Feb. 4, 1964 T. JUUSELA ET AL 3,120,107

METHOD OF AND A DEVICE FOR MAKING DRAIN PIPES

Filed Nov. 30, 1959 2 Sheets-Sheet 1

FIG 1

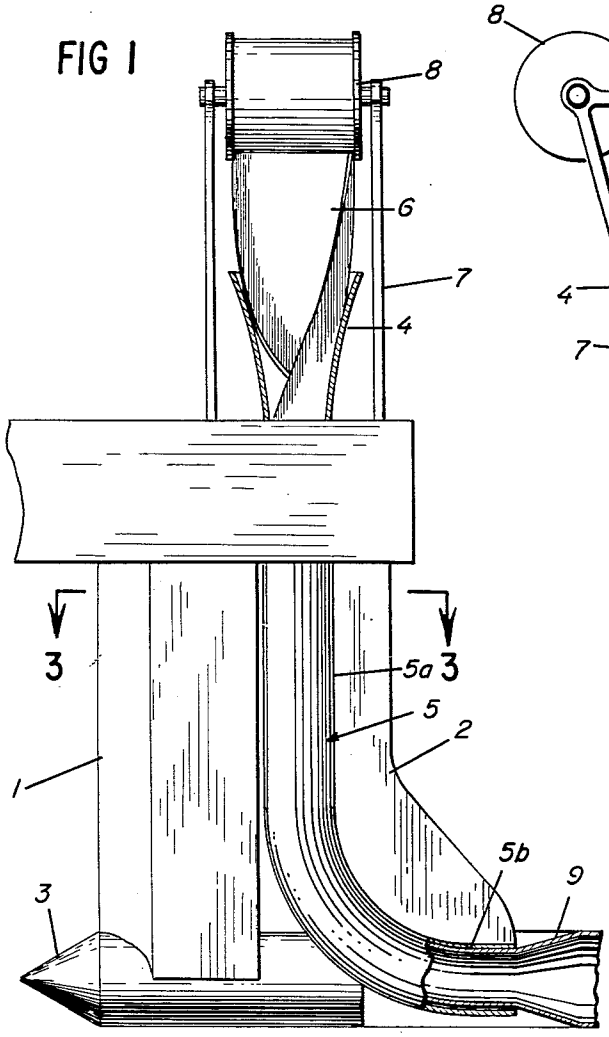
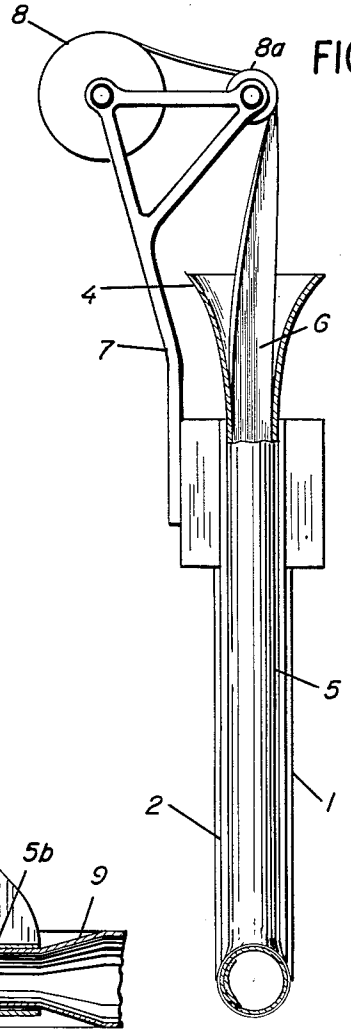


