E. W. MARSHALL.

EXPANSION SHIELD.

APPLICATION FILED AUG. 15, 1919.

1,394,925. Patented Oct. 25, 1921.

Fig. 1,

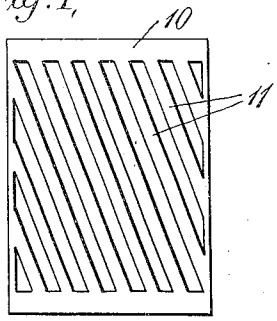


Fig. 2,

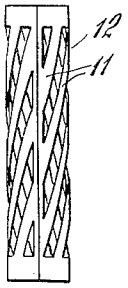


Fig. 3,

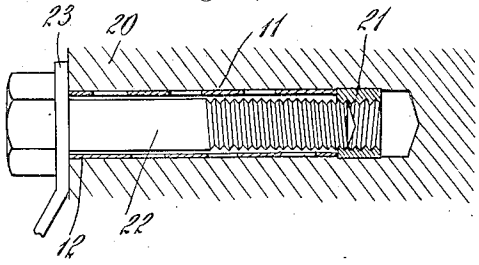


Fig. 4,

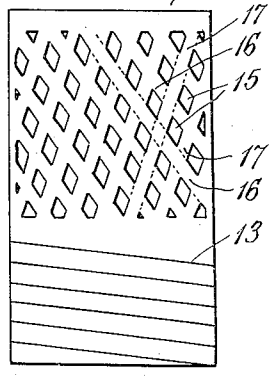


Fig. 5,

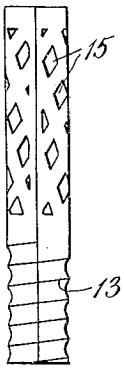


Fig. 6,

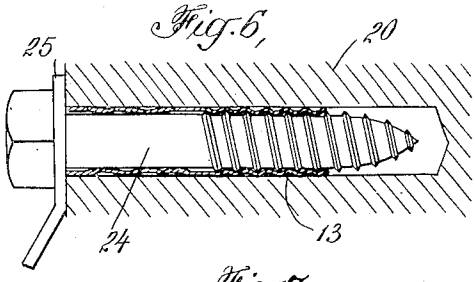


Fig. 7,

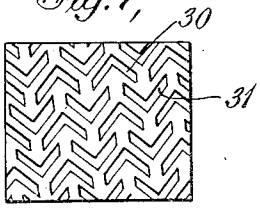


Fig. 10,

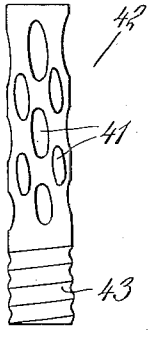


Fig. 9,

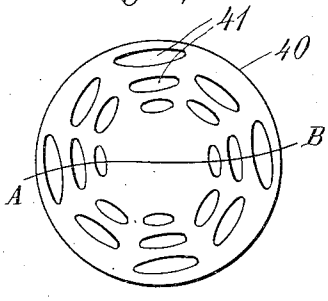
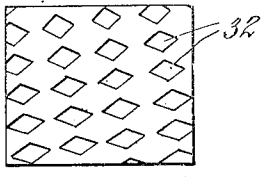


Fig. 8.



Inventor,

Ernest W. Marshall

UNITED STATES PATENT OFFICE.

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EXPANSION-SHIELD.

1,394,925. Specification of Letters Patent. Patented Oct. 25, 1921.

Application filed August 15, 1919. Serial No. 317,726.

To all whom it may concern:

Be it known that I, ERNEST W. MARSHALL, a citizen of the United States of America, and a resident of Yonkers, Westchester county, and State of New York, have invented certain new and useful Improvements in Expansion-Shields, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

This invention relates to expansion shields and its object is to provide a simple device which is inexpensive to manufacture and which may be used to form an effective anchorage for bolts or screws in structures of cement, brick, stone or other material with which the threads of the bolts or screws cannot obtain a good hold.

More specifically, the object of the invention is to provide a device of this character which may be made of sheet metal.

In order that my invention may be thoroughly understood, I will now proceed to describe the same in the following specification and will then point out the novel features thereof in appended claims.

