

G. B. COLE & E. DURYEE.
 PIPE FORMING MACHINE.
 APPLICATION FILED OCT. 2, 1912.

1,146,477.

Patented July 13, 1915.

3 SHEETS—SHEET 1.

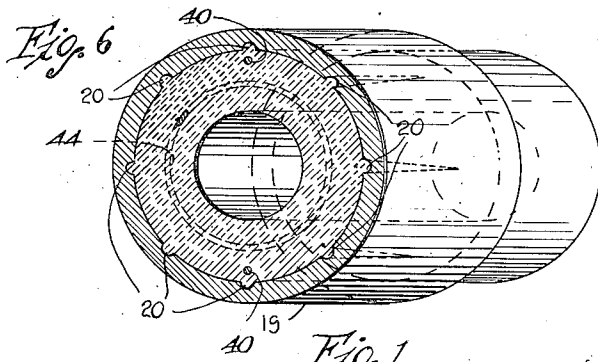


Fig. 1

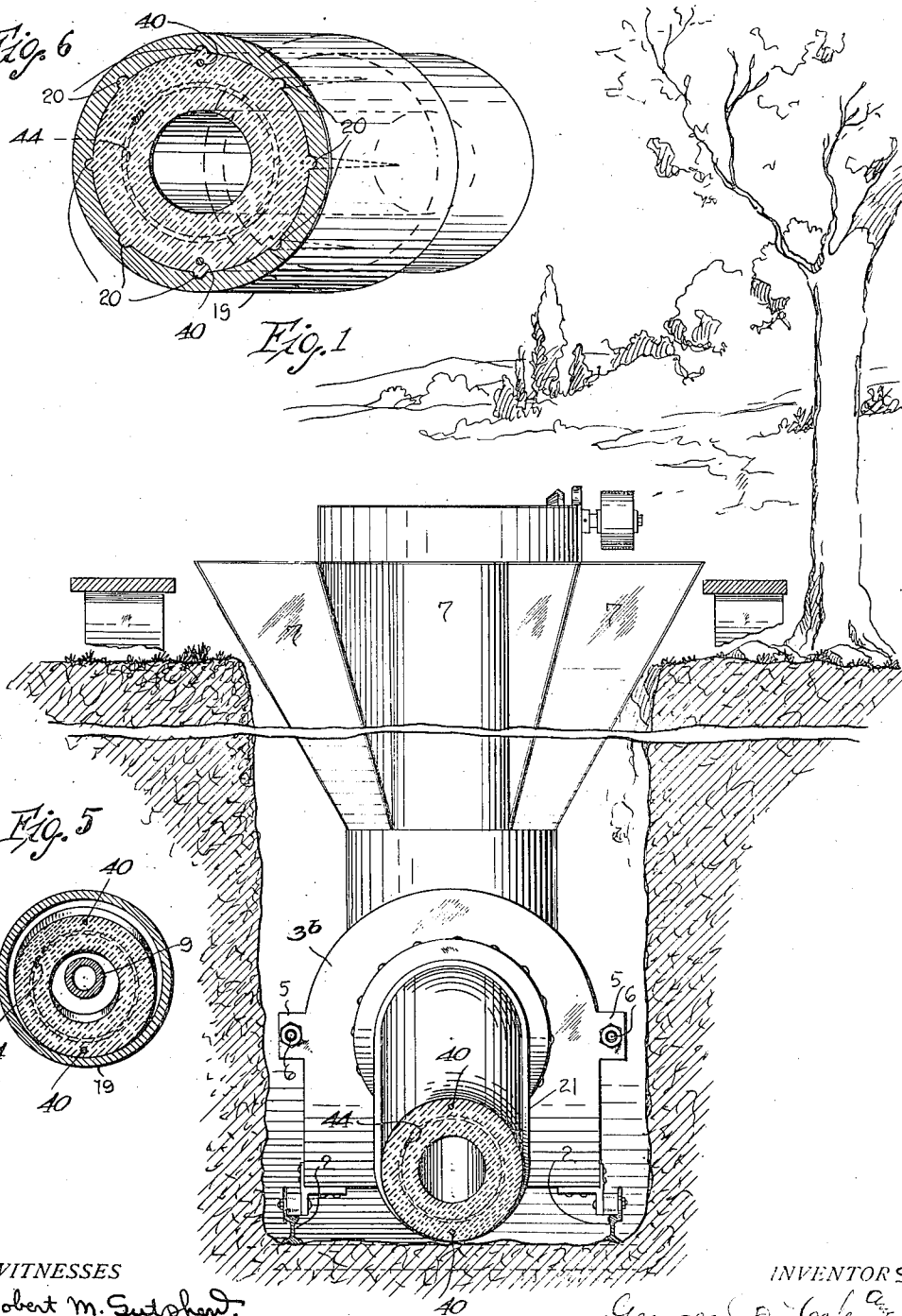
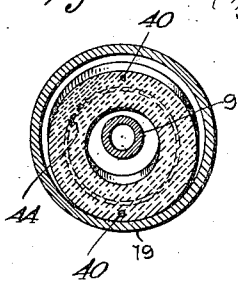


