

PATENT SPECIFICATION

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(54) GUIDE HEAD FOR A BRACING STRUT OF A TRENCH SHORING DEVICE

(71) I, JOSEF KRINGS, of Hans-Böckler-Strasse 23, Oberbruch, 5138 Heinsberg, 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 in general to new and useful improvements in trench shoring devices and more particularly to a guide head for a bracing strut of such a device having supporting posts of a slotted box construction. There has been previously developed a trench shoring device in which superposed bracing struts are provided at their ends with dumb-bell type heads which are adjustable in vertical supporting posts of a box construction and wherein each post has a slotted wall facing into a trench in which the device is being used. In such a device it is also suggested that the two superposed bracing struts be connected to each other.

It has been found that the guiding heads of the prior bracing strut arrangements tend to become twisted or distorted, especially when they are connected to each other in pairs. In addition to this, it has been found that there is required relatively accurate guidance of the heads in the supporting posts which necessitates a special construction of the supporting posts. Even with this arrangement, extensive fitting and/or adjustment of the guiding heads with respect to the supporting posts is required. Further, the unhindered access of soil to the guiding posts leads to clogging of the guiding track and to jamming of the guiding heads.

An object of this invention is to design, in view of the deficiencies of the above-discussed prior art, a guiding head which eliminates the described disadvantages and makes possible easy and accurate movement of the guiding heads of the bracing struts.

The invention provides a guide head for a bracing strut of a trench shoring device of the type including a support post having a slotted wall with inner and outer surfaces, said guide head comprising a head member, at least two pairs of inner rollers carried by said member, said pairs of inner rollers being spaced longitudinally of said head member and the rollers of each pair being transversely spaced, support bracket means carried by said head member for projection through the slotted wall of the post, at least one pair of transversely spaced outer rollers carried by said support bracket means in spaced relation to said inner rollers, and at least one support element means disposed generally in alignment with such support bracket means for projection through the slotted wall and attaching a bracing strut to said head member.

The head member may also be braced relative to the supporting post by further rollers which engage either a wall or flange of the supporting post opposite to the slotted wall or on opposite sides of the slotted wall.

It is also preferable to provide means for adjusting the relative positions of the inner and outer rollers with a preferred adjusting means including the pivotal mounting of the support brackets at one end and the adjustable positioning of the other end of each support bracket by means of an adjusting screw.

A further characteristic of the invention is that the width of each support bracket is generally the same as that of the slot of the supporting post so as to make possible greater accuracy of guidance transversely of the post.

It is a further feature of the invention that the pairs of rollers moving along the inner and outer surface of the slotted wall are spaced longitudinally of the head member and are longitudinally offset from each other.

In order to prevent the slotted wall from becoming distorted due to the forces transmitted thereto, in accordance with a further

form of the invention, at least one bracing roller is provided for running along that wall of the supporting post which is disposed opposite to the slotted wall, with the bracing roller being carried by the head member.

At this time it is pointed out that it is preferable to have at least two of the bracing rollers carried on the head member in longitudinally spaced relation and the bracing rollers may be arranged in pairs projecting laterally from the head member and/or singly in recesses in that face of the head member remote from the slotted wall.

In order to prevent excessive stresses, it is preferable that the bracing rollers are resiliently mounted for the movement in the direction of transmission of compressive forces acting on the bracing strut, or to make the bracing rollers of a resilient material. It is also feasible to so resiliently adjustably mount others of the rollers or to make them of a resilient material.

With the above and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following detailed description, the appended claims and the several views illustrated by way of example in the accompanying drawings in which:—

Figure 1 is a fragmentary vertical sectional view of part of a trench shoring device showing a guide head thereof constructed in accordance with this invention taken along the line I—I of Figure 2;

Figure 2 is a fragmentary horizontal sectional view taken along line II—II of Figure 1;

Figure 3 is a fragmentary vertical sectional view similar to Figure 1 of a modified form of guide head.

Figure 4 is a fragmentary vertical sectional view of a part of a modified form of guide head and is taken along line IV—IV of Figure 5;

Figure 5 is a fragmentary horizontal sectional view taken along line V—V of Figure 4;

Figure 6 is a fragmentary horizontal sectional view similar to Figure 5 and shows another form of guide head;

Figure 7 is a fragmentary vertical sectional view similar to Figure 4 and shows another form of guide head;

Figure 8 is a fragmentary vertical sectional view similar to Figure 1 taken along line VIII—VIII of Figure 9 and shows another form of the invention.