FIG 2



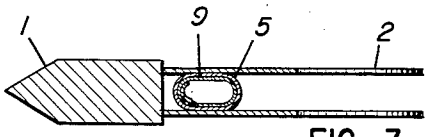


FIG 3

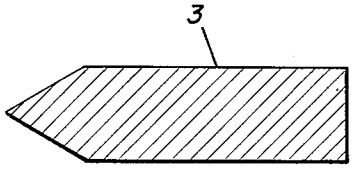


FIG 4

Taneli Juusela and
Lari Juusela
INVENTORS

BY Wenderoth, Lind and Ponack
ATTORNEYS

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FIG 5

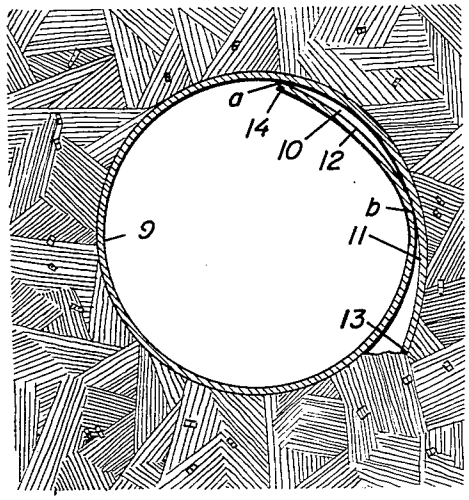


FIG 6

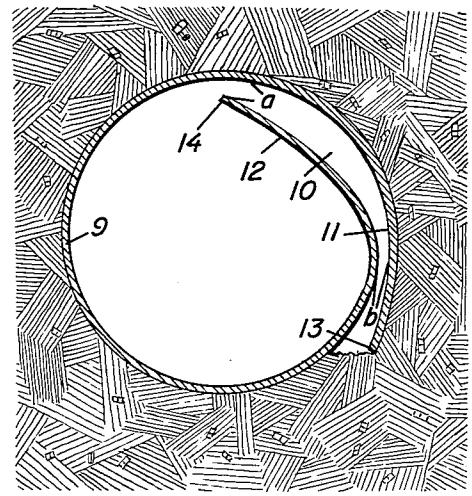


FIG 8

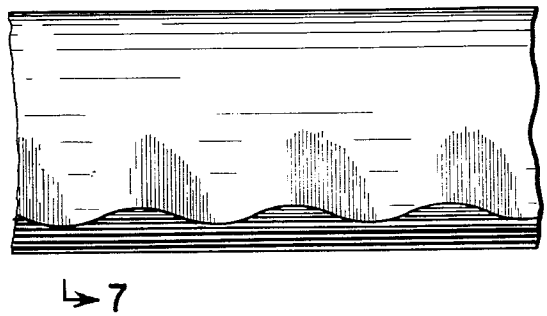
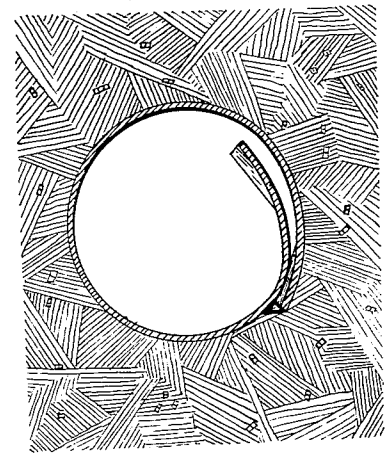


FIG 7



Taneli Juusela and
Lari Juusela
INVENTORS
BY Wenderoth, Lind and Ponack
ATTORNEYS

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METHOD OF AND A DEVICE FOR MAKING DRAIN PIPES

Taneli Juusela and Lari Juusela, both of Puistotie 1A2, Munkkiniemi, Helsinki, Finland

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5 Claims. (Cl. 61—72.6)

This invention relates to draining and more particularly to a method of and a device for making drain pipes by passing a ribbon fed from a drum into an underground hole in which the ribbon is brought to form a continuous drain.

According to the invention the method of making drain pipes comprising the steps of bending a ribbon fed from a drum as to bring the ribbon edge portions to overlap each other as to form a pipe with a smaller diameter than the final drain pipe is intended to have and feeding said pipe into an underground hole, where the pipe is allowed to expand in correspondence with the diameter of said hole, whereby a split joint between the longitudinal, mutually overlapping edges of the pipe is maintained.

According to an especially favourable embodiment of the invention said split is situated in an upright position when the drain pipe is arranged within the hole in the ground.

By making the drain pipes by the method according to the invention several important advantages are achieved compared with drain pipes made by known methods. Because the split joint is maintained between the longitudinal, overlapping edges of the drain pipe a special valve effect is obtained which promotes the draining of the surrounding ground. This split joint which according to the invention is preferably arranged in a vertical position when the drain pipe is located in the earth also provides a special filtering effect preventing mineral earth particles heavier than water from penetrating into the drain pipe where they form deposits preventing the flowing of water. The drain pipe is produced by this method in a very simple way. No special steps are necessary to prevent mineral earth particles from entering into the pipe, so as is the case for instance at draining tiles, where the tiles must be protected with a surrounding layer of gravel.

Further features of the invention will appear from the following description referring to the drawings.

The device for carrying out the method comprises a displacing body arranged at the lower end of a knife adapted to cut the ground. It has forming tube arranged behind said knife and provided with a funnel at its upper end, into which the ribbon from the drum is led. Said funnel is adapted to form the pipe and it extends, curved backwards, into the hole formed behind the displacing body.

By the device according to the invention the drain pipe may be formed rapidly and in a very simple way, whereby the costs of production and mounting become highly reduced.

