

Feb. 19, 1929.

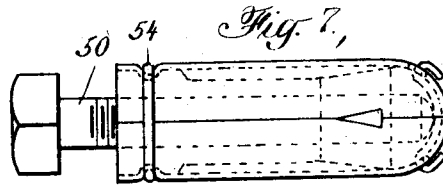
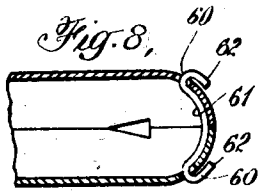
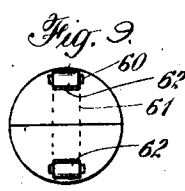
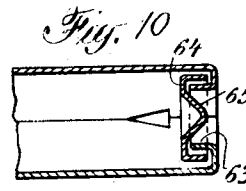
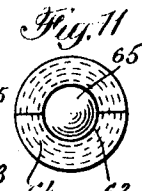
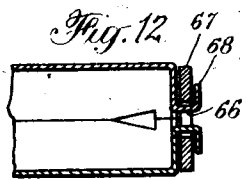
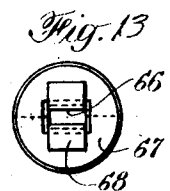
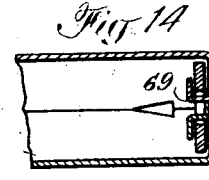
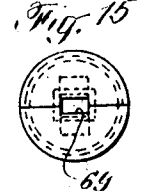
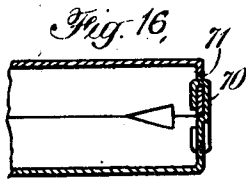
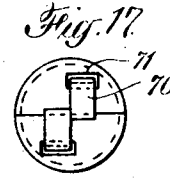
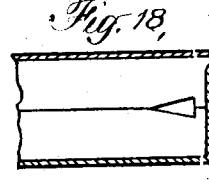
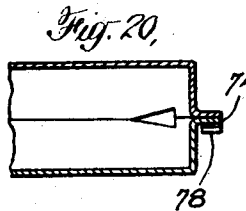
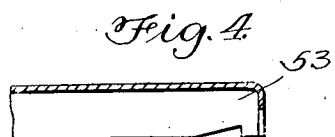
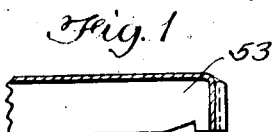
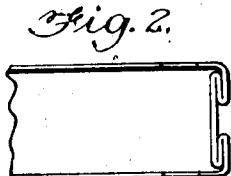
1,702,920