Referring to the drawings:

Figure 1 is an elevation of a blank of sheet metal with parts thereof cut away to form integral diagonal strips between the ends and edges of the blank.

Fig. 2 is an elevation of an expansion shield made by rolling the blank of Fig. 1 into a tube.

Fig. 3 is a sectional elevation of a part of a wall or other structure having a hole therein in which is inserted an expansion shield like that shown in Fig. 2. In this figure a nut is shown in section and a bolt in elevation.

Fig. 4 is an elevation of a blank of sheet metal with a part thereof corrugated and another part perforated to form oppositely inclined diagonal strips.

Fig. 5 is an elevation of an expansion shield made by rolling the blank of Fig. 4 into a tube.

Fig. 6 is a sectional elevation of an expansion shield like that shown in Fig. 5 in a hole drilled in a part of a wall.

Figs. 7 and 8 are portions of blanks having other forms of perforations which may be used either in tubes or sheets, to form shields which also embody this invention.

Fig. 9 is a perforated blank which may be pressed or drawn into a tubular shield and

Fig. 10 is an elevation of a shield formed from the blank shown in Fig. 9.

Like characters of reference designate corresponding parts in all the figures.

10 designates a rectangular blank of sheet metal. In Figs. 1, 2 and 3 slot-like perforations are punched through this blank intermediate its ends and edges to form diagonal ribs 11 connecting the ends and edges. This blank is shown in Figs. 2 and 3 rolled into a tube 12. 20 designates a portion of a wall or other structure in which is drilled a clearance hole for this shield. In Fig. 3 a nut 21 is shown pushed into this hole, ahead of the shield 12. After this has been done a bolt 22 with a washer or other device 23 under its head, is put through the shield into the nut.

It is obvious that the nut may be drawn toward the head of a bolt by turning the latter and that this will draw the strips 11 together, thus closing the spaces between them. This will cause an increase of the circumference and consequently of the diameter of the part of the shield which the strips form and this will cause the strips to be distorted both inwardly and outwardly against the shank of the bolt and against the wall of the hole, and thus form a secure anchorage. It is to be noted that this expansion will not take place along longitudinal lines but will be distributed circumferentially thus gripping all parts of the circumference of the bolt and of the wall of the hole.

In Fig. 4 the lower part of the blank 10′ is shown corrugated at 13 for the purpose and forming screw threads when the blank is rolled into a tube 14 as shown in Fig. 5. Between this corrugated part of the blank and its upper end are angular perforations 15 so disposed as to leave a plurality of diagonal strips 16 inclined in one direction to the edges of the blank and to the axis of the tube 14, and a plurality of other diagonal strips 17 inclined in another direction but at a greater angle to the edges of the block and to the axis of the tube. These strips when formed as thus described, are interconnected at their points of crossing.

Fig. 6 shows an expansion shield of this form inserted and expanded in a hole in the

structure 20. 24 is a lag screw and 25 an article held thereby against the side of the wall 20. The threads of the lag screw engage the threads formed by the corrugations 13 and when the screw is turned this end of the shield is moved thereby toward the head of the bolt. This causes an increase of circumference and diameter of the part of the shield formed of the strips which results in the strips buckling or collapsing and forming an anchorage. Because of the fact that the ribs which run in one direction are at a greater angle of inclination than those which run in the other direction, this expansion will be distributed circumferentially in order to form a perfect anchorage by gripping all parts of the circumference of the lag screw and of the wall of the hole.

The intermediate part of the blank may be formed as shown in Fig. 7 with angular perforations 30, and 31 oppositely disposed or as shown in Fig. 8 with angular perforations 32.

In both of these cases the rows of perforations are inclined to the vertical edges of the blank. In the latter case the perforations 32 increase in size toward the lower end of the blank which forms the inner end of the finished shield which will result in the first and greatest expansion taking place at the inner end of the shield when it is shortened by longitudinal pressure.

It is obvious that a great variety of forms of perforations may be used, a few of which have been shown, and that these perforations may be either formed in a tube or in a flat sheet which may be rolled into a tube as described.

This invention is, I believe, capable of being carried out in many different forms, some of which have been illustrated and described for the purpose of showing structures which embody the invention, but I do not intend to limit myself to these specific forms of construction as it is well within the scope of the invention to manufacture expansion shields which embody this invention in other ways than those which have been shown. Oppositely inclined strips similar to those shown in Figs. 4–7 may be some on one of two superimposed blanks and the others on the other blank in which case the strips will not be interconnected. The shields may be made by casting or pressing and in either one part or in a plurality of parts.

