

PATENT SPECIFICATION

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(54) LINING APPARATUS FOR PROTECTION OF TRENCHES

(71) I, JOSEF KRINGS, of D5138 Heinsberg, Oberbruch, Hans-Boeckler Strasse, 23, Germany; a German National, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to lining apparatus for the protection of trenches for utilities such as pipes and cables; consisting of lining panels which can be inserted in vertical slides on the edge of the trench, the panels being capable of being pressed by adjustable expanding devices against the wall of the trench.

The dismantling of the lining apparatus forms a substantial part of the work entailed in lining the trench, i.e. The extraction and taking apart of the lining panels and slides, after or during the filling of the trench. As the lining apparatus have to be reused many times, they must be handled with appropriate care. In order to avoid accidents, the lining panels must not be extracted until there is sufficient certainty that the walls of the trench will not collapse. This in turn presupposes a sufficient consolidated filling of the trench.

The lining panels are of course, during extraction, subjected to considerable frictional forces so that extracting devices of considerable strength are required. Since the gripping locations for the extracting devices on the lining panels are subject to a considerable tension load, it is desirable to lighten the extraction work and substantially reduce the traction forces which need to be applied to the panels.

An object of this invention is to provide lining apparatus such that it permits comparatively light dismantling work.

According to the invention there is provided a lining apparatus for the protection of trenches, comprising lining panels which are insertable in vertical slides on the side of the trench, and capable of being pressed against the walls of the trench

by expanding devices, wherein each lining panel consists of two component plates connected together loosely and detachably in face-to-face relationship, the component plates being guided together in slides, and the peripheral dimensions of the component plates being equal to those of the lining panel which may comprise.

The construction according to the invention has the advantage that the component plate, which upon being driven into the soil is worn the most, can be replaced more cheaply than if, as previously, a complete lining panel has to be exchanged.

In order to be certain that the lining panel, consisting of two component plates is inserted uniformly into the ground, according to a preferred construction of the invention, it is advantageous if one of the two component plates engages under the other plate by means of a bracket. By this means it is ensured that the component plates can then be moved relative to one another only upon extraction, and not during pressing into the ground. At the same time there is thus obviated any need for sheer-resistant screws which would be needed to connect the component plates detachably to each other. In addition, it is possible to place two lining panels on top of one another in a simple manner if it is required to protect particularly deep trenches.

In order to render possible easy use of the lining panel, it is advantageously arranged that one of the two component plates is connected to a wedge-shaped panel foot part. This panel foot part may be connected firmly or detachably to one of the component plates or to a bracket.

In order to reduce to a minimum frictional forces between the two component plates, there are advantageously friction reducing means disposed between the two component plates.

The friction reducing means may consist of perpendicular slide bars connected to at least one of the component plates. Both

component plates are advantageously connected to slide bars which are disposed to slide on one another.

It is furthermore of advantage if at least the sliding faces of one component plate has a plastics coating.

The invention will now be further described by way of example, with reference to the accompanying drawings, wherein:—

Fig. 1 is a partial perspective view of a lining panel according to the invention;

Fig. 2 is a perpendicular longitudinal sectional view of a second embodiment of lining panel, corresponding to that on line II—II of Fig. 1; and

Figs. 3 to 5 are horizontal sectional views of different embodiments of lining panels which are guided in perpendicular sliding carriers.

Fig. 1 shows in perspective the front part of a lining panel 1 which is formed as a so-called edge supporting plate. This lining panel 1 consists of two component plates 2, 3, disposed in face-to-face relationship, and a wedge-shaped foot panel part 4 connected to the component plate 2. The end of the lining panel 1 consists of flanges 5 and 6 which are attached to the component plates 2 and 3 respectively, and are rigidly guided in a perpendicular carrier (not shown). Between the component plates 2, 3 there is arranged a gap 7 in which are disposed some perpendicular guide bars 8 which are firmly connected to one of the component plates 2 or 3 respectively. By means of these guide bars the faces of the two single plates 2 and 3 moveable on one another are reduced to a minimum.