The invention will be described more in detail with reference to the accompanying drawings, which diagrammatically show one embodiment of a device for carrying out the method of the invention.

FIGURE 1 is a side elevation view, partly in section, of the rear part of the device.

FIGURE 2 is an end elevation of the device shown in FIG. 1.

FIGURE 3 is a section taken on line III—III of FIG. 1.

FIGURE 4 is a longitudinal axial section of the mole plug on the lower end of the device.

FIGURES 5 and 6 are cross sections of the drain pipe in position in the ground; and

FIGS. 7 and 8 are sectional and side elevation views, respectively, of a modified form of drain pipe.

The device shown in FIGS. 1 and 2, a so-called mole plow, is provided with a knife extending downwards from the frame, the front edge of the knife being sharpened as shown in FIG. 3. The extension of the back part of the knife is formed by two shields 2 spaced at a distance smaller than the thickness of the knife. In the lower end of the knife there is a mole plug 3 forming the underground hole for the drain pipe. Between the shields behind the knife there is arranged a forming tube 5 provided at its upper end with a funnel 4, the tube 5 having a vertical portion 5*a* with a cross section oval in form. The forming tube has a lower and rear end 5*b* curving downwardly and rearwardly from the lower end of vertical portion 5*a* and forming an extension of the displacing body, the cross section of the lower and rear end gradually changing from oval to round. The ribbon 6 forming the drain pipe is rolled on a drum 8 supported by a stand on the frame.

The drain pipe is formed according to the invention by means of the above described mole plow in the following way: The ribbon 6 is fed from the drum 8 over a smaller wheel 8*a* into the funnel 4, whereby the edge portions of the ribbon will overlap each other. Said smaller wheel is a quite common expedient. Its use is not necessary. It is easily possible to arrange the drum 8 in such a way that the ribbons run directly into the funnel 4. Consequently said smaller wheel forms no part of the instant invention. Having passed the funnel the overlapping of the edge portions increases when the ribbon enters the oval forming tube 5 in such a way that the ribbon forms a pipe 9 as shown in FIG. 3. Where the pipe passes through the curved lower portion of the forming tube the cross section of which gradually increases to a round form the pipe which in the inlet end of the tube is bent to an oval form with considerably overlapping edge portions can owing to its elasticity expand and partly straighten out, whereby the cross section of the pipe increases and its form becomes round. In the outlet end of the forming tube which is arranged to form an extension of the mole plug 3 the pipe reaches substantially its final size and shape which it will have when remaining in the hole after being removed from the forming tube. The funnel 4 and the forming tube 5 are arranged to cooperate with each other and with the ribbon in such a way that the overlapping of the edges of the ribbon when it is bent to form a tube is at the side of the drawing pipe when the drain pipe is placed in the mole hole behind the outlet end of the forming tube 5. The overlapping edges are arranged in such a way that the outer edge extends downwardly and the inner edge upwardly. Between the edges is a vertical split joint 10 maintained as illustrated in FIGS. 5 and 6. Said vertical split joint is adapted to permit water entrance into the drain pipe. The said position of the edges of the ribbon prevents earth from penetrating into the split joint and closing it.

The particular position of the drum 8 relative the forming tube 5 is a critical feature of the invention. It is of decisive importance that the overlapping of the ribbon edges in the aforedescribed is at the side of the drain pipe when it is laid in the mole hole. This is obtained by arranging the axis of the drum 8 parallel to the moving direction of the mole plow as shown in FIGS. 1 and 2. The oval shape of the forming tube 5 makes it easier to transport the tube through the space in the earth cut by the knife 1. The circular lower end and outlet of the forming tube facilitates the shaping of the drain pipe according to the mole hole.

In FIGS. 5 and 6 there is shown how the split joint 10 provides a specially favourable valve effect. FIG. 5 represents the situation when the pressure inside the drain

pipe is greater than the pressure acting outside the pipe. In FIG. 6 the inside pressure is smaller. The split joint 10 is formed by the overlapping edge portions 11 and 12 of the drain pipe. In the situation shown in FIG. 5 these edge portions 11 and 12 contact each other at *a* and *b*, whereby the water inside the drain pipe is prevented from escaping through the split joint. In FIG. 6 there is no contact between the edge portions 11 and 12. The water may due to an increasing external pressure flow more and more easily through the split joint 10 into the drain pipe and be removed through the pipe. The drain pipe according to the invention is capable of automatically regulating the flow of water through the split joint under varying conditions.

