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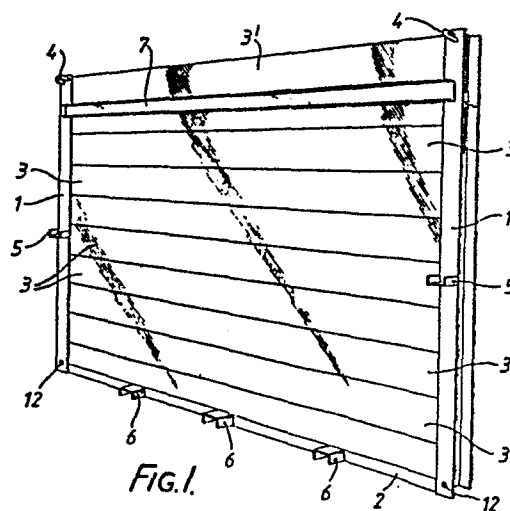
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54 **Securing element for trenches.**

57 A securing element for preventing the side walls of a trench from caving in is built by the aid of a U-shaped frame (1, 2) having flanges facing inwards to hold wood members (3) in the shape of planks, squares or the like fitting between said flanges in place. Said frame is provided with brackets (5-6) and a stiffening U-profile 7 welded to said frame and forming holding means for the ends of bracings extending across the trench between two securing elements. Brackets (6) at the lower edge of securing element (1, 2) are open downwards, so that said securing element can be pulled free from the cross bracings when said trench is almost filled up. Said securing element is provided with lugs (4) for hoisting, and several elements may be locked together with a connecting member (8 - 9 - 10).



Securing element for trenches

The present invention relates to a securing element for trenches. Rising demands to security in connection with all kinds of work also imply demands of securing trenches to ensure the safety of operators carrying out excavation and various tasks in connection with laying conduits, pipes, etc. Also, when nobody is hurt nor equipment is damaged it is important to avoid the extra work of excavating a caved-in trench.

Stiffening members and cover plates were previously proposed for stiffening trenches, e.g. as disclosed in DOS 29 10 259, US-PS No. 4 019 328, and in two published Norwegian Patent Applications Nos. 80 3224 and 83 4457.

Said known approaches, however, have a series of disadvantages and are, among others, so complicated and, thus, expensive in production that it might be tempting in many cases to omit the necessary protection when excavating trenches with the resulting hazards.

Another disadvantage of several of the known approaches is that cross bracings between boards or cover plates on both sides of the trench must be removed before the trench can be filled up again after piping or cables have been placed. Removal of such bracings can be a dangerous task. Additionally, known boards and cover plates are difficult to connect in the longitudinal direction as well as vertically, and in many cases it may be necessary to remove boards or plates before the trench can be filled up. Securing elements of the kind discusses here are subjected to great loads and it is a considerable disadvantage of the known designs that damages easily become permanent and difficult to mend.

It is, thus, an object of the present invention to provide a securing element that is inexpensive in production, which is achieved by having said element constructed in standard dimensions of channel iron and standard dimensions of wood material. Said wood material forms the main panels of the securing element, and if large or small portions of said panes are damaged the securing element can easily be mended with material

present at most buildings sites. By using merchantable qualities of standardised channel iron, damaged steel members can also be repaired or exchanged by professional welding operations.

Due to the fact that the securing element is built of ordinary channel iron, e.g. H profiles, there are many possibilities of connecting the securing elements in the longitudinal direction as well as vertically. By arranging separate holding means for cross bracings between elements on opposite sides of the trench the task of adapting the cross bracings made of wood is simplified, and when at least the holding means for cross bracings at the lower edge of said elements are designed to permit the securing element to be pulled free of them without removing said holding means it is possible to avoid carrying out work at the bottom of the trench before it is filled up, since the cross bracings remain in the bottom of the trench when said securing elements are lifted up, e.g. by the aid of lifting lugs provided in the upper corners for this object.