Fig. 2 shows a lining plate similar to that of Fig. 1 in a perpendicular longitudinal section, and with this, no gap 7 is arranged between the component plates 2 and 3, nor are there guide bars 8. The drawing shows that the outer component plate 2 (that is, the component plate which is placed directly at the top of the trench) is at its lower end received in a plate 9 which also acts at the same time as a support bracket for the component plate 3. By means of this plate 9 it is possible to introduce the two component plates together and without material movement into the ground.

Each component plate consists in known manner of a frame formed from profiled supports 10 and 11 respectively, and cover plates 12 and 13 respectively fixed thereon. Other types of lining panel are also feasible within the scope of the invention.

A lining panel according to Fig. 2 is shown in horizontal cross-section in Fig. 3. The flanges 5, 6 are guided to lock in a generally T-sectioned channel 15 in a perpendicularly slide 14 which has, directed towards the inside of the trench, a likewise slotted hollow cross-section strip 16 to receive

shoes on expanding devices for forcing the lining plates against the trench wall.

Fig. 4 shows a modified construction of a lining panel. Herein, a gap 7 as in the plate of Fig. 1 is provided and there are sliding bars 8 provided and fixed to the component plate 2. On both side of the sliding bars 8 guide bars 17 are fixed on the component plate 3 so that the two component plates 2, and 3 are guided and interlocked in the perpendicular direction.

The lining panel according to Fig. 5 differs from that of Fig. 4 in that the flange 6 of the inner component plate 3 engages around the flange 5 of the component plate 2. This construction could be of course reversed so that the flange 5 engages around the flange 6.

In practical use, first of all the inner component plate 3 is extracted, and is guided by sliding over the component plate 2 being subjected only to the frictional forces of the filling in the trench. After this component plate 3 has been extracted, there is no longer any difficulty in extracting the component plate 2 remaining in the lining.

In order to bring about further reduction in the frictional forces between the two component plates, 2, 3, it may be expedient for a plastics coating to be provided on at least one of the sliding faces of the two component plates. A plastics coating may also be provided on the outer walls of the component plates 2, 3.

WHAT I CLAIM IS:—

1. Lining apparatus for the protection of trenches, comprising lining panels which are insertable in vertical slides on the side of the trench, and capable of being pressed against the walls of the trench by expanding devices, wherein each lining panel consists of two component plates connected together loosely and detachably, in face to face relationship, the component plates being guided together in slides, and the peripheral dimensions of the component plates being equal to those of the unitary lining panel which they comprise.

2. Lining apparatus according to Claim 1, wherein one of the two component plates engages the other by means of a bracket.

3. Lining apparatus according to either Claim 1 or 2, wherein one of the component plates is connected to a pointed plate foot part.

4. Lining apparatus according to any one of Claims 1 to 3 wherein friction reducing means are disposed between the two component plates.

5. Lining apparatus according to Claim 4 wherein the friction reducing means comprise perpendicular sliding bars connected to at least one of the component plates.



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3. Lining apparatus according to either Claim 1 or 2, wherein one of the component plates is connected to a pointed plate foot part.

4. Lining apparatus according to any one of Claims 1 to 3 wherein friction reducing means are disposed between the two component plates.

5. Lining apparatus according to Claim 4 wherein the friction reducing means comprise perpendicular sliding bars connected to at least one of the component plates.



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6. Lining apparatus according to Claim 5 wherein both component plates are connected to respective ones of the sliding bars and to guide bars respectively guided in one another.

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7. Lining apparatus according to any one of Claims 1 to 6 wherein at least the face of at least one of the component plates facing the other component plate is coated with a plastics material.

8. Lining apparatus for the protection of trenches, substantially as herein before described with reference to and as illustrated in any figure of the accompanying drawings. 15

W. REID SHARP & CO.,
10 Portland Terrace,
Newcastle upon Tyne NE2 1QZ.
Chartered Patent Agents.

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