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None

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(54) A sheet laying device

(57) A device for laying a membrane in sheet form as a lining in a trench, comprises an elongated vertical and substantially cylindrical housing (1) pivotally connectable at one side to a vehicle for movement into and out of a position in which it depends into the trench, a spindle (2) for carrying thereon a roll of sheet to be laid, which spindle is removably rotatably mountable in the housing (1) together with a roll of sheet when thereon to extend in the direction of the longitudinal axis of the housing (1), an elongated slot-like aperture (3) extending generally parallel to the rotary axis of the spindle (2) through a side wall of the housing remote from said one side, through which aperture (3) the sheet can be fed from a roll when on the spindle (2) and guide means (4) on the housing (1) in the vicinity of the slot-like aperture (3) for directing the sheet towards one side of a trench when the housing (1) is connected to a vehicle, depending into the trench as aforesaid and drawn by the vehicle along the trench. Preferably the sheet material used is rodent resistant, impermeable to water, and/or made of plastics material.

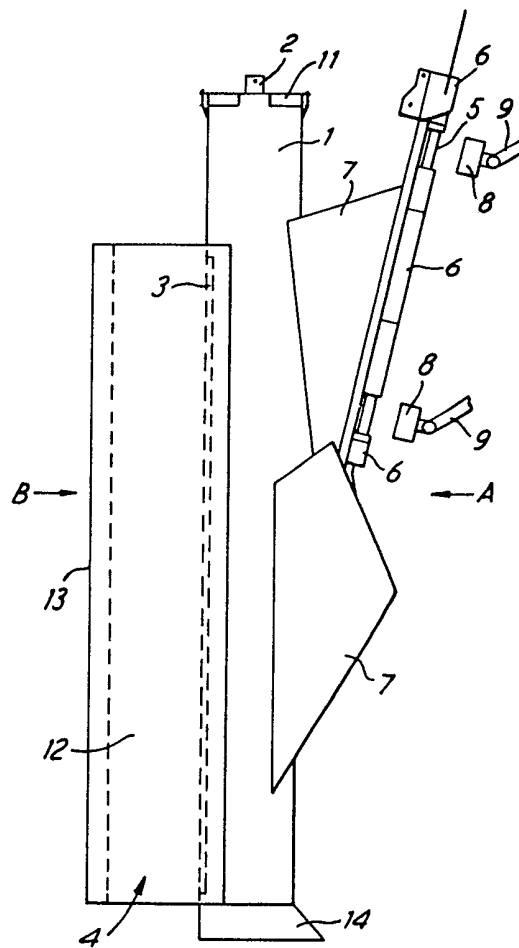


FIG. 1

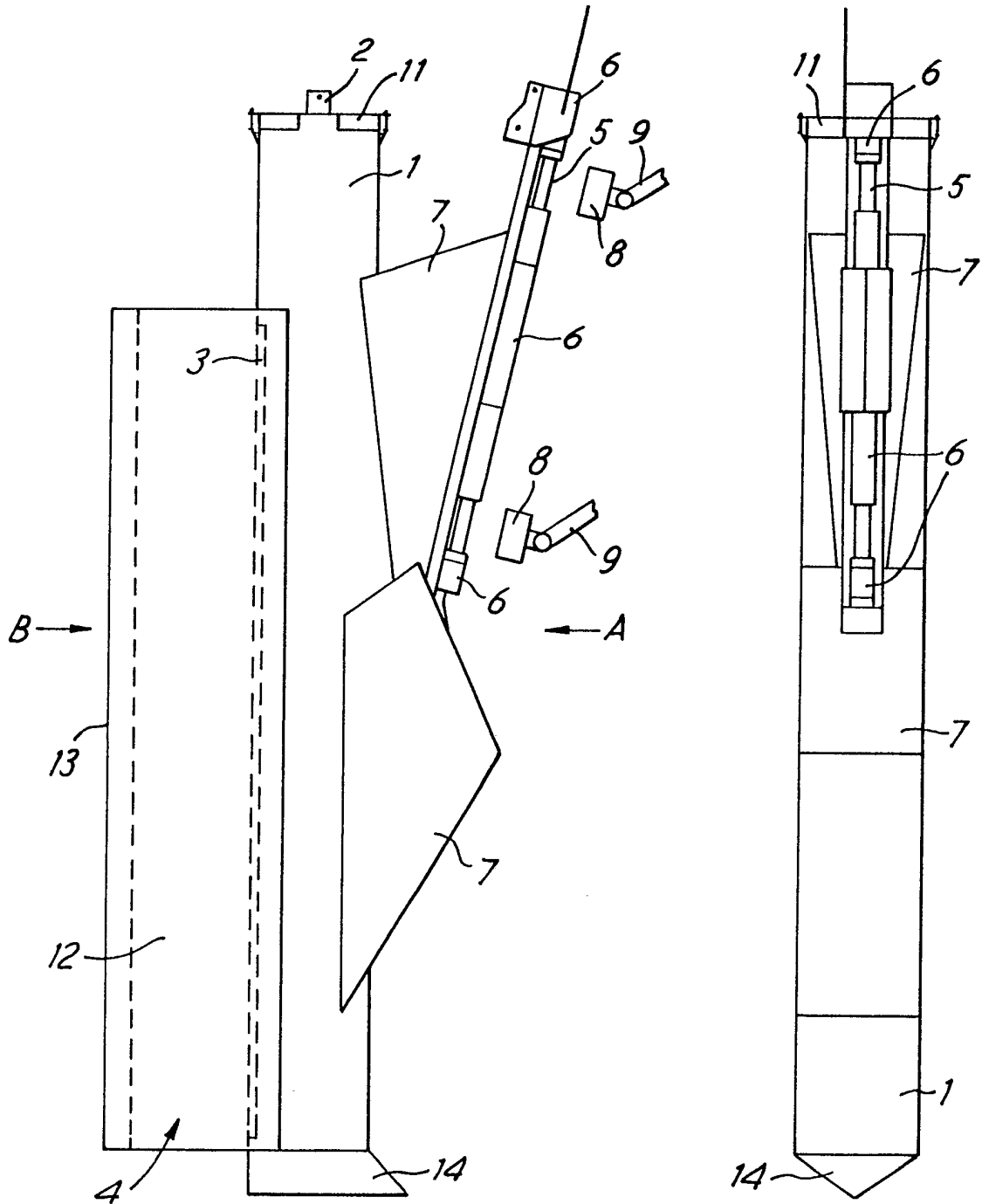
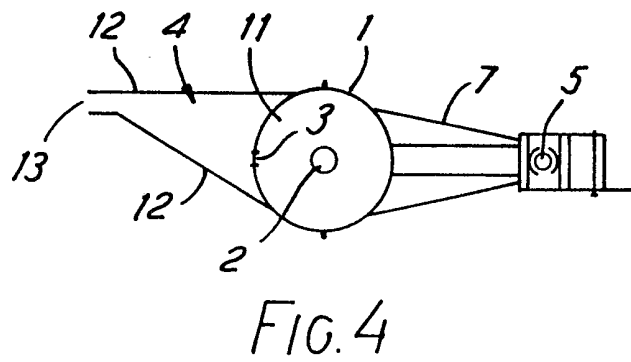
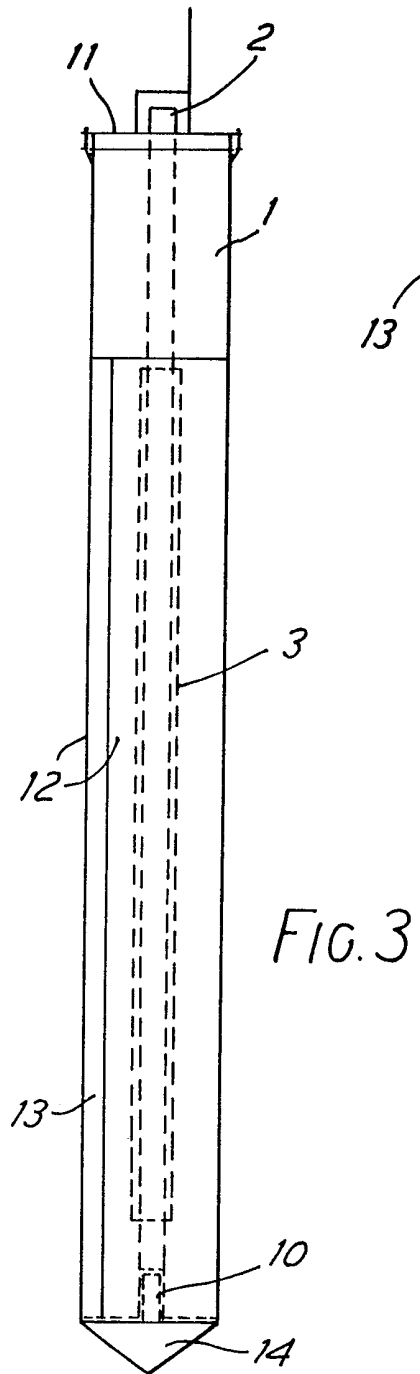


