No. 850,238. PATENTED APR. 16, 1907.

M. S. MANNING.

PIPE LAYING MACHINE.

APPLICATION FILED DEC. 13, 1906.

Fig. 1.

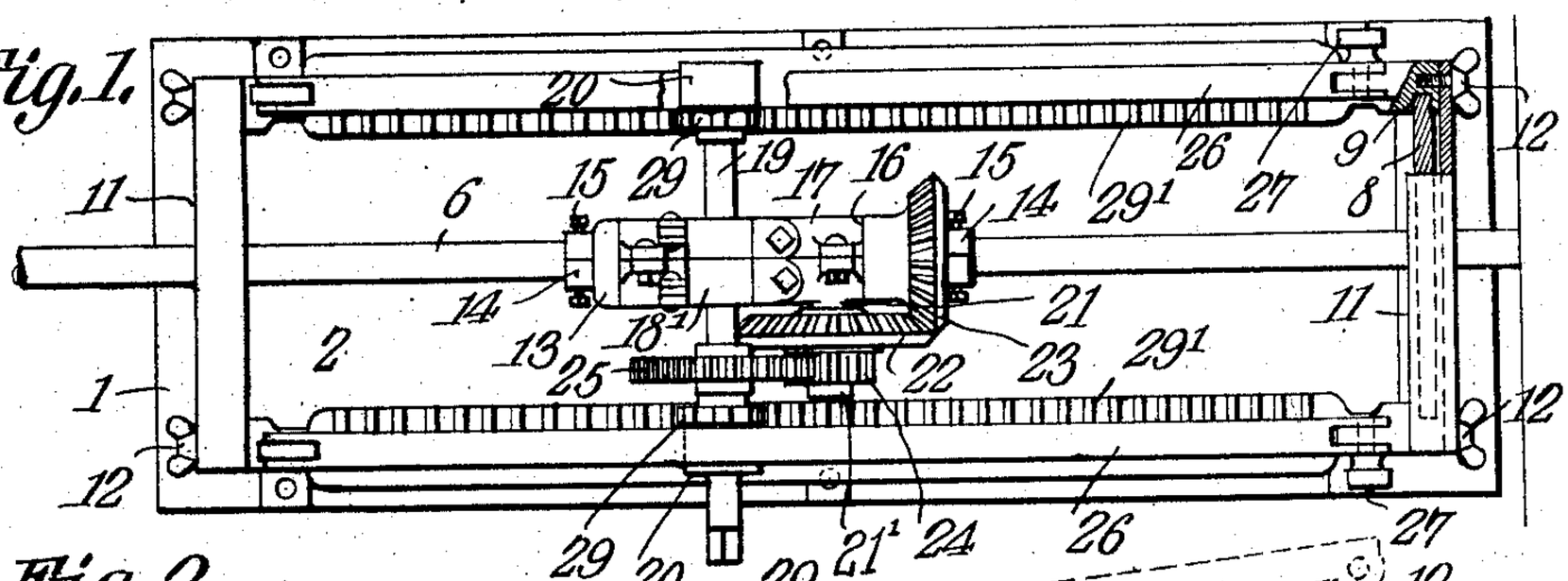


Fig. 2.