Figure 9 is a fragmentary horizontal sectional view taken along line IX—IX of Figure 8;

Figure 10 is a fragmentary horizontal sectional view similar to Figure 9 and shows a form of the invention similar to that of Figure 6;

Figure 11 is a fragmentary vertical sec-

tional view similar to Figure 8 and shows a form of the invention similar to that of Figure 7.

Referring now to the drawings in detail, it will be seen that there is illustrated a portion of a trench shoring device. With particular reference to Figures 1 and 2, it will be seen that the device includes a supporting post 1 which is of a combination H and box cross section so as to provide oppositely facing recesses opening transversely of the post for receiving end portions of shoring panels 2. In the box portion of the supporting post 1, there is positioned a guiding head which has extending therefrom generally normal to the shoring panels 2 bracing struts 4.

It is to be understood that in the construction of the trench shoring device, there will be a pair of the posts 1 arranged in a trench at opposite sides of the trench. The pairs of posts are located at the ends of the panels 2. Also, supporting posts may be arranged intermediate the ends of the panels 2. As previously described, each supporting post 1 is of a combination H- and box shaped cross section, and more specifically includes an H-shaped holder 5 receiving the opposite ends of the shoring panels 2, and a slotted box portion 6 for receiving the guiding heads of the bracing struts 4, as is best shown in Figure 2. It is to be understood that the H-shaped holder 5 may be omitted from the post 1 and a supporting post formed by the box shaped portion 6 may be utilized intermediate the ends of a panel 2.

The box shaped portion 6 of the supporting post 1 has mounted therein a head member 3 which has bilaterally distributed over its length a number of pairs of rollers 7 which will be considered inner rollers. The box shaped portion 6 includes an inner wall having a vertical slot therein defining a pair of flanges 10. The inner rollers 7 roll along the inner surface 8 of the flanges 10. The guiding head also includes several support brackets 11 which project through the slot 9 and carry outer pairs of rollers 12 which move along the outer surface 13 of the flanges 10. The support brackets 11 are so mounted so that the pairs of outer rollers 12 carried by them can be adjusted relative to the rollers 7. For this purpose, the support brackets 11 are supported relative to the head member 3 for pivoting about an axis extending transversely of the head member 3 and at the opposite end are adjustably connected to the head member 3 by means of adjusting screws 14.

At this time it is pointed out that the pairs of inner rollers 7 and the pairs of outer rollers 12 are spaced longitudinally of the head member 3 and are longitudinally offset with respect to one another.

The head member 3 is further provided with laterally projecting lugs 15 to which can be releasably attached the bracing struts 4.

which are preferably longitudinally adjustable such as by way of counter-threaded components.

Referring now to Figures 4 and 5, it will be seen that the head member 3 is provided with a elongated recess 21 in the inner face thereof with the recess 21 facing an inner wall 20 of the supporting post opposite to the slotted wall 10. It is to be noted that the recess 21 is substantially in alignment with the center of the H-shaped holder 5, and there is mounted within the slot 21 at least one, and preferably 2, rollers 18. The rollers 18 function as bracing rollers and directly transmit loads from the struts 4 through the head member 3 to the inner wall 20 of the post 1.

Although the slot 21 has been illustrated as extending only a portion of the length of the head member 3, it is to be understood that the head member 3 could be of a channel construction and the slot 21 would then extend the full length thereof.

It is to be understood that the constructional details of the trench shoring device shown in Figures 4 and 5 are the same as those of Figure 1 and 2 except for the addition of the bracing rollers 18.

Referring now to Figure 6, which illustrates a modification of the arrangement of Figures 4 and 5, it will be seen that the head member 3 may be provided with bracing rollers 19 arranged in pairs of opposite sides thereof. These bracing rollers also engage the wall 20 of the post 1 and directly apply a compressive force from the struts 4 through the head member 3 to the inner wall 20 of the post 1.

Referring is now made to Figures 8 and 9 wherein the trench shoring device of Figures 4 and 5 has been modified so as to include at least one pair of guide rollers 22 being mounted on the head member 3 and projecting from opposite sides thereof and engaging side walls 25 of the box shaped portion 6 of the post 1. Each guide roller 22 is mounted on a shaft 23 which, in turn, is carried by a bearing member 24 secured to a respective side of the head member 3.

Referring now to Figure 10, it will be seen that there is illustrated still a further form of trench shoring device wherein the head member 3 is provided with the guiding rollers 22, but the bracing rollers 18 have been eliminated. Essentially Figure 10 illustrates a modification of the trench shoring device of Figures 1 and 2 with the addition of the guide rollers 22.