One way in which shields which embody this invention may be made is illustrated in Figs. 9 and 10. 40 is a circular blank in which perforations 41 which in the blank are longer circumferentially than they are radially. These perforations may be disposed on curved lines such as A—B. This blank may be drawn into a seamless tube as shown at 42 in Fig. 10 with the upper end thereof, which would otherwise be closed, cut off. Drawing the metal will change the shape of the perforations so that they will appear as they do in Fig. 10. Of course other shapes of perforations may be used. The lower end of the tube is shown with helical corrugations rolled in it as at 43 to provide screw threads for the reception of a screw or bolt.

What I claim is:

1. An expansion shield comprising a tubular member having between its ends a plurality of spaced straight parallel strips inclined to the axis of the tube.

2. An expansion shield comprising a tubular member having between its ends a plurality of oppositely inclined spaced diagonal strips.

3. An expansion shield comprising a tubular member having between its ends a plurality of oppositely inclined spaced interconnected diagonal strips.

4. An expansion shield comprising a tubular member having between its ends a plurality of oppositely inclined spaced interconnected diagonal strips, the strips which are inclined in one direction being at a greater angle to the axis of the tube than those which are inclined in the opposite direction.

5. An expansion shield comprising a tubular member, said member being corrugated near one of its ends to receive the threads of a bolt, said member being cut away at spaced intervals between the thread receiving means and its other end to form a plurality of strips inclined to the axis of the tube.

6. An expansion shield comprising a tubular member, means near one end of said member for receiving the threads of a bolt, said member being cut away at spaced intervals between the thread receiving means and its other end to form a plurality of oppositely inclined diagonal strips.

7. An expansion shield comprising a tubular member, means near one end of said member for receiving the threads of a bolt, said member being cut away at spaced intervals between the thread receiving means and its other end to form a plurality of oppositely inclined interconnected diagonal strips.

8. An expansion shield comprising a tubular member, means near one end of said member for receiving the threads of a bolt, said member being cut away at spaced intervals between the thread receiving means and its other end to form a plurality of oppositely inclined interconnected diagonal strips, the strips which are inclined in one direction being at a greater angle to the axis of the tube than those which are inclined in the opposite direction.

9. An expansion shield constructed of a sheet metal blank perforated to form in the

finished shield a plurality of oppositely inclined interconnected diagonal strips, said perforated blank being formed into a tube, the strips which are inclined in one direction being at a greater angle to the axis of the tube than those which are inclined in the opposite direction.

10. An expansion shield constructed of a sheet metal blank corrugated near one end to form means for receiving the threads of a bolt, and perforated between said corrugated part and its other end to make a plurality of diagonal strips, said blank being rolled transversely into a tube.

11. An expansion shield constructed of a sheet metal blank corrugated near one end to form screw threads, and perforated between said corrugated part and its other end to make a plurality of oppositely inclined interconnected diagonal strips, said blank being rolled transversely into a tube.

12. An expansion shield made of a sheet metal blank with a part thereof intermediate its ends comprising portions separated by diagonally disposed perforations, said blank being formed into a tube, said separated portions lying in parallel helical lines in the tube and being adapted to be moved together to decrease the size of said perforations when the ends of the tube are forced toward each other.

13. An expansion shield comprising a tubular member cut away at spaced intervals to provide a plurality of reversely inclined strips.

14. An expansion shield comprising a tubular member of sheet metal having rows of perforations therein providing parallel helical strips of metal separated by the perforations, said member being adapted to be compressed longitudinally to bring the strips toward abutting engagement with each other and to expand the strips laterally, inwardly and outwardly.

15. An expansion shield comprising a tubular member of sheet metal having rows of perforations therein increasing in size toward the inner end of the shield, providing strips of metal separated by the perforations, said member being adapted to be compressed longitudinally to bring the strips toward abutting engagement with each other and to expand the strips laterally, inwardly and outwardly.

In witness whereof, I have hereunto set my hand this 12th day of August, 1919.

ERNEST W. MARSHALL.