The invention is characterized by the features stated in the claims and it will be disclosed in more detail with reference to the drawings, where

Figure 1 shows a securing element according to the invention in a side elevation,

Figure 2 shows the same as Figure 1 from above,

Figure 3 shows the securing element in an end view, and

Figure 4 is a perspective view of an embodiment of a connecting member that may be used for joining four securing elements.

In the embodiment shown in the drawing the securing element according to the invention comprises a U-shaped frame having upright H-profiles 1 on the sides and a U-profile at the bottom. In the channels formed in profiles 1 and 2 wood members 3 in the shape of thick planks, squares, or the like fitting between the flanges of the profiles 1, 2 are inserted. The wood members may be held together in any suitable manner, e.g. by three

through bolts that are not shown, or in some other manner, e. g. by securing the uppermost member 3' to the frame member 1 by screws or nails. In the upper frame corners lugs 4 are provided for lifting when the securing element is to be placed in a trench. Two opposite securing elements each on one side of an excavated trench are usually connected by cross bracings. On the side of the frame facing the trench holding means for said cross bracings are provided in the shape of short pieces of channel iron 5, 6 into which the ends of cross bracings are fitted. The cross bracings are made of wood cut to a length adapted to the width of the trench. For stiffening the frame 1, 2 it may be provided on top with a longitudinal U-profile welded to said frame, where the ends of cross bracings will also fit and may be secured, e.g. by the aid of nail holes that may be provided in U-profiles 7 in an equally spaced manner. One of the most important features of the invention is that the U-profile pieces forming the holding means 6 for stiffening braces lowermost on the frame are open downwards. When work is completed in a trench filling it up may begin without somebody, perhaps risking his life, must go down into the trench that may be several meters deep, in order to remove the cross bracings secured in the holding means 6. In stead, it is possible to fill up the trench, if desired up to the strengthened U-profil 7, and then the securing elements may be lifted by a crane, said elements being simply pulled up from the cross bracings held in holding means 6 by the aid of a mail. The cross bracings, as mentioned consisting of inexpensive wood material, are then left in the trench.

Several securing elements according to the invention can be connected in a simple manner by the aid of a connecting member as shown in Figure 4. Said connecting member is shown in a much larger scale than Figures 1 - 3. This connecting member comprises a piece of an H-profile 8 which is, outside each flange provided with a plate 9 welded to H-profile 8 by the aid of a web 10. The width of H-profile flanges 8' is selected so as to fit between the flanges of H-profile 1 of the frame. Approximately half of a plate 9 is inserted between the flanges of H-profile 1 at the end of wood member 3 - 3'. A connect-

ing member is inserted from below at both lower corners of the securing element in Figure 1. When the connecting member is in place a hole 11 will be flush with a hole 12 in said securing element and a suitable bolt will lock said connecting member to the securing element, which can then be hoisted into the trench. The next securing element is guided so that the upper half of opposite plate 9 slides in between H-profile 1 and wood member 3 - 3' in the next securing element to be connected with the first one. On top said securing elements are locked together by corresponding connecting members that are there kept in place due to their weight. With the shown embodiment of the connecting member securing elements may also be stapled vertically. The shown embodiment only serves to illustrate the invention. Other embodiments are contemplated within the scope of the invention, e.g. the holding means for the ends of cross bracings may be modified. It is, however, important that cross bracings along the lower edge of the securing element can easily be released from the securing element when it is hoisted from the trench so that there is no need to send people down to the bottom of the trench to release the cross bracings which was the case with previously known boards and plates.