C. C. TOMKINSON

EXPANSION SHIELD

Filed Aug. 25, 1921

2 Sheets-Sheet 1



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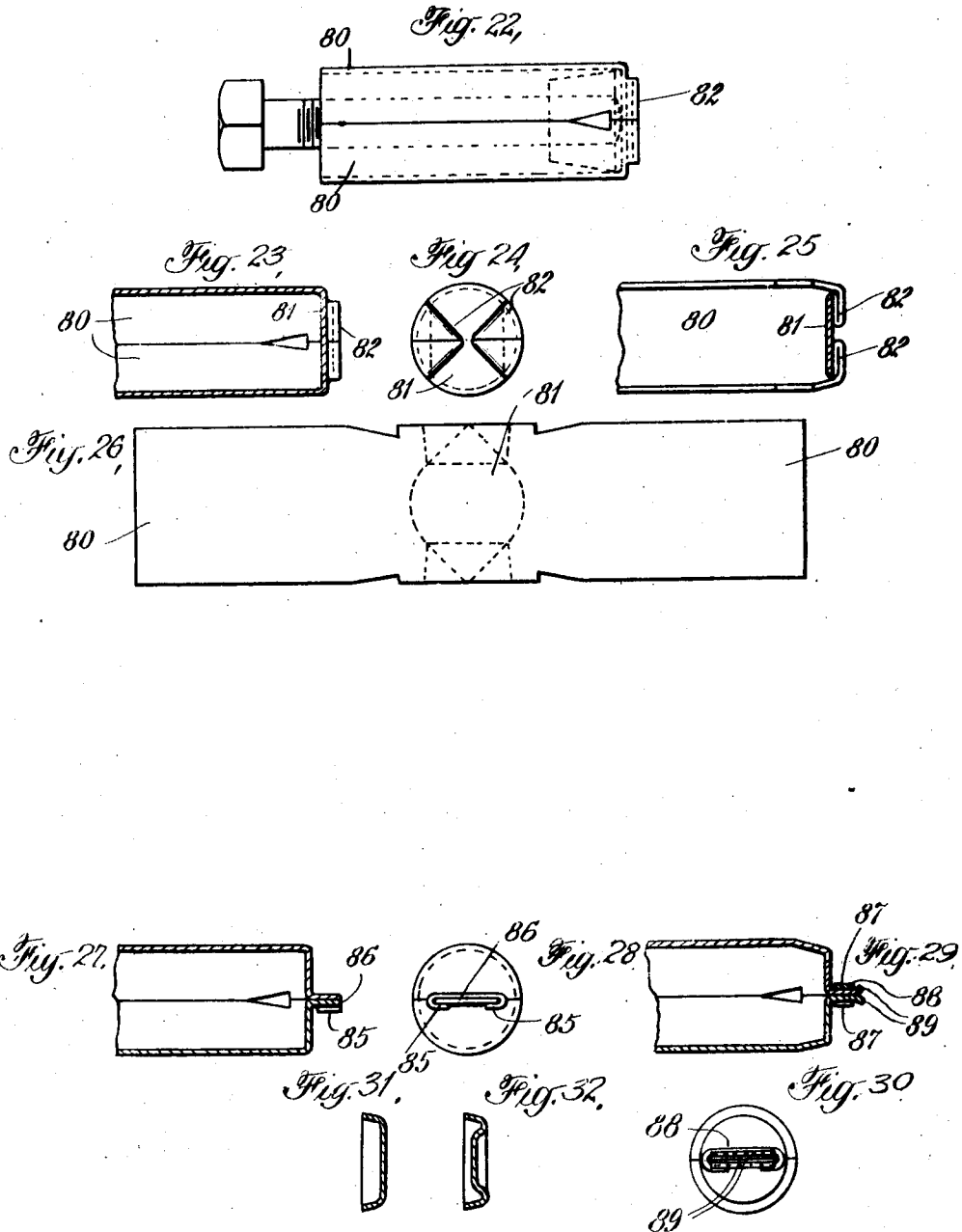
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EXPANSION SHIELD

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE.

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EXPANSION SHIELD.

Application filed August 25, 1921. Serial No. 495,315.

This invention relates to expansion shields for bolt anchors such as are used in walls of brick, stone or cementitious material.

Expansion shields used in bolt anchors in which the shield is expanded by a nut carried by a bolt that bears directly against the bottom of the shield are termed bottom bearing shields. Tests of shields of this type have established the fact that the success of the shield is largely dependent upon the strength of the bottom to resist the pressure of the bolt. When shields of this type are formed from sheet metal the thinness and ductility of the metal makes it necessary to reinforce the bottom in some manner to withstand this thrust of the bolt.

This invention has for its object to provide means for reinforcing the bottom or inner end of an expansion shield.

Further objects will appear as the description proceeds.

Several different forms of expansion shields having means for attaining the objects of the invention have been illustrated in the drawings and for convenience the different forms may be roughly grouped as follows.

The first group shown in Figs. 1-6 inclusive, comprises shields having a plurality of separate sections held together by suitable means such as a split ring, each section having its inner end or bottom reinforced as by folding or corrugating the end or by a separate reinforcing member.

The second group, shown in Figs. 7-21 inclusive, comprises shields having a plurality of sections held together if desired by a split ring and joined at their inner ends by a slack connection which allows the sections to expand freely at first but forms a bridge to sustain the bolt thrust after the slack has been taken up.

The third group, shown in Figs. 22-32 inclusive, comprises a shield made from a single piece sheet metal blank with a connecting bridge between the expansion elements located at the inner end of the shield to take the thrust of the bolt. Another form that may be classed with the third group includes sectional shields having the sections tightly held together at their bottom or inner ends. Still another form falling in this group comprises sectional shields having their bottoms welded together.

If desired a thrust washer may be combined with any of the three groups described as shown, for instance, in Figs. 5 and 6.

Referring now specifically to the figures of the drawings.

Fig. 1 is a sectional elevation of one section of a shield constructed in accordance with the invention.

Fig. 2 is an elevation of the structure shown in Fig. 1, taken at right angles thereto.

Fig. 3 is an end elevation of the shield comprising sections constructed as shown in Figs. 1 and 2.

Figs. 4, 5 and 6 show another form of the invention in which a separate thrust washer or disc is used to form a thrust bearing.