Reference is now made to Figures 3, 7 and 11 wherein modifications of the trench shoring devices of Figures 1, 4 and 8, respectively, are illustrated. It is to be noted that in lieu of the individual support brackets 11 for each pair of further rollers 12, the pairs of further rollers 12 are carried by a single

piece bar 16 which is mounted on a pair of threaded members 17 which are carried by the head member 3. Each threaded member 17 has associated therewith a nut and thus by adjusting the nuts carried by the threaded member 17, the bar 16 may be adjusted with respect to the head member 3 and thus adjust the spacing between the rollers 7 and 12.

In order to prevent excess stresses within the guide head, the bracing rollers 18, 19 and/or the guide rollers 7, 12 and/or the guide rollers 22 can be formed wholly or partially of resilient material. On the other hand, these rollers can be supported in a resilient manner. A typical resilient mounting of the rollers may be in respect of the bracing rollers 18 which are mounted on an axle which is slidably mounted within a lateral slot formed in the head member 3 on opposite sides of the slot 21 (Fig. 9). In each slot there is a spring engaging the axle and urging the bracing roller 18 out of the head member 3. Other resilient mountings may be provided.

It is to be understood that the opposite ends of the bracing struts 4 are carried by guiding heads and that two of the bracing struts, together with two of the guiding heads, form a rigid frame which may be displaced vertically relative to a pair of opposing posts 1 without changing the geometry of the trench structure.

WHAT I CLAIM IS:—

1. A guide head for a bracing strut of a trench shoring device of the type including a support post having a slotted wall with inner and outer surfaces, said guide head comprising a head member, at least two pairs of inner rollers carried by said member, said pairs of inner rollers being spaced longitudinally of said head member and the rollers of each pair being transversely spaced, support bracket means carried by said head member for projection through the slotted wall of the post, at least one pair of transversely spaced outer rollers carried by said support bracket means in spaced relation to said inner rollers, and at least one support element means disposed generally in alignment with said support bracket means for projection through the slotted wall and attaching a bracing strut to said head member.

2. A guide head as claimed in claim 1 together with adjustment means for adjusting the spacing between inner rollers and said outer rollers.

3. A guide head as claimed in claim 2, wherein the adjustment means includes pivot means mounting said support bracket means on said head member for pivoting about an axis transverse to the head member, and adjustable connecting means between said support bracket means and said head member remote from said pivot means.

4. A guide head as claimed in claim 1, 2



which are preferably longitudinally adjustable such as by way of counter-threaded components.

Referring now to Figures 4 and 5, it will be seen that the head member 3 is provided with a elongated recess 21 in the inner face thereof with the recess 21 facing an inner wall 20 of the supporting post opposite to the slotted wall 10. It is to be noted that the recess 21 is substantially in alignment with the center of the H-shaped holder 5, and there is mounted within the slot 21 at least one, and preferably 2, rollers 18. The rollers 18 function as bracing rollers and directly transmit loads from the struts 4 through the head member 3 to the inner wall 20 of the post 1.

Although the slot 21 has been illustrated as extending only a portion of the length of the head member 3, it is to be understood that the head member 3 could be of a channel construction and the slot 21 would then extend the full length thereof.

It is to be understood that the constructional details of the trench shoring device shown in Figures 4 and 5 are the same as those of Figure 1 and 2 except for the addition of the bracing rollers 18.

Referring now to Figure 6, which illustrates a modification of the arrangement of Figures 4 and 5, it will be seen that the head member 3 may be provided with bracing rollers 19 arranged in pairs of opposite sides thereof. These bracing rollers also engage the wall 20 of the post 1 and directly apply a compressive force from the struts 4 through the head member 3 to the inner wall 20 of the post 1.

Referring is now made to Figures 8 and 9 wherein the trench shoring device of Figures 4 and 5 has been modified so as to include at least one pair of guide rollers 22 being mounted on the head member 3 and projecting from opposite sides thereof and engaging side walls 25 of the box shaped portion 6 of the post 1. Each guide roller 22 is mounted on a shaft 23 which, in turn, is carried by a bearing member 24 secured to a respective side of the head member 3.

Referring now to Figure 10, it will be seen that there is illustrated still a further form of trench shoring device wherein the head member 3 is provided with the guiding rollers 22, but the bracing rollers 18 have been eliminated. Essentially Figure 10 illustrates a modification of the trench shoring device of Figures 1 and 2 with the addition of the guide rollers 22.