Fig. 5



WITNESSES
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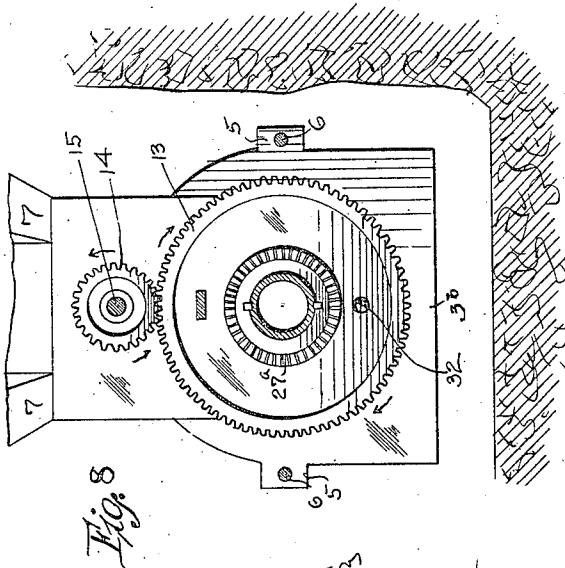


Fig. 8

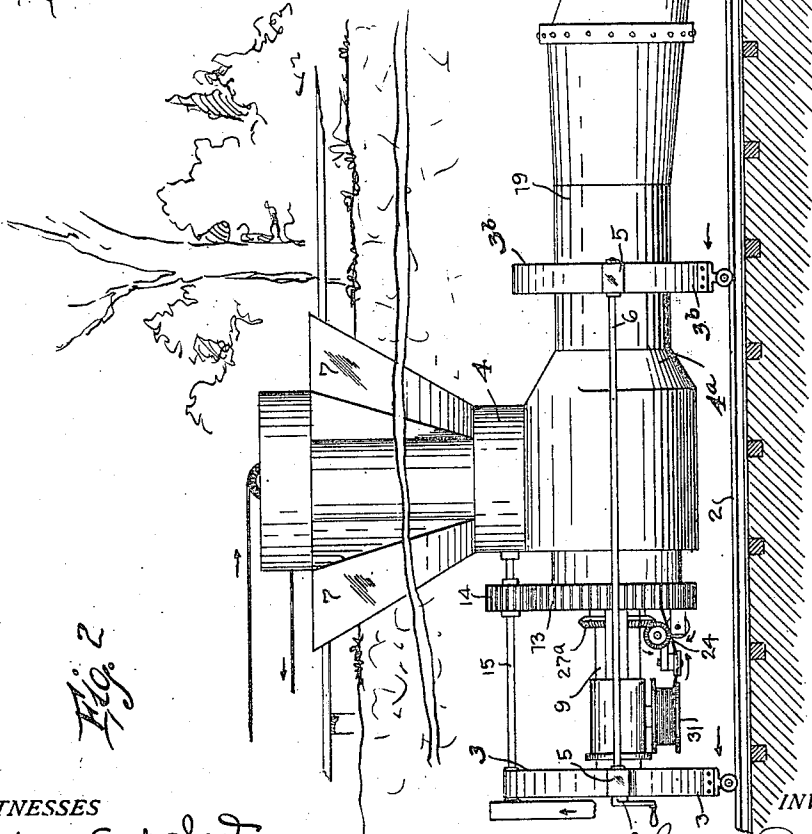


Fig. 2

WITNESSES

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UNITED STATES PATENT OFFICE.