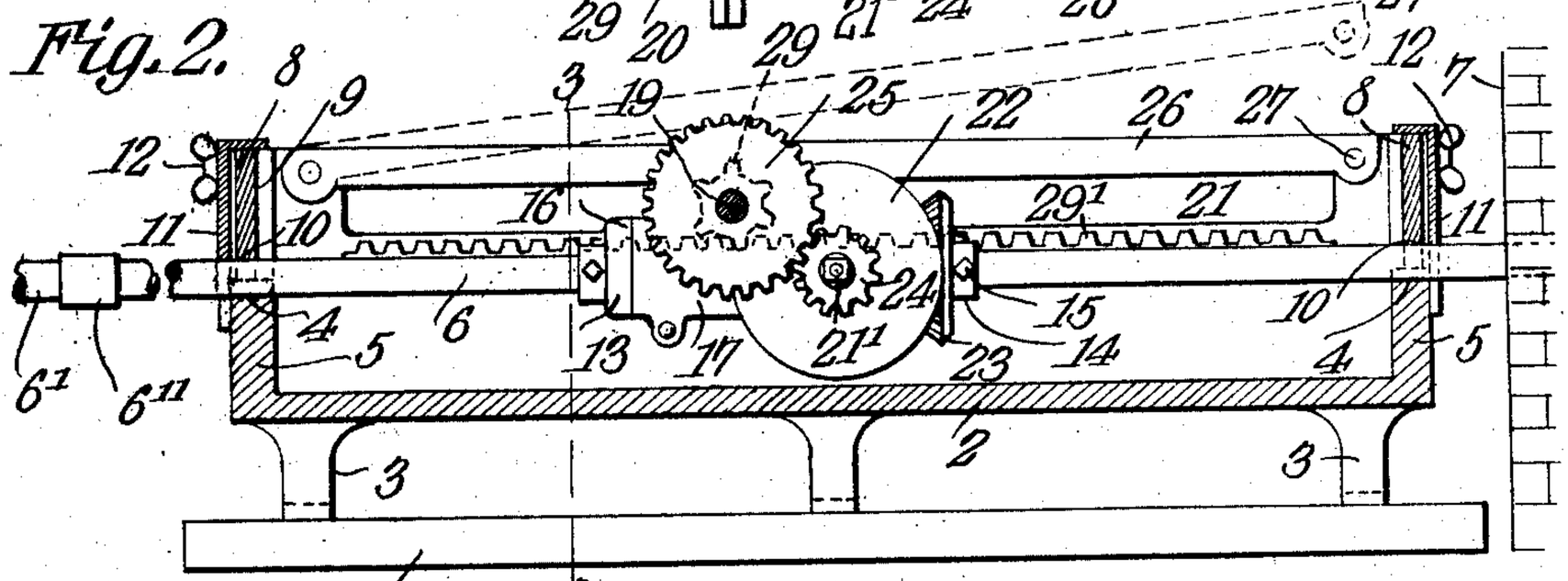


Fig. 5.

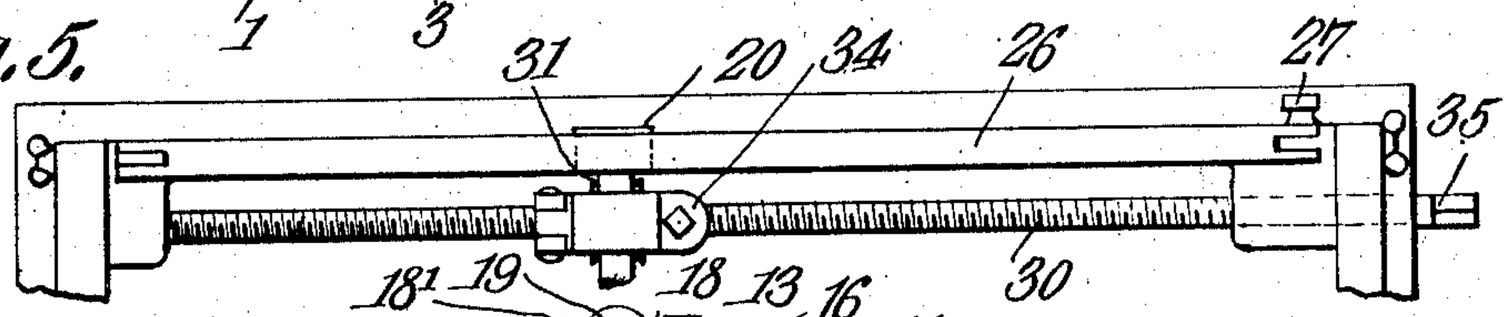


Fig. 4.

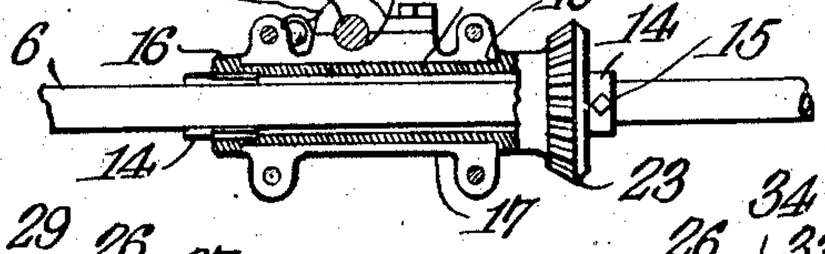


Fig. 3.

