the pipe.

In Figs. 1 and 6, the compressor and former is disposed vertically and extends up through the hopper, being equipped with a gear wheel 61 near its upper extremity which meshes with a pinion 62 on a short vertical shaft 63 which is journaled in a suitable support 64 on the rear truck adjacent and in advance of the hopper. On the lower end of the shaft 63 is a bevel gear wheel 65 which meshes with a bevel gear wheel 66 on the rear end of a shaft 67 disposed centrally and longitudinally of the front truck and equipped with a gear wheel 68 which is connected by suitable gearing with the engine 59. The shaft 67 is composed of three sections, the front and rear sections being journaled in fixed bearings and the intermediate section consisting of telescoping members and connected to the front and rear sections by universal couplings 69. The shaft is thus permitted to lengthen or shorten automatically so that the pipe forming and laying mechanism may operate evenly and steadily notwithstanding variations in the speed or traction of the excavating mechanism. The gear 62 is feathered upon the shaft 63 which is slidable in its bearing so as to accommodate the vertical vibrations of the truck.

In Fig. 5, a straight inclined tube 72 leads from the hopper 45, instead of the curved elbow shown in Figs. 1 and 6, and the pipe forming and compressing blade is located within said tube. The hollow shaft 73, carrying the said blade extends upwardly through the side of the spout and does not extend up through the hopper. A bevel pinion 74 is fixed on the shaft externally of the spout and has its hub journaled in a bracket 75 secured to and projecting forwardly from the spout. The pinion 74 meshes with a pinion 76 on the lower end of a vertical shaft 77 which is also journaled in said bracket 75. The upper portion of the shaft 77 is journaled in a bracket 78 provided on the rear truck and just below said bracket the shaft 77 is equipped with a bevel pinion 79 meshing with the pinion 66 on the rear end of the shaft 67.

81 designates a screw mounted in the side of the hopper spout and engaging the mandrel directly under the worm to prevent spreading or displacement of the mandrel when pressure is applied thereto, and thus avoid the possibility of making the walls of the pipe too thin on one side and too thick on the other.

From the foregoing description, taken in connection with the accompanying draw-

ings, it will be seen that we have provided a simple and efficient machine by which a continuous monolithic pipe will be formed and laid in the bottom of a ditch simultaneously with its formation.

Having thus fully described our invention what we claim as new and desire to secure by Letters Patent is:—

1. In an apparatus of the character described, mechanism for forming and simultaneously laying pipe, comprising a hopper, an outlet for said hopper, a mandrel within said outlet, means for compressing pipe forming material around the mandrel and out of said outlet, and means for forcing compressed air into the interior of said newly formed pipe to prevent collapse thereof.

2. In an apparatus of the character described, mechanism for forming and simultaneously laying pipe comprising a hopper, an outlet for said hopper, a mandrel within said outlet, means for compressing material around the mandrel and forcing the same out of said outlet, means for depositing covering material around said newly formed pipe, and means coöperating therewith for tamping the material around the pipe as said material is deposited.

3. In an apparatus of the character described, pipe forming and laying mechanism comprising a hopper, a mandrel in the outlet of the hopper, means for compressing material around the mandrel to form a pipe and ejecting the formed pipe, means for depositing dirt over the pipe, vibratory tampers mounted on the rear of the hopper and means for vibrating said tampers substantially as and for the purpose set forth.

4. In an apparatus of the character described, mechanism for forming and laying pipe comprising a hopper, a mandrel in the outlet of the hopper, means for compressing material around the mandrel to form a pipe and ejecting the formed pipe, a chute in rear of the hopper adapted to receive and deposit material over the pipe, and means for tamping said material around the pipe as the same is being deposited.

5. In an apparatus of the character described, pipe forming and laying mechanism comprising a hopper, a mandrel in the outlet of the hopper, means for compressing material around the mandrel to form a pipe and ejecting the formed pipe, means for depositing dirt over the pipe, vibratory tampers mounted on the rear of the hopper, means for vibrating said tampers, and means entering the hopper adapted to convey compressed air to the interior of the newly formed pipe to prevent collapse thereof.

6. In an apparatus of the character described, mechanism for forming and laying pipe comprising a hopper, a mandrel in the outlet of the hopper, means for compressing

material around the mandrel to form a pipe and ejecting the formed pipe, a chute in rear of the hopper adapted to receive and deposit material over the pipe, means for tamping the material around the pipe as the same is being deposited, and means entering the hopper adapted to convey compressed air to the interior of the newly formed pipe to prevent collapse thereof.

7. In an apparatus of the character described, mechanism for forming and laying pipe comprising a hopper, a mandrel in the outlet of the hopper, means for compressing material around the mandrel to form a pipe and ejecting the formed pipe, means for preventing displacement of said mandrel, and means for forcing compressed air into the interior of said newly formed pipe to prevent collapse thereof.

8. In an apparatus of the character described, mechanism for forming and laying pipe comprising a hopper, a mandrel in the outlet of the hopper, means for compressing material around the mandrel to form a pipe and ejecting the formed pipe, means for preventing displacement of said mandrel, a chute in rear of the hopper adapted to receive and deposit material over the pipe, and means for tamping said material around the pipe as the same is being deposited.

9. In an apparatus of the character described, mechanism for forming and laying pipe, comprising a hopper, a mandrel in the

outlet of the hopper, means for compressing material around the mandrel to form a pipe and ejecting the formed pipe, and means secured to the hopper outlet adapted to contact with the walls of the ditch in which the pipe is being laid whereby the hopper is caused to follow the line of the ditch, a chute in rear of the hopper adapted to receive and deposit material over the pipe, and means for tamping said material around the pipe as the same is being deposited.

10. In an apparatus of the character described, mechanism for forming and laying pipe, comprising a hopper, a mandrel in the outlet of the hopper, means for compressing material around the mandrel to form a pipe and ejecting the formed pipe, and supporting means secured to the lower end of the hopper outlet and adapted to support the same in its movement along the ditch wherein the pipe is being laid, a chute in rear of the hopper adapted to receive and deposit material over the pipe, and means for tamping said material around the pipe as the same is being deposited.

In testimony whereof we have hereunto signed our names to this specification in the presence of two attesting witnesses.

JOHN H. CARR.

A. CLARENCE ROUTHE.

Witnesses:

SLOAN PITZER,
W. T. LAWSON.