Fig. 7 is an elevation of another form of bolt anchor in which the shield is formed from a plurality of sections held together at one end by means such as a spring clip and having a slack connection at the other end.

Fig. 8 is a sectional elevation of the shield shown in Fig. 7.

Fig. 9 is an end elevation of the construction shown in Fig. 8.

Figs. 10 and 11 are respectively sectional elevation and end views of a modified form of the construction in which the sections are loosely connected by a cupped member.

Figs. 12 and 13 are corresponding views of another form of the invention in which the ends are bent outwardly and laterally and receive a disc or washer.

Figs. 14 and 15 are corresponding views of another form of the invention in which the disc is disposed within instead of without the shield.

Figs. 16 and 17 are corresponding views of another form of the invention in which each section has a member projecting from its end and extending into a slot formed in another section.

Figs. 18 and 19 are corresponding views of another form of the invention in which the ends of the sections overlap and are joined by a slack connection.

Figs. 20 and 21 are corresponding views of another form of the invention having outwardly projecting portions joined by a slack connection.

Fig. 22 is an elevation of another form of bolt anchor embodying my invention and comprising a plurality of sections having their inner or bottom ends tightly connected

together and reinforced as by folding. In this form of the invention the shield is made from a single piece sheet metal blank.

Fig. 23 is a sectional elevation of the shield shown in Fig. 22.

Fig. 24 is an end elevation of the construction shown in Fig. 22.

Fig. 25 is an elevation of one of the sections of the shield shown in Fig. 22.

Fig. 26 is a plan view of the blank from which the shield shown in Figs. 22, 23, 24 and 25 is constructed.

Fig. 27 is a sectional elevation of another form or shield constructed in accordance with my invention and comprising a plurality of sections having outwardly projecting overlapping portions.

Fig. 28 is an end view of the construction shown in Fig. 27.

Fig. 29 is a sectional elevation of another form of shield comprising a plurality of sections having connected outwardly projecting portions.

Fig. 30 is a new end view of the construction shown in Fig. 29.

Figs. 31 and 32 are sectional elevations of two different forms of reinforcing discs that may be used in connection with the shields shown in the preceding figures.

In the form of the invention illustrated in Figs. 1, 2 and 3 each section 53 has its inner end folded back upon itself in the form of a letter S as shown particularly in Fig. 6. These folded over portions materially strengthen the bottom of the shield.

In the form of shield shown in Figs. 4, 5 and 6 the ends of the sections are bent inwardly toward the axis of the shield and a disc or washer 58 is positioned in the bottom of the shield.

The form of the invention shown in Fig. 7 falls within the second group in which the sections of the shield are held at one end by a split ring 54 but the opposite or inner ends of the sections are permitted to move laterally a limited distance upon the initial expansion of the shield. The details of this slack connection are shown in Figs. 8 and 9 wherein each section is shown as provided with a slot 60. A bridge member or strip 61 is positioned within the bottom of the shield and has its ends extending through the slots and bent backwardly as shown at 62. When the nut used in connection with this shield begins to travel along the bolt 50 the initial movement of the nut will cause the inner ends of the sections to move outwardly until the slack between the ends of the members 61 and the shield sections is taken up. Thereafter the bridge member 61 forms a firm and rigid abutment for the bolt.

In Figs. 10 and 11 another slack connection between the shield sections is shown and in this form the inner ends of the sections are turned inwardly as shown at 63, and a cup

shaped member 64 encircles these end portions. The member 64 is indented as shown at 65 to strengthen the member and by this construction also a firm abutment for the bolt is formed.

In Figs. 12 and 13 the ends 66 of the shield sections are bent laterally outwardly and are then bent away from the axis each end forming a U-shaped section. A washer 67 is placed over the laterally bent portions and is retained in place by the ends 68 of the sections.

The form of shield shown in Figs. 14 and 15 is similar to that shown in Figs. 12 and 13 but differs in that the ends 69 of the shield are bent inwardly instead of outwardly.

In Figs. 16 and 17 each section of the shield is formed with an extension 70 the end of which is passed through a slot 71 in the adjacent section. The extreme ends of these portions 70 are bent back against the bottom of the shield.

In Figs. 18 and 19 the ends of the two sections of the shield overlap and one of them has formed therein a slot 72 through which is passed an extension 73 formed on the other section.

In Figs. 20 and 21 one section is provided with an outwardly bent end portion 74 which is encircled by an overlapping portion 78 formed on the other section, these portions being loosely connected to provide slack and to be taken up upon the initial expansion.