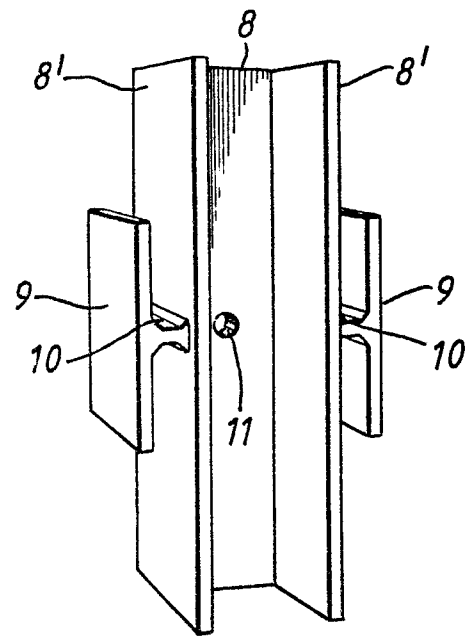
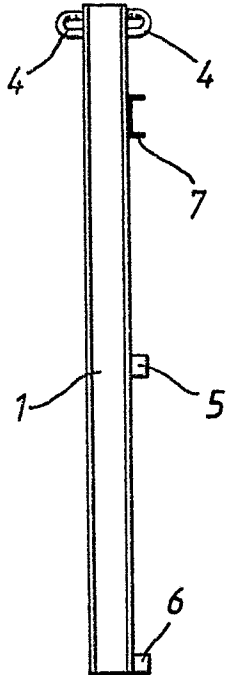
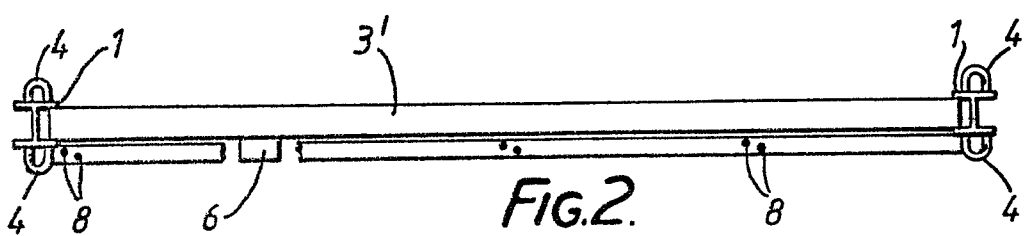
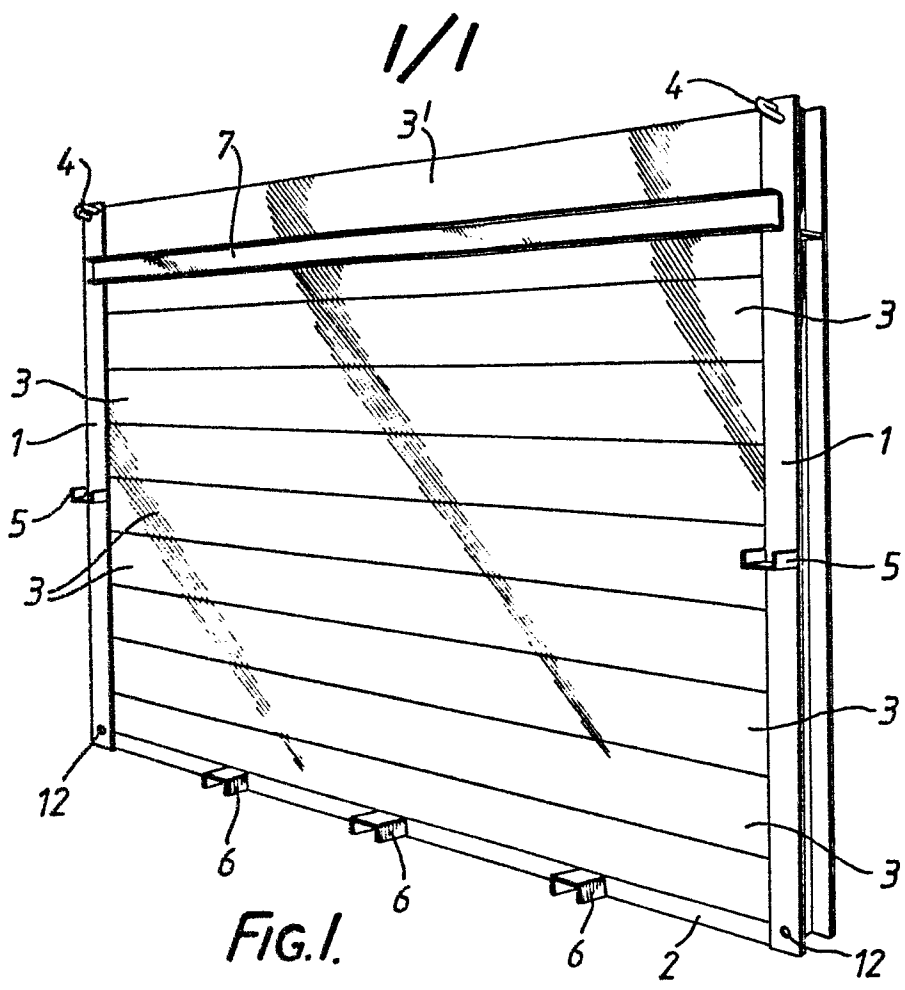
CLAIMS:

1. A securing element for trenches,
c h a r a c t e r i z e d i n that it comprises a U-shaped steel frame having flanges facing inwards for inserting and holding wood material forming the exchangeable supporting surface.
2. A securing element as defined in claim 1,
c h a r a c t e r i z e d i n that the components of said U-shaped frame are iron H-profiles, where one of the open sides of said H-profile face inwards toward the U-shape of the frame and the other open side faces outwards.
3. A securing element as defined in claim 1,
c h a r a c t e r i z e d i n a number of projecting brackets for securing the ends of bracings across a trench.
4. A securing element as defined in claim 3,
c h a r a c t e r i z e d i n that said brackets are U-shaped with a shape adapted to the ends of said bracings.
5. A securing element as defined in claim 4,
c h a r a c t e r i z e d i n that brackets at the lower edge of said element have the opening of the U-shape facing downwards, so that the bracings can slide out of said brackets and stay in the trench when said element is hoisted up.
6. A securing element as defined in claims 1 - 4,
c h a r a c t e r i z e d i n that the front of said frame is stiffened by a U-profile extending along the length of said element.
7. A securing element as defined in claim 6,
c h a r a c t e r i z e d i n that the open side of said U-profile faces outwards and has holding means for the cross bracings.

8. A securing element as defined in claim 7, characterized in that said holding means are shaped as through holes for nails or other securing members.

9. A securing element as defined in the preceding claims, characterized in that they are adapted for being connected vertically and/or in the longitudinal direction by the aid of suitable connecting members.

10. A securing element as defined in one or several of the preceding claims, characterized in that the wood material consists of a plurality of lengths of wood members of suitable dimensions and, if desired, with through holes for bolts holding the wood members together.





European Patent
Office

EUROPEAN SEARCH REPORT

0202207

Application number

EP 86 85 0124

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 4)
X	US-A-1 644 288 (STREHLOW) * Page 2, lines 24-37, 55-60, 69-74, 97-106; figures 1-7 *	1, 2, 10	E 02 D 17/08
X	US-A- 841 773 (FITZGERALD) * Claims 1-12; figures *	1-3	
A	DE-A-2 021 928 (KRINGS) * Page 4, paragraphs 5, 7; page 5, paragraph 3; figures 1, 5 *	1-4, 9, 10	
A	US-A-3 710 578 (TAMOTSU INOUE) * Column 2, lines 11-47; figure 1 *	1, 2, 6	
A	DE-A-2 651 590 (BRAUN) * Page 15, paragraph 4; figure 3 *	1, 2, 6	TECHNICAL FIELDS SEARCHED (Int. Cl. 4) E 02 D
A	GB-A-2 053 314 (KANKYO KIZAI KAISHA) * Page 3, lines 2-24; figures 2, 7, 8 *	3, 5	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 31-07-1986	Examiner RUYMBEKE L.G.M.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			



DOCUMENTS CONSIDERED TO BE RELEVANT			Page 2
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 4)
A	CH-A- 160 116 (HUNZIKER) * Page 1, right-hand column, lines 14-23; page 2, right-hand column, lines 1-15; figures 1-4 * -----	6,7,9	
			TECHNICAL FIELDS SEARCHED (Int. Cl. 4)
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 31-07-1986	Examiner RUYMBEKE L.G.M.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			