FIG. 1

FIG. 2



## SPECIFICATION

**A sheet laying device**

5 This invention relates to a sheet laying device for laying a membrane in sheet form as a lining in a trench and concerns particularly, but not exclusively, such a device for laying rodent resistant, water impermeable, plastics sheeting along a trench at a spacing from a river or reservoir bank to provide, when the trench is refilled, a substantially vertical barrier in and along the bank to water seepage and rodents burrowing underground from the river or reservoir bank.

10 It has previously been proposed to do this by means of a modified tile laying box attachable to a trenching machine, in which a roll of sheet material was attached to the top of a mole plough of the machine, above ground level. The sheet material was fed at an angle of about 45° to the vertical into the trench from the roll, alongside the plough blade and through a standard square section pile laying box fixed to the side of the blade, in which box it was turned by a roller through about 45° to lie along the trench. This has not been successful as the weight of spoil in the trench pushed by the blade against the box has tended to crush the box and is has not been possible accurately to locate the sheet material along the trench side as the material has tended to buckle and drop to the trench bottom. To counteract this tendency it has been necessary to lay the sheet being fed, manually against the desired wall of the trench until the spoil has been returned into the trench and this is dangerous and time consuming. Additionally the sheet material passing from the roll to the tile box is unprotected and easily damaged by material or obstruction thrown by a plough during trenching.

35 There is thus a need for a generally improved device for laying sheet material in a trench.

40 According to the present invention there is provided a sheet laying device for use in laying a membrane in sheet form as a lining in a trench, including an elongated substantially cylindrical housing pivotally connectable at one side to a vehicle for movement into and out of a position in which it depends into a trench to be lined with its longitudinal axis substantially vertical, a rotatable spindle for carrying thereon a roll of sheet to be laid, which spindle is removably rotatably mountable in the housing together with a roll of sheet when thereon to extend in the direction of the longitudinal axis of the housing, an elongated slot-like aperture extending generally parallel to the rotary axis of the spindle through a side wall of the housing remote from said one side, through which slot-like aperture sheet to be laid can be fed from a roll when on the spindle in the housing, and guide means on the

housing in the vicinity of the slot-like aperture for directing sheet leaving the housing through the slot-like aperture towards one side of a trench when the housing is connected to a vehicle, depending into the trench as aforesaid and drawn by the vehicle along the trench.

70 Preferably the sheet material to be used is rodent resistant.

75 Conveniently the sheet material to be used is impermeable to water.

Advantageously the sheet material to be used is made of plastics material.

80 Preferably the spindle is rotatably mountable at one end in a bearing carried in the housing in the end thereof which is lowermost in use of the device and rotatably mountable at its other end in a bearing carried on a removable cover forming the other end of the housing.

85 Advantageously the slot-like aperture is diametrically opposite in the housing to the pivotal connection side thereof and the guide means is in the form of two elongated panel-like members attached at one longitudinal edge along and to the wall of the housing one on either side of the slot-like aperture to project and converge away from the aperture so that their opposite adjacent longitudinal edges define therebetween an elongated slot, extending generally parallel to the slot-like aperture, but laterally displaced from the plane containing the slot-like aperture, spindle rotational axis and pivot connecting points, so as to be located, in use, close to one side wall of the trench being or to be lined, to feed sheet material against or adjacent to said one side wall of the trench from the spindle via the slot-like aperture.

90 Preferably the pivotal connection points are provided by means of a shaft removably housed in bearings attached to the housing to extend substantially parallel to or at an acute angle thereto, at least two tube-like sleeves being provided pivotally to fit on said shaft at spaced locations there along, with the sleeve being securable each to one end of a respective one of a pair of arms attached or attachable at their other ends to the vehicle.