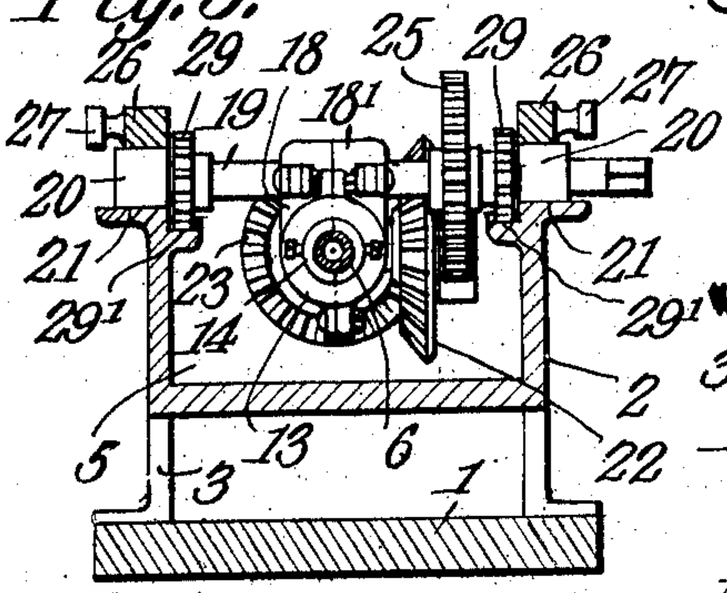


Fig. 7.

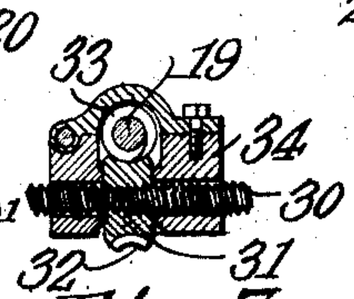
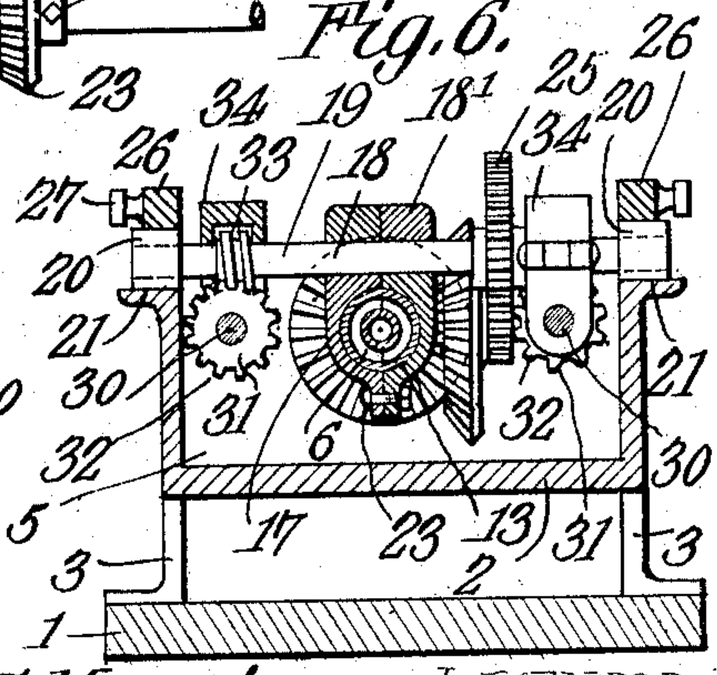


Fig. 6.



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MICHAEL S. MANNING, OF MORTON, PENNSYLVANIA.

PIPE-LAYING MACHINE.

No. 850,238. Specification of Letters Patent. Patented April 16, 1907.

Application filed December 13, 1906. Serial No. 347,656.

To all whom it may concern:

Be it known that I, MICHAEL S. MANNING, a citizen of the United States, residing at Morton, in the county of Delaware and State of Pennsylvania, have invented a new and useful Pipe-Laying Machine, of which the following is a specification.

This invention relates to a pipe-laying machine of that type in which section after section of the pipe can be driven into the earth, so that excavating can be avoided, and is intended more particularly for use by plumbers for facilitating the laying of gas and water pipes under sidewalks and streets.

The invention has for one of its objects to improve and simplify the construction and operation of apparatus of this character so as to be reliable and efficient in use, comparatively easy and inexpensive to manufacture, and to enable pipes to be laid with dispatch and a minimum of labor.

A further object of the invention is the provision of a simple and effective driving mechanism by which the pipe to be laid is simultaneously rotated and fed forwardly to bore its way into the earth.

With these objects in view and others as will appear as the nature of the invention is better understood the invention comprises the various novel features of construction and arrangement of parts, as will be more fully described hereinafter and set forth with particularity in the claims appended hereto.

