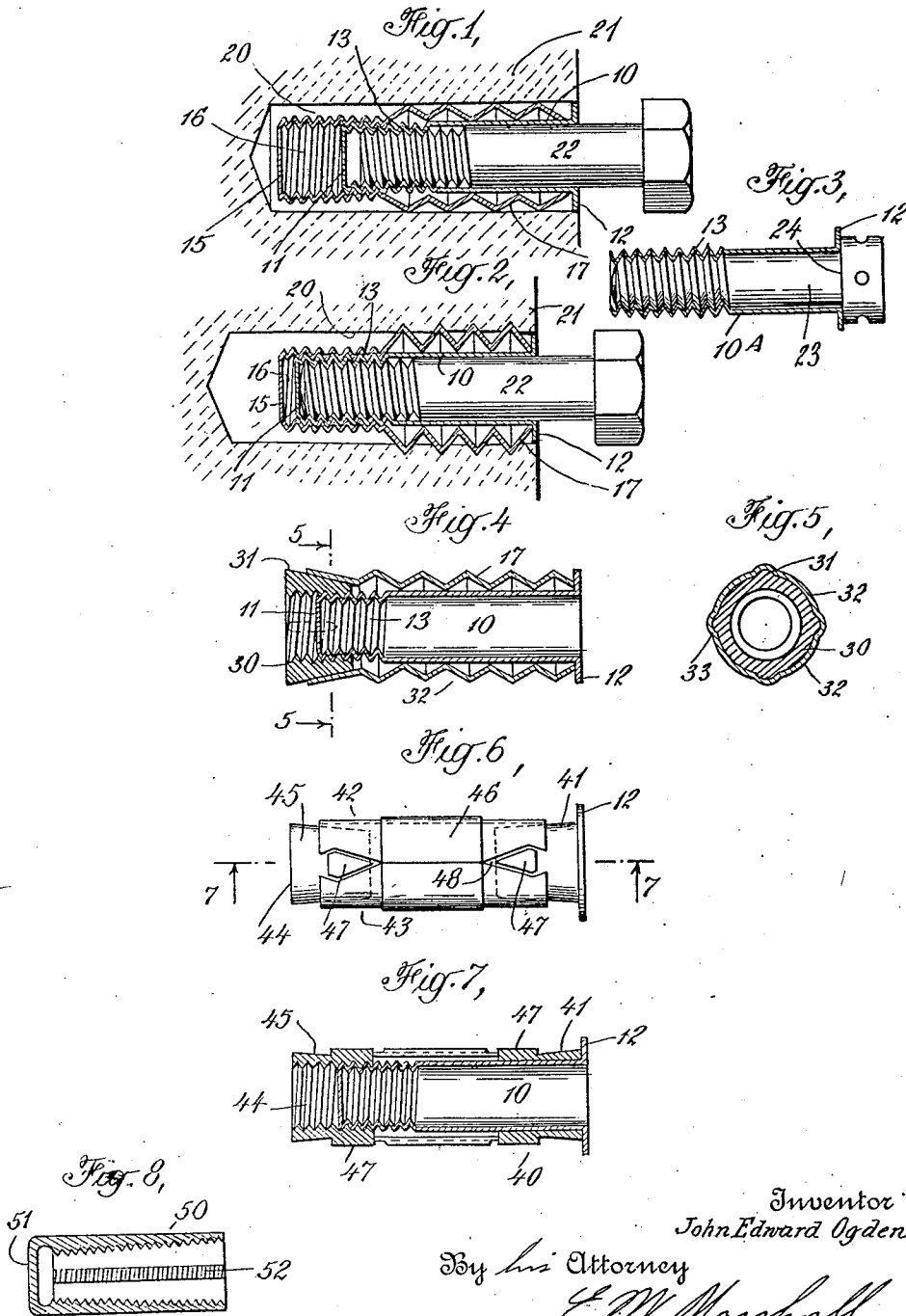


1,431,176.

Patented Oct. 10, 1922.



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Patented Oct. 10, 1922.

1,431,176

UNITED STATES PATENT OFFICE.

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EXPANSION SHIELD.

Application filed June 19, 1920. Serial No. 390,139.

To all whom it may concern:

Be it known that I, JOHN EDWARD OGDEN, a citizen of the United States of America, and a resident of Cornwall, Orange 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 drawing, forming a part thereof.

This invention relates to expansion shields of the type used to form anchorages for threaded members in such materials which cannot effectively receive and hold the threads of screws, bolts or the like. Its object is to provide a simple, inexpensive and efficient device for forming such anchorages. Another object is to provide an internally threaded screw receiving member which may be inserted in an expansion shield and be made to expand the same, which may be held in such a shield ready to receive a screw or bolt. Another object is to provide a threaded member adapted to receive a bolt and to be turned by the bolt, and an expansible member arranged to be expanded into holding engagement with the walls of a recess or hole drilled in a wall or other object, by the rotation of the bolt receiving member. Another object is to provide an anchorage in which the bolt receiving screw threads are protected so that bolts may be removed and re-inserted at will. A still further object is to provide structures which may be drawn or pressed from sheet metal.