105 For a better understanding of the present invention, and to show how the same may be carried into effect, reference will now be made, by way of example, to the accompanying drawings, in which:

110 *Figure 1* is a vertical side view of a device according to the invention,

120 *Figure 2* is a vertical front view of the device of Fig. 1 taken in the direction of the arrow A thereon,

125 *Figure 3* is a vertical rear view of the device of Fig. 1 taken in the direction of the arrow B thereon,

*Figure 4* is a plan view from above of the device of Figs., 1, 2 and 3.

130 As can be seen from the accompanying drawings a sheet laying device of the invention which is intended for attachment to a

trench digging vehicle, in a manner such as will be hereinafter described, to be towed thereby, basically includes an elongated substantially cylindrical housing 1, a rotatable spindle 2, an elongated slot-like aperture 3 and guide-means generally indicated at 4. These components are made in any convenient manner from any convenient material such as mild steel sheet or rod. The housing 1 by being cylindrical in form is able strongly to resist crushing side forces thereon which may be exerted against the housing side walls when the device is operatively in use in a trench by spoil material forced there against. The housing 1 is pivotally connectable at one side to a vehicle (not shown) by pivotal connection points provided by means of a shaft 5 removably housed in bearings 6 attachable to the housing 1, such as by brackets 7 to extend substantially parallel or at an acute angle thereto and at least two tube-like sleeves 8. As shown in Fig. 1 the sleeves 8 pivotally fit on the shaft 5 at spaced locations there along and are securable each to one end of the respective one of a pair of arms 9 attached or attachable at their other ends to the vehicle such as a trench digging machine, such that the device is dragged by the machine thereafter.

The device is movable by means of the shaft 5, sleeves 8 and arms 9 into and out of a position in which it depends into a trench to be lined, with the longitudinal axis of the housing 1 substantially vertical in the trench. The spindle 2 is rotatably mountable at one end in a bearing 10 carried in the housing 1 in the end thereof which is lowermost in use of the device and rotatably mountable at its other end in a bearing carried on a removable cover 11 forming the other end of the housing 1.

A roll of sheet material to be laid, preferably rodent resistant and/or water impermeable material such as sheet plastics material is mounted on the spindle 2 in the housing 1. The spindle 2 extends in the direction of the longitudinal axis of the housing.

The slot-like aperture 3 extends generally parallel to the rotary axis of the spindle 2 and longitudinal axis of the housing 1 through a side wall of the housing 1 remote from the side carrying the pivot connection points formed by the sleeves 8 and shaft 5. Preferably, as illustrated, the aperture 3 is diametrically opposite in the housing 1 to the pivotal connection side thereof and sheet material to be laid in the trench can be fed from the roll on the spindle 2 in the housing 1 through the aperture 3. Thus in this device the sheet material to be laid is contained in the housing 1 prior to being laid and is thus protected against damage by spoil or other obstructions disturbed or created by the plough during trenching.

The guide means 4 provided on the housing

1 in the vicinity of the aperture 3 has the effect of directing the sheet leaving the housing through the aperture 3 towards one side of a trench when the housing is connected to a vehicle, depending into the trench and drawn by the vehicle along the trench. To this end the guide means is in the form of two elongated panel-like members 12 attached at one longitudinal edge along and to the wall of the housing 1, one on either side of the aperture 3 to project and converge away from the aperture 3 so that their opposite adjacent longitudinal edges defined therebetween an elongated slot 13. The slot 13 extends generally parallel to the aperture 3 but it laterally displaced from the plane containing the aperture 3, rotational axis of the spindle 2 and pivot connection points on the shaft 5. In this way the slot 13 is located, in use, close to one side wall of the trench being or to be lined to feed sheet material against or adjacent to said one side wall of the trench from the spindle 2 via the aperture 3.

Thus in use of the device the roll of sheet material to be fed along the trench is contained in the housing 1, and protected thereby. The housing 1 depends substantially vertically into the trench and by virtue of its cylindrical construction is very resistant to crushing by pressures applied thereto in the trench by spoil material. Additionally the guide means provided by the members 12 direct the sheet material to a side wall of the trench, conveniently to the landward side wall of the trench with respect to the river or reservoir. In this way it is not necessary for the sheet to be manually applied against the trench wall with consequent improvement in safety and reliability. If necessary at the commencement of a lining operation the initial end of the sheet material being laid can be held manually against the trench wall for fixing purposes or pinned thereto in any convenient manner. Subsequently the sheet material is laid automatically by movement of the trenching machine.