In the accompanying drawings, which illustrate certain of the embodiments of the invention, Figure 1 is a plan view of the machine with portions broken away. Fig. 2 is a longitudinal section thereof. Fig. 3 is a vertical transverse section on the line 3 3, Fig. 2. Fig. 4 is a detail view of the pipe-holder. Fig. 5 is a fragmentary plan view showing a modified form of feed device. Fig. 6 is a vertical transverse section of the machine equipped with the modified form of feed devices. Fig. 7 is a detail view of one of the nut holders or guides for one of the feed devices.

Corresponding parts in the several figures are indicated throughout by similar characters of reference.

Referring to the drawings, 1 designates the base of the machine, and 2 the frame thereof, which is attached to and supported on the base by legs 3. As viewed in plan, the frame 2 is rectangular in shape and of a length several times greater than its width. It is preferably an iron casting of box-like form provided with two semicircular bearings 4 in the ends 5. Extending longitudinally of the frame and supported on the bearings 4 is a pipe 6, which the machine is in the process of laying. On the front end of the pipe a suitable bit is provided, so as to bore a hole in the earth to receive the pipe. The pipe is shown passing through a wall 7 and partly driven into the earth on the opposite side—as, for instance, under a sidewalk—a suitable opening being first provided in the wall for the pipe to extend through. At the ends of the frame are bearing-plates 8, which are held in grooves 9 in the sides of the frame and rest on the end wall 5, one of said grooves being clearly shown in the upper right-hand corner of Fig. 1. These plates are provided with semicircular bearings 10, which coöperate with the semicircular bearings 4 to guide the pipe through the frame. The plates are secured in position by means of clamping members 11, that are of L-shaped cross-section, as shown in Fig. 2, and extend over the ends of the frame 2 and project inwardly at their upper portions over the top of the bearing-plates 8, set-screws 12 being employed to hold the clamping members in place, as shown clearly in the upper right-hand corner of Fig. 1. These plates are removable, so that others with different-sized bearings may be inserted for receiving pipes of different-sized diameters. The plate and clamping members may also be removed for the purpose of placing the pipe in the machine.

Arranged on the pipe 6 is a sleeve 13, that is clamped to the pipe by means of split bushings 14, extending into the ends of the sleeve. These bushings are keyed to the sleeve so as to rotate therewith and are clamped to the pipe by the screw-bolt 15. The bore of the sleeve is of suitable diameter to receive pipes of various sizes, a plurality of sets of bushings 14 being provided for the different-sized pipes. The exterior of the sleeve is reduced to form shoulders 16 at its ends, and between these shoulders is arranged a supporting-frame 17 for parts of the driving mechanism and is preferably made in two parts divisible on a longitudinal axis. The frame 17 is provided with a bearing 18 for the transverse driving-shaft 19. The cap 18′ of the bearing is removable to permit the shaft 19 to be lifted out. The driving-shaft extends through bearing-blocks 20, adjacent its ends, which move in the horizontal guide-

ways 21 at the sides of the frame 2. The frame 17 is held from rotating by means of the driving-shaft 19 and is adapted to move longitudinally of the machine with the said shaft through the operation of the feed mechanism. Extending laterally from the frame 17 is a bearing-stud 21′, on which is rotatably mounted the miter-gear 22, that meshes with the miter-gear 23 on the sleeve 13. Rigidly secured to the gear 22 is a pinion 24, that meshes with the gear-wheel 25 on the driving-shaft 19. The gear-wheel and pinion, as well as the miter-gears, may be proportioned to rotate the sleeve 13 and pipe 6 at any desired speed. To permit the shaft to be removed, rails 26 are employed to form the upper portions of the guideways 21, and these rails are pivoted at one end of the frame 2, so as to swing upwardly, as shown by dotted lines in Fig. 2, and the free ends of the rails are normally secured in place by the thumb-screws 27. One end of the driving-shaft 19 is extended beyond the side of the frame 2 and is adapted to receive any suitable device for rotating the same.

In order to feed the pipe forwardly, the rotation of the driving-shaft is employed, so that the feed of the pipe can be accomplished automatically. According to the construction shown in Figs. 1 to 3, inclusive, the frame 2 is provided with longitudinal racks on its side walls, with which mesh pinions 29 on the driving-shaft. By this means the rotation of the driving-shaft will cause the latter to gradually move laterally from one end of the frame to the other. This lateral movement of the shaft carries the frame 17 with it, and since the sleeve 13 is rotatably mounted in the frame the pipe 6 is continuously advanced, while it is rotated through the miter-gearing between the pipe and the driving-shaft.