GEORGE B. COLE, OF SPOKANE, WASHINGTON, AND EDWARD DURYEE, OF LOS ANGELES, CALIFORNIA.

PIPE-FORMING MACHINE.

1,146,477.

Specification of Letters Patent.

Patented July 13, 1915.

Application filed October 2, 1912. Serial No. 723,618.

To all whom it may concern:

Be it known that we, GEORGE B. COLE, a citizen of the United States, residing at Spokane, in the county of Spokane and State of Washington, and EDWARD DURYEE, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented certain new and useful Improvements in Pipe-Forming Machines, of which the following is a specification.

The object of our invention is to provide a machine by means of which we may make jointless, continuous pipe of plastic material and simultaneously reinforce the pipe as it is formed, whereby the complete pipe combines all of the advantages of metal pipe with the non-corroding qualities of various plastic material, such for instance as cement.

A further object of our invention is to so construct a machine of this character that it may be operated in a trench and lay the pipe in the trench as it is formed in any desired length and free from joints or cracks; and with this and minor objects in view our invention consists in the parts and combinations of parts as will be hereinafter more fully set forth.

In the drawings, Figure 1 is a sectional view of a ditch in which our machine is positioned for work. Fig. 2 is a side elevation of the machine. Fig. 3 is a sectional view on the line 3^a—3^a, Fig. 4. Fig. 4 is a longitudinal sectional view of the machine. Fig. 5 is an enlarged detail sectional view. Fig. 6 is a sectional view through the pipe forming chamber. Fig. 7 is a diagrammatic view showing the three screws. Fig. 8 is a section on the line 8—8 of Fig. 4.

1 is a wheeled truck on which our machine may be mounted to run on the rails 2. 3 and 3^a are frames suitably secured to the truck and provided with perforated lugs.

4 is a combined feeding chamber and compression chamber 4^a having a forwardly extending pipe forming chamber 19 which passes through the frame 3^b, the frames 3 and 3^b being tied together by means of the rods 6 which pass through said lugs 5. This feeding and compressing chamber is provided with a series of hoppers 7, in which a suitable feeding screw 8 is mounted, whereby material is fed at the sides as well as at the center of the feeding and compressing chamber.

9 is a hollow stationary shaft fixed to the head 3, and extending through and beyond the feeding and compressing chamber into the pipe forming chamber 19, as is clearly shown in Fig. 3.

11 designates a sleeve mounted on the shaft 9 in the compression chamber 4^a on which is formed three separate feeding and compression screw-threads or screws 10, each terminating in the pipe forming chamber flush in the same vertical plane. The sleeve is journaled on the hollow stationary shaft 9 in the feeding and compressing chamber. Said screw-threads being connected to a collar 12, which collar is keyed or otherwise secured to a driving gear 13, which meshes with the pinion 14, mounted on shaft 15. Said shaft being journaled in the head 3, and the walls of chamber 4 as shown. The shaft 15 may be connected to any suitable source of power such for instance as the motor 16, mounted on the truck. A compression shoe 17 is mounted on the end of each of the three feeding and compression screw-threads 10, one of these shoes being provided with a port 18 near its periphery.