The drain pipe may preferably be made so that the longitudinal split joint is directed in such a way relative to the pipe, that the edge 13 of the outer edge portion 11 of the drain pipe will be positioned near the lower part of the drain pipe and the edge 14 of the inner edge portion 12 will be positioned near the upper part of the pipe. In this way a specially favourable filtering effect is achieved. As the flow in the split joint 10 of the drain pipe passes upwardly the mineral earth particles carried by the water and which are heavier than water are prevented from entering the pipe, because the heavier mineral earth particles are unable to flow upwardly in the split joint over the inner edge portion as easily as water. Consequently it is possible to achieve an effective filtration by simple means, whereby the formation of deposits in the drain pipe reducing the flow of water along the pipe may be prevented.

The ribbon used for forming the drain pipe may be either perforated or not and it can be cut into suitable portions or consist of a continuous ribbon. The marginal portions of the ribbon may also have offset portions, e.g. corrugated, as shown in FIGS. 7 and 8 so that between the overlapping edge portions of the final pipe there remains a sufficient split for the flow of water into the pipe. The marginal inner portion of the drain pipe may also have a wave-like form or the like to provide sufficient splits permitting water to flow into the pipe.

For carrying out the method according to the invention preferably plastic ribbons are used. Such a plastic ribbon meets all requirements concerning elasticity, stability, strength, etc. Ribbons of other materials with similar favourable properties may of course also be used successfully. Such materials are e.g. fibrous cellulose, fibrous lignine, aluminium and similar materials. The ribbon forming the drain pipe may consist either wholly of such a material or of a material in combination with plastic. In the last mentioned case the material may be mixed in a plastic composition or a ribbon of this material may be e.g. coated with a layer of plastic. The ribbon forming the drain pipe may also consist of some other material with suitable properties, which material e.g. is impregnated before use.

It is obvious that various changes may be made without departing from the scope of the invention, the particular embodiment being described merely to illustrate the invention. If it is preferred to provide the drain pipe with two split joints the drain pipe may thus be formed of two halves of pipes or two separate ribbons.

What we claim is:

1. A method of producing and laying a drain pipe, in which a mole plow having a hole forming plug disposed below a cutting knife is forced through the ground for forming a substantially cylindrical bore for receiving the drain pipe, said drain pipe being formed by a flexible flat strip which is unwound from a supply drum carried on the plow above the level of the ground to be drained together with the device by which the mole is produced, said method comprising the step of bending said strip material into a vertical tubular form above the level of the ground with the outer edge extending forwardly of the plow and the inner edge extending rearwardly, bending the flexible strip, when forming the pipe, into a cross section smaller than that of the mole hole, by overlapping the edges of the flexible strip and leaving them in an unsecured condition and making the said overlapping sufficiently great that it will be maintained even after the strip material has been allowed to expand after the pipe has been deposited within the mole hole, laying the thus formed tube by curving it downwardly and rearwardly of the plow into the mole hole through the space cut by the knife carrying the mole plow without any longitudinal movement between the drain pipe and the mole hole, and positioning said unsecured overlapping edges of the strip with the outer edge extending downwardly and the inner edge extending upwardly to form a downwardly opening vertical slit along one side of the drain pipe.

2. A method as claimed in claim 1 in which the flat strip is a ribbon, the marginal portions of which have offset portions, whereby said marginal portions are spaced from each other when they are overlapped.

3. A method as claimed in claim 1 in which the flat strip is a ribbon having one marginal portion flat and the other marginal portion having offset portions, whereby said marginal portions are spaced from each other when they are overlapped.

4. A machine for forming a laying drain pipe, comprising a mole plow with a knife and a mole plug on the bottom of said knife, a supply drum mounted on said mole plow for holding a roll of flexible resilient pipe forming material, the axis of said drum being parallel to the said mole plug, and a pipe forming tube vertically mounted on said plow above the point on said mole plow which is adapted to be at the ground level, said tube having a vertical portion with an oval cross section and being adapted to receive the strip of pipe forming material from said supply drum and bend it into a pipe with the edges of said strip overlapped at a portion of said tube on one side of said mole plow, said pipe forming tube having a lower and rear end extending downwardly and then curving rearwardly of said mole plow from the lower end of the oval cross section vertical portion of said pipe forming tube and having the rear end substantially aligned with said mole plug and having a cross section which is oval at the point where it joins the lower end of said vertical portion and said cross section changing to circular at its rear end, whereby the strip of pipe forming material can be passed into the vertical portion of said pipe forming tube with the edges overlapped to form an oval pipe and the thus formed pipe is transferred downwardly and rearwardly through the circular rear end and into the hole bored in the ground by the mole plug as the mole plow moves through the ground.

5. A machine as claimed in claim 4 in which the bore of said lower and rear portion is smaller in cross section than the cross section of the mole plug.

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