The feed mechanism shown in Figs. 5 and 6 comprises a pair of stationary screws 30, extending longitudinally of the frame 2 and supported at their ends on the latter. On each screw is a nut 31, which is provided with teeth 32, forming a worm-wheel that meshes with the worm 33 on the driving-shaft 19. The rotation of the driving-shaft causes the feed-nuts 31 to turn and move along the stationary screws 30. In order to move the shaft 19 bodily along with the nuts 31, the latter are arranged in holders 34, through which the shaft 19 extends. The nuts 31 move the holders 34 lengthwise of the screw, and thereby carry the driving-shaft 19 bodily so that the pipe 6 is advanced continuously during the rotation of the driving-shaft.

The operation is as follows: The machine is first arranged in the desired position and secured in place, as by staking it on the floor or securing it in any other suitable manner. The pipe to be driven after being fitted with a suitable bit can be placed in the machine in either of two ways. According to one method the pipe 6 is moved inwardly through the bearing at the left-hand end of the machine, through the sleeve 13, and then through the bearing at the right-hand end of the machine. The split bushings are then fitted into the ends of the sleeve, and the clamping-bolts 15 are then tightened so as to clamp the pipe and sleeve together. The machine is then ready to lay the pipe, and all that is necessary is to rotate the driving-shaft 19. This can be done by a crank operated by hand or by any suitable power mechanism, as will be readily understood. Since the feed of the pipe is done automatically, no attention is required on the part of the operator, the feed and rotation of the pipe being accomplished merely by rotating the driving-shaft 19. According to the second method of placing the pipe the driving-shaft is removed from the frame 17 by opening the cap 18′ and by raising the guide-rails 26. When the feed mechanism, such as that shown in Fig. 1, is employed, the driving-shaft can be then readily lifted out. With the feed mechanism shown in Figs. 5 to 7 the top parts of the holders 34 are swung open, so as to permit the shaft 19 to be lifted out. The bearing-plates 8 and clamping members 11 are next removed from the frame 2. The sleeve 13, with the supporting-frame 17, is then adjusted to the pipe 6, after which the latter is lowered vertically into bearings 4. The bearing-plates 8 and clamping members 11 are then replaced and the driving-shaft again secured in position, whereupon the machine is ready to be operated. After the pipe has been fed forwardly to such a point that the sleeve 13 reaches the right-hand end of the frame the bolts 15 are loosened so that the sleeve 13 can be slid along the pipe to the left-hand end of the frame. This movement of the sleeve carries with it the driving-shaft 19 and mechanism between it and the sleeve. The pinions 29 will move freely over the racks 29′ as the sleeve is moved to the left, and after the latter reaches the end of the machine the screw-bolts 15 are again clamped. The pipe can then be fed another step forwardly, and the operation is repeated until the pipe is laid to the desired distance. In the nut-and-screw feed mechanism the return of the sleeve to the left-hand end of the machine can be accomplished by simultaneously rotating the screws 30 by means of cranks applied to the squared ends of the screws, one of such ends being shown at 35, Fig. 5. When one section of the pipe is almost entirely laid, another section 6′ is connected thereto by a coupling 6″, as shown in Fig. 2. When the coupling 6″ reaches the left-hand end of the machine, the bearing-plate and clamping member at the said end of the machine are

loosened so that they can be raised to permit the coupling to move forwardly into the machine with the advance of the pipe. In order to move the sleeve 13 over the coupling, as in readjusting the sleeve to the pipe, the split bushings 14 are removed, so that the clamping-sleeve can be moved over the coupling to the left end of the machine and be reclamped to the pipe to feed the latter another step forward. When the coupling reaches the right end of the machine, the bearing-plate and clamping member are loosened, so that the coupling can pass out of the machine, after which the bearing-plate and clamping member are again secured in place. It will thus be seen that section after section can be easily and quickly laid and fed step by step to any desired distance.

I have described the principle of operation of the invention, together with the apparatus which I now consider to be the best embodiment thereof; but I desire to have it understood that the apparatus shown is merely illustrative and that various changes may be made when desired as are within the scope of the claims.

What is claimed is—

1. In a pipe-laying machine, the combination of a supporting structure, guideways thereon, bearing-blocks slidably mounted in the said ways, a shaft mounted in the bearing-blocks, bearings on the structure for the pipe to be laid, and separate means for rotating and longitudinally moving the pipe through the agency of the shaft.