Reference is now made to Figures 3, 7 and 11 wherein modifications of the trench shoring devices of Figures 1, 4 and 8, respectively, are illustrated. It is to be noted that in lieu of the individual support brackets 11 for each pair of further rollers 12, the pairs of further rollers 12 are carried by a single

piece bar 16 which is mounted on a pair of threaded members 17 which are carried by the head member 3. Each threaded member 17 has associated therewith a nut and thus by adjusting the nuts carried by the threaded member 17, the bar 16 may be adjusted with respect to the head member 3 and thus adjust the spacing between the rollers 7 and 12.

In order to prevent excess stresses within the guide head, the bracing rollers 18, 19 and/or the guide rollers 7, 12 and/or the guide rollers 22 can be formed wholly or partially of resilient material. On the other hand, these rollers can be supported in a resilient manner. A typical resilient mounting of the rollers which are mounted on an axle which is slidably mounted within a lateral slot formed in the head member 3 on opposite sides of the slot 21 (Fig. 9). In each slot there is a spring engaging the axle and urging the bracing roller 18 out of the head member 3. Other resilient mountings may be provided.

It is to be understood that the opposite ends of the bracing struts 4 are carried by guiding heads and that two of the bracing struts, together with two of the guiding heads, form a rigid frame which may be displaced vertically relative to a pair of opposing posts 1 without changing the geometry of the trench structure.

WHAT I CLAIM IS:—

1. A guide head for a bracing strut of a trench shoring device of the type including a support post having a slotted wall with inner and outer surfaces, said guide head comprising a head member, at least two pairs of inner rollers carried by said member, said pairs of inner rollers being spaced longitudinally of said head member and the rollers of each pair being transversely spaced, support bracket means carried by said head member for projection through the slotted wall of the post, at least one pair of transversely spaced outer rollers carried by said support bracket means in spaced relation to said inner rollers, and at least one support element means disposed generally in alignment with said support bracket means for projection through the slotted wall and attaching a bracing strut to said head member.

2. A guide head as claimed in claim 1 together with adjustment means for adjusting the spacing between inner rollers and said outer rollers.

3. A guide head as claimed in claim 2, wherein the adjustment means includes pivot means mounting said support bracket means on said head member for pivoting about an axis transverse to the head member, and adjustable connecting means between said support bracket means and said head member remote from said pivot means.

4. A guide head as claimed in claim 1, 2

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- or 3 wherein said outer rollers are longitudinally offset relative to said inner rollers.
- 5 5. A guide head as claimed in any of the preceding claims wherein said head member carries at least one further roller facing in a direction different from that of said inner rollers.
- 10 6. A guide head as claimed in claim 5 having a plurality of said further rollers spaced one from another.
7. A guide head as claimed in claim 6 wherein said further rollers are spaced from one another longitudinally of said head member.
- 15 8. A guide head as claimed in claim 6 wherein said further rollers are spaced from one another transversely of said head member.
- 20 9. A guide head as claimed in claim 5 wherein said further roller extends in a direction opposite from that of said inner rollers.
10. A guide head as claimed in claim 5 wherein said further roller extends in a transverse direction.
- 25 11. A guide head as claimed in any of claims 5 to 10 wherein each further roller is positioned in a recess in the head member.
12. A guide head as claimed in any of claims 5 to 11 having mounting means for said further roller or rollers resiliently urging it or them away from the direction in which said inner rollers face.
- 30 13. A guide head as claimed in any of claims 5 to 12 wherein some or all of the rollers are of a resilient construction.
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14. A guide head as claimed in any of the preceding claims provided with a hollow post having a support wall disposed between said inner and outer rollers, a slot in said support wall being disposed between the rollers of each pair of inner rollers and said support bracket means extending through said slot.
- 40 15. A guide head as claimed in claim 14 and any of claims 5 to 13 in which said further roller or rollers engage a second wall of the hollow post for bracing said head member.
- 45 16. A guide head as claimed in claims 14 or 15 wherein said support bracket means is of a width corresponding to the width of said slot.
- 50 17. A guide head as claimed in any of claims 5 to 13 or claim 15 in which said further rollers are carried in pairs.
- 55 18. A guide head as claimed in any of the preceding claims in which guide rollers are mounted on the sides of said head member with their longitudinal axes inclined in a direction parallel or substantially parallel to that of the bracing strut.
- 60 19. A guide head constructed and arranged substantially as alternatively described with reference to and as illustrated in the accompanying drawings.

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