In Figs. 22 to 26 inclusive a one piece sheet metal expansion shield is illustrated, the blank being shown in Fig. 26. In order to form this shield the end portions 80 are folded about the central portion 81 and the central portion is folded on the dotted lines thereby forming the overlapping ends shown at 82 in Figs. 24 and 25. This construction is somewhat similar to that shown in Figs. 1, 2 and 3 but in the present instance the shield is formed from a single piece blank. The completed shield formed from this blank is shown in Fig. 22.

Figs. 27 and 28 illustrate a shield somewhat similar to that shown in Figs. 20 and 21 and in this instance the overlapping ends 85 formed on one section of the shield tightly enclose the outwardly projecting portion 86 formed on the other section.

In the shield shown in Figs. 29 and 30 each section has an outwardly extending portion 87, these portions being encircled by a band 88. The ends of the portions 87 are flared outwardly as shown at 89 to retain the band in place.

Fig. 31 shows a cup shaped reinforcing member which may be used in conjunction with any of the shields shown in the preceding figures in a manner similar to the washer 58 shown in Figs. 5 and 6.

Another form of reinforcing member is shown in Fig. 32, this member being cup

shaped and having an indented central portion further strengthening the thrust member.

Although several specific embodiments of the invention have been illustrated and described, it will be understood that the invention is capable of further modification and that further changes in the construction and in the arrangement of the various elements may be made without departing from the spirit or scope of the invention as expressed in the following claims.

What I claim is:

1. An expansion shield comprising a plurality of sections, the inner ends of the sections being slotted and reinforcing means extending through the slots.

2. An expansion shield comprising a plurality of sections, the inner ends of the sections being slotted and reinforcing means within the shield extending through the slots.

3. An expansion shield comprising a plurality of sections, the inner ends of the sections being slotted and reinforcing means having ends extending into the shield through the slots.

4. An expansion shield comprising a plurality of sections, the inner end of one of the sections being slotted and reinforcing means extending through the slot.

5. An expansion shield having a plurality of sections, the inner end of one of the sections being slotted and reinforcing means secured to another section and extending through the slot.

6. A sheet metal expansion shield expansible at its inner end, comprising a plurality of sections laterally expansible into permanent gripping engagement with a wall opening and having its inner end closed and separate reinforcing means for the closed end of the shield.

7. An expansion shield formed of sheet metal and expansible at its inner end, comprising a plurality of longitudinal laterally expansible sections having their inner ends bent to form a closed end for the shield, and separate means reinforcing said closed end.

8. A sheet metal expansion shield expansible at its inner end, comprising a plurality of sections laterally expansible into permanent gripping engagement with a wall opening and having its inner end closed and reinforcing means for the closed end of the shield, said reinforcing means extending

across and bridging the closed end and in juxtaposition thereto.

9. In combination, an expansion shield having walls of uniform thickness, reinforcing means disposed across and bridging the inner end of the shield, an expansion member in the shield adapted to travel longitudinally therein and expand the shield at its inner end and a threaded bolt engaging said member and adapted to move said member longitudinally in the shield, said bolt being adapted to contact with said reinforced end.

10. In combination, an expansion shield having walls of uniform thickness and comprising a plurality of sections connected at their inner ends by a reinforcing member, a nut in the shield adapted to travel longitudinally in said shield and expand the shield and a bolt threaded into said nut and adapted to contact with said reinforcing member.

11. A sheet metal expansion shield having walls of single thickness and comprising a plurality of walls laterally expansible into permanent gripping engagement with a wall opening and reinforcing and expansion limiting means for the inner end of the shield.

12. An expansion shield having walls of single thickness and substantially uniform in cross section throughout their length, said walls being laterally expansible into permanent gripping engagement with a wall opening, and reinforcing and expansion limiting means for the inner end of the shield.

13. An expansion shield formed of sheet metal and expansible at its inner end, said shield comprising a plurality of laterally expansible sections having their inner ends bent inwardly toward the axis of the shield, and separate means disposed within the inner end of the shield and reinforcing said inwardly bent ends.

14. A sheet metal expansion shield comprising a plurality of sections laterally expansible at the inner ends thereof into permanent gripping engagement with a wall opening, the inner end of each section of the shield being bent inwardly toward the axis thereof, and reinforcing means disposed in the inner end of the shield and extending across and bridging the inwardly bent inner ends.

In witness whereof, I have hereunto set my hand this 12th day of August, 1921.

CHARLES C. TOMKINSON.