The pipe forming chamber 19 as stated connects with and extends from the compressing chamber 4^a, and is flared gradually toward its discharge end in order to reduce friction between its interior face and the mass of plastic material passing there-through. The pipe forming chamber is provided with a series of longitudinally extending grooves 20, into which the plastic material is forced, thereby forming ribs on the exterior of the pipe, which being keyed in said grooves, prevent the pipe revolving as it is formed, thus eliminating any tendency of the pipe to crack or twist under transverse strains while being formed. These ribs are pressed out in the passage of the pipe through the cylinder, unless they are needed to embed longitudinal re-inforcements. For that purpose, a reel 41 is provided for the reinforcing wire 40 and guide rolls 42 to lead the wire through an opening 43 in the cylindrical casing of the chamber 19. The reel 41 and the rolls 42 are all mounted on spindles in suitable bearings attached preferably to the forward frame 3^b. These longitudinally reinforcing wires may be supplied as desired under one or more of the ribs formed by the grooves 20.

As will be seen from Fig. 4, the hollow

stationary shaft 9 extends into the pipe forming chamber 19, and serves as a core or mandrel around which the plastic pipe is formed.

21 is a guide detachably connected to the discharge end of the pipe forming chamber which serves as a guide or slide to conduct the formed pipe gradually from the pipe forming chamber to the bottom of the trench, and relieve the pipe of all strains and stresses in its descent to the bottom of the trench.

The compression shoes 17 are provided with a removable face plate 22. A thrust collar 23 is secured to the shaft 9, to take up any thrust that may be communicated to the driving gear 13.

24 and 24 are brackets fixed rigidly to the driving gear 13, and extending forwardly therefrom between which are mounted wire feeding rolls 25, which are mounted on a shaft 26, journaled in said brackets 27 is a bevel gear keyed to the shaft 26, which meshes with the stationary bevel gear 27^a, having a collar 28 through which a set screw 29 is passed thereby keying said gear 27^a to the stationary shaft 9.

30 is an idler around which wire passes from the reel 31, which is suitably mounted on the machine.

32 is a passage formed through the body of the driving gear 13 and the collar 12, and opening into the hollow shaft 9, as is more clearly shown in Fig. 4.

Plastic material, such for instance as cement, paper pulp asphalt, etc., is fed by the feeding screws 10 into the pipe forming chamber 19, and therein formed around the hollow stationary shaft 9 into the pipe, which pipe discharges on to the guide and is thereby deposited in the bottom of the trench as a continuous pipe without joints or cracks.

It is desirable that the cement pipe be circumferentially reinforced, and for this purpose we feed wire 44 from the reel 31, over the idler 30 between the feeding rolls 25, thence through the passage 32 into the hollow shaft 9 from whence it is fed through a port 18 into the pipe forming chamber in the mass of cement, and inasmuch as the shoes 17 are revolved with the feeding screws 10, the wire is coiled in the mass of cement and embodied therein, thereby constituting a reinforcement for the pipe.

To reduce friction incident to the drive between the inner face of the pipe forming chamber and the pipe being formed, we give the pipe forming chamber a gradual flare toward its discharge end, in order to prevent the pipe from revolving on the hollow shaft 9. We also provide the inner face of the pipe forming chamber with longitudinally disposed spaced grooves into which cement is forced, thereby locking the pipe against revolution. The ribs formed on the pipe by the said longitudinally disposed grooves in

the pipe forming chamber may be left on the pipe by continuing the grooves the full length of the cylinder and wire may be embedded in them longitudinally as a reinforcement. In pipes of large diameter we may feed reinforcing wires extending longitudinally of the pipe through the ribs formed by the longitudinal grooves in the pipe forming chamber. The bevel gear 27 travels around the bevel gear 27^a by reason of its being fixed to the driving gear 13 which also similarly moves the reel 31.

As above stated, in forming continuous pipes in a ditch, the machine is mounted on rails formed in sections so that as the machine advances in the ditch, short sections of rails can be laid ahead to carry the machine as it advances or as the pipe is formed. By the employment of our machine, continuous pipe without joint or crack can be formed and laid in ditches for any length.

Pipe formed by our machine combines all the advantages of metal with the non-corroding qualities of cement mortar. The coil reinforcement will resist external compression strains as well as internal tension strains.

Referring to the gradual flare of the pipe forming chamber, we wish to note that this flare is sufficient to allow the pipe to feed out of the machine when the friction of the moving mass becomes sufficient to insure the proper amount of compression.