2. In a pipe-laying machine, the combination of a supporting structure, bearings thereon for the pipe to be laid, a sleeve surrounding the pipe, split bushings fitted in the sleeve for clamping the latter to the pipe, means for rotating the sleeve, and means for moving the sleeve longitudinally.

3. In a pipe-laying machine, the combination of a supporting structure, bearings thereon for the pipe to be laid, a sleeve adapted to be clamped to the pipe, a two-part frame in which the sleeve rotates, a driving-shaft extending through the two-part frame, means for moving the shaft and thereby the frame on the supporting structure, and a gearing between the shaft and sleeve having one of its members supported on the two-part frame.

4. In a pipe-laying machine, the combination of a stationary supporting structure, stationary bearings thereon for the pipe to be laid, a driving-shaft extending transversely to the pipe and mounted on the structure to have a bodily lateral movement independently of the latter, a mechanism for moving the shaft laterally, a connection between the shaft and the pipe for moving the latter longitudinally, and means for rotating the pipe by the driving-shaft.

5. In a pipe-laying machine, the combination of a supporting structure, bearings thereon for the pipe to be laid, a sleeve split bushings for clamping the sleeve to the pipe and a mechanism for simultaneously rotating the sleeve and feeding the same longitudinally, said mechanism including a driving-shaft which receives the power for both rotating and longitudinally moving the sleeve.

6. In a pipe-laying machine, the combination of a supporting structure, bearings thereon for the pipe to be laid, a sleeve adapted to be clamped to the pipe to rotate the same and move it longitudinally, a non-rotatable frame sleeved on the sleeve, a transverse shaft mounted on the structure to have a lateral movement, a bearing on the frame for the shaft through which the latter moves the frame and sleeve longitudinally, and a speed-multiplying device between the shaft and sleeve for rotating the latter.

7. In a pipe-laying machine, the combination of a supporting structure for the pipe to be laid, guideways on the structure, bearing-blocks therein, a driving-shaft mounted on the bearing-blocks for bodily lateral movement, means for connecting the shaft with the pipe for moving the latter longitudinally by the bodily movement of the shaft, a feed mechanism arranged to cause the rotation of the shaft to move the latter bodily, and a gearing between the shaft and pipe for rotating the latter.

8. In a pipe-laying machine, the combination of a supporting structure for the pipe to be laid, guideways thereon, a driving-shaft, bearing-blocks in the guideways for rotatably mounting the shaft, and separate means for rotating the pipe and feeding the same by the rotation of the driving-shaft.

9. In a pipe-laying machine, the combination of a supporting structure for the pipe to be laid, guideways thereon, a driving-shaft, bearing-blocks in the guideways for rotatably mounting the shaft, a feed mechanism arranged to move the shaft along the guideways by its rotation, and a mechanism arranged to rotate the pipe by the driving-shaft at a higher speed than the latter.

10. In a pipe-laying machine, the combination of a supporting structure for the pipe to be laid, guideways thereon, a driving-shaft, bearing-blocks in the guideways for rotatably mounting the shaft, racks on the structure, pinions meshing with the racks and secured to the shaft for moving the latter bodily, means for connecting the shaft with the pipe, and a gearing between the shaft and pipe for rotating the latter.

11. In a pipe-laying machine, the combination of a supporting structure for the pipe to be laid, a laterally movable and rotatable shaft on the structure, a sleeve adapted to be clamped to the pipe to rotate and move longitudinally therewith, a non-rotatable frame sleeved to the pipe and connected with the

shaft to move the sleeve by the latter, and a power-transmitting mechanism between the shaft and sleeve and supported on the frame for rotating the sleeve by the driving-shaft.

12. In a pipe-laying machine, the combination of a supporting structure for the pipe to be laid, a laterally movable and rotatable shaft on the structure, a sleeve adapted to be clamped to the pipe to rotate and move longitudinally therewith, a supporting means on the sleeve connected with the shaft to move the sleeve by the latter, a gearing including a gear-wheel on the shaft and a pinion on the supporting means, and a miter-gearing between the pinion and sleeve for rotating the latter by the driving-shaft.

13. In a pipe-laying machine, the combination of a supporting structure for the pipe to be laid, a laterally movable and rotatable shaft on the structure, a sleeve through which the pipe extends, means for removably clamping the sleeve to the pipe, a frame on the sleeve and connected with the shaft to move with the latter and to be held from rotation thereby, a gear on the shaft, a pinion mounted on the frame, a miter-gear connected with the pinion, and a miter-gear on the sleeve.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

MICHAEL S. MANNING.

Witnesses:
R. H. SANFORD,
C. W. FUIGLE.