Advantageously the bottom of the housing 1 is provided with a V-shaped plate 14 to assist in movement of the device along the trench. A row of sheet material approximately 40 metres long can be laid in a trench to 3.5 metres in depth and by appropriate design of the device a width of sheet material of up to at least 3.5 metres can be accommodated and laid. After lining the trench is back-filled with excavated soil or spoil and compacted using a vibrating stamper. The sheet material laid is preferably high-density polythene sheeting and provides a rodent resistant barrier against rodents burrowing through and from the river bank and thus undermining the latter and also provides a barrier resisting seepage of water from the river or reservoir. Preferably the material utilized is approximately 1.6 mm thick as this is particularly resistant to rodents and sufficiently strong to have a required de-

gree of strength when standing on edge prior to filling the trench. Sheeting less than about 1 mm thick does not have the required rigidity and sheeting greater than 1.6 mm in thickness is unnecessarily expensive. In effect the sheet material being laid is dragged off the roll by movement of the vehicle along the trench when the leading end of the sheet material is secured to the side wall of trench. Continuing movement of vehicle along the trench causes the material to be unwound from the roll by rotating the spindle 2. If necessary the spindle 2 could be positively driven.

#### CLAIMS

- 15 1. A sheet laying device for use in laying a membrane in sheet form as a lining in a trench, including an elongated substantially cylindrical housing pivotally connectable at one side to a vehicle for movement into and out of a position in which it depends into a trench to be lined with its longitudinal axis substantially vertical, a rotatable spindle for carrying thereon a roll of sheet to be laid, which spindle is removably rotatably mountable in the housing together with a roll of sheet when thereon to extend in the direction of the longitudinal axis of the housing, an elongated slot-like aperture extending generally parallel to the rotary axis of the spindle through a side wall of the housing remote from said one side, through which slot-like aperture sheet to be laid can be fed from a roll when on the spindle in the housing, and guide means on the housing in the vicinity of the slot-like aperture for directing sheet leaving the housing through the slot-like aperture towards one side of a trench when the housing is connected to a vehicle, depending into the trench as aforesaid and drawn by the vehicle along the trench.
- 20 2. A sheet laying device according to claim 1, wherein the sheet material to be used is rodent resistant.
- 25 3. A sheet laying device according to any one of claims 1 to 2, wherein the sheet material to be used is impermeable to water.
- 30 4. A sheet laying device according to any one of claims 1 to 3, wherein the sheet material to be used is made of plastics material.
- 35 5. A sheet laying device according to any one of claims 1 to 4, wherein the spindle is rotatably mountable at one end in a bearing carried in the housing in the end thereof which is lowermost in use of the device and rotatably mountable at its other end in a bearing carried on a removable cover forming the other end of the housing.
- 40 6. A sheet laying device according to any one of claims 1 to 5, wherein the slot-like aperture is diametrically opposite in the housing to the pivotal connection side thereof and the guide means is in the form of two elongated panel-like members attached at one longitudinal edge along and to the wall of the housing one on either side of the slot-like
- 45 aperture to project and converge away from the aperture so that their opposite adjacent longitudinal edges define therebetween an elongated slot, extending generally parallel to the slot-like aperture, but laterally displaced from the plane containing the slot-like aperture, spindle rotational axis and pivot connecting points, so as to be located, in use, close to one side wall of the trench being or to be lined, to feed sheet material against or adjacent to said one side wall of the trench from the spindle via the slot-like aperture.
- 50 7. A sheet laying device according to any one of claims 1 to 6, wherein the pivotal connection points are provided by means of a shaft removably housed in bearings attached to the housing to extend substantially parallel thereto or at an acute angle thereto, at least two tube-like sleeves being provided pivotally to fit on said shaft at spaced locations there along, with the sleeves being securable each to one end of a respective one of a pair of arms attached or attachable at their other ends to the vehicle.
- 55 8. A sheet laying device for use in laying a membrane in sheet form as a lining in a trench, substantially as hereinbefore described with reference to the accompanying drawings.

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