What we claim is:

1. In a continuously running machine for manufacturing monolithic pipe, the combination with a horizontal forming chamber flaring out from its central portion both toward its receiving and its discharging end; of a suitably threaded feed screw mounted to revolve within said chamber without axial displacement.

2. In a continuously running machine for simultaneously reinforcing and manufacturing monolithic pipe, the combination with a horizontal forming chamber, of a suitably threaded feed screw mounted to revolve within said chamber without axial displacement, said screw being provided with a compression shoe at its discharge end, said shoe having a port for passing reinforcing wire, and means for feeding the wire through said port.

3. In a continuously running machine for manufacturing monolithic pipe, the combination with a horizontal forming chamber, of a suitably threaded feed screw mounted to revolve within said chamber without axial displacement; said chamber having longitudinal grooves for the purpose of forming lands on said pipe and means for disposing a reinforcing wire under certain of said lands.

4. In a continuously running machine for manufacturing monolithic pipe, the combination with a horizontal forming chamber

flaring out from its central portion toward its discharging end; of a multiple threaded feed screw mounted to revolve within said chamber without axial displacement, said chamber being mounted on wheels and driven forward by the discharged portion of the pipe.

5. In a continuously running machine for manufacturing monolithic pipe, the combination with a horizontal forming chamber, flaring out from its central portion toward its discharge end, a mandrel in the chamber with its discharge end tapered, a suitably threaded feed screw mounted to revolve within said chamber without axial displacement.

6. In a continuously running machine for manufacturing monolithic pipe, the combination with a horizontal forming chamber, flaring out from its central portion toward its discharge end; a mandrel in the chamber with its discharge end tapered, a suitably threaded feed screw mounted to revolve within said chamber without axial displacement, said flaring out of the chamber and the taper of the mandrel coinciding as to the angularity and commencing approximately in the same transverse plane, so as to facilitate the discharge of the pipe.

7. In a continuously running machine for simultaneously reinforcing and manufacturing monolithic pipe, the combination with a horizontal forming chamber; of a suitably threaded feed screw mounted to revolve within said chamber without axial displacement, a mandrel on which said screw is carried, said mandrel extending beyond said screw into the discharge end of said chamber, thus constituting the core for the plastic mass, said screw being provided with a compression shoe at its discharge end, said shoe having a port for passing reinforcing wire, and means for feeding the wire through said port, whereby said screw coils the reinforcing wire while embedding it in the plastic mass.

8. In a continuously running machine for simultaneously reinforcing and manufacturing monolithic pipe, the combination with a horizontal forming chamber; of a suitably

threaded feed screw mounted to revolve within said chamber without axial displacement, said screw being provided with a compression shoe at its discharge end, said shoe having a port for passing reinforcing wire, and means for feeding the wire through said port, a head on said screw having a suitably driven gear wheel, said means comprising a stationary bevel gear, a pinion mounted on said head and meshing with said bevel gear, feed rolls revolved by said pinion and a wire reel positively connected with said wire to said feed rolls whereby said screw coils the reinforcing wire while embedding it in the plastic mass.

9. In a continuously running machine for simultaneously reinforcing and manufacturing monolithic pipe, the combination with a horizontal forming chamber, of a suitably threaded feed screw mounted to revolve within said chamber without axial displacement, a mandrel on which said screw is carried, said mandrel extending beyond said screw into the discharge end of said chamber, thus constituting the core for the plastic mass, said screw being provided with a compression shoe at its discharge end, said shoe having a port for passing reinforcing wire, and means for feeding the wire through said port, a head on said screw having a suitably driven gear wheel, said means comprising a stationary bevel gear, a pinion mounted on said head and meshing with said bevel gear, feed rolls revolved by said pinion and a wire reel positively connected with said head so as to partake in its rotation, said reel delivering the wire to said feed rolls whereby said screw coils the reinforcing wire while embedding it in the plastic mass.

The foregoing specification signed at New York city this 11th day of September, 1912.

GEORGE B. COLE.

EDWARD DURYEE.

Witnesses for George B. Cole:

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C. C. UPTON.

Witnesses for Edward Duryee:

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W. G. DURYEE.