These and other objects of the invention will appear in the following specification in which I will describe the invention, the novel features of which will be set forth in appended claims.

Figure 1 is a longitudinal section of an expansion shield which is made according to and embodies this invention, the same being inserted in a hole drilled in a wall and a bolt shown in elevation inserted therein.

Figure 2 is a similar view of the same parts with the shield or outer member expanded to form an anchorage.

Figure 3 is an elevation in section of a modified form of one of the parts shown in the preceding figures with a setting tool shown therein in elevation.

Figure 4 is a longitudinal section of an-

other form of expansion shield which also embodies this invention.

Figure 5 is a transverse section of the device of Figure 4, the section being taken on the line 5-5 of the latter figure.

Figure 6 is a longitudinal elevation of a further modified form of construction.

Figure 7 is a longitudinal sectional elevation of the structure shown in Figure 6, the section being taken on the line 7-7 of the latter figure, and the view being taken at right angles to that shown in Figure 6.

Figure 8 is a sectional elevation of another structure which also embodies this invention.

Referring first to Figures 1 and 2:-

10 designates a hollow cylindrical screw receiving member with a closed end 11 and an outstanding annular flange 12 at its opposite end. Near its closed end its wall is crimped to form internal and external screw threads 13. Surrounding the thread receiving member is an outer shell closed at one end, as shown at 15 and formed with screw threads 16 near this end into which the threads 13 fit. The rest of its body is crimped or folded inwardly and outwardly on transverse lines, as shown at 17, and this part of the outer shell extends to the flange 12.

The device is inserted in a drill hole 20 in a structure 21, and a bolt 22 inserted. This fits the internal threads 13 of the member 10 which it enters freely. As soon as the end of the bolt reaches the bottom of this thread receiving member or its closed end 11, it cannot go further into the member, but a continuation of the rotation of the bolt will cause the member 10 to turn with it. This by reason of its engagement with the threads 16 will draw the latter onto the inner member and cause the closed end of the outer member to be moved towards the head of the bolt. The other end of the outer member is held against moving in this direction by the flange 12. The result is that the crimps or folds 17 will be folded towards one another, and as they cannot move inwardly because of their engagement with the outer surface of the inner member, they will expand into a tight engagement with the wall of the hole 20, as shown in Figure 2 and thereby form a firm anchorage.

If desired, the member 10 may be first screwed onto the bolt and the two screwed

into the outer member in the hole 20. Such a screw receiving member either with or without a closed end may be inserted in and used to expand expansion shields of many types, and left therein after the removal of the bolt or tool by which it was inserted, ready to receive any desired threaded device.

An operation of the kind described, has a tendency to crumble some of the wall of the hole and the particles of material thus loosened clog the threads of open ended expansion shields, but in this case the inner end of the device is closed so that the internal threads are fully protected. The parts as shown are pressed or drawn metal and so are inexpensively produced.

In Figure 3 the screw receiving member 10¹ is open at both ends. This figure also shows a setting tool 23 which may be used instead of a bolt to insert the screw receiving member and expand the outer member. It has a shoulder 24 which backs up the flange 12.

In the device shown in Figure 4, the inner screw receiving member 10 is the same as that shown in Figures 1 and 2. In this case its outer threads engage the threads of a nut 30 which is constructed with flaring tapered longitudinal ribs 31 on its outer surface. The outer shell 32 has tapered channels 33 formed at one end into which these ribs fit. The rest of its body is made with folds or crimps 17 which extend to the flange 12.

When a bolt is inserted in this device and rotated after the engagement of its end with the closed end 11, the rotation of the inner member produced by a continued rotation of the bolt, will draw the nut into the outer member. The tapered ribs will expand the inner end of the outer member as far as it can go, and then a relative movement of the nut 30 and flange 12 towards each other, will expand the folds or crimps 17 in the manner previously described.

Figures 6 and 7 show this invention applied to another type of expansion shield. The inner member 10 passes through a clearance hole in a collar 40, the outside of which is tapered, as shown at 41, through a two-part shield 42-43 into a nut 44 having a tapered exterior 45. The intermediate portions of both parts 42-43 of the shield are thickened in some suitable manner, as for example, by folding the metal in which these parts are formed back on itself, as shown at 46. If desired, the collar and nut 44 may have tapered lugs 47 which project into or through the parts 42-43 of the shield into suitable tapered spaces 48 formed between these parts.

The operation of this device is as follows: The collar and nut are made to approach each other by the rotation of the inner mem-

ber and its engagement with the nut. The tapered surfaces 41 and 45 of the collar and nut, and the wedge shaped sides of the lugs 47 if they are used, force the two parts of the shield apart, and thus form a secure anchorage which is made still further secure by the thickening of the intermediate parts of the outer shield.

Figure 8 is a representation of a single piece expansion shield 50 having a closed end 51. This is preferably made of soft metal with internal tapered longitudinal ribs 52 which reduce the bore toward the inner end of the shield. These ribs may be threaded if desired, or the device made of metal which is soft enough for the bolt to cut its own threads therein. The tapered bore provides an excess of metal which will become crowded between the bolt and the wall of the hole in which it is inserted, to form the desired anchorage. After expansion the bolt may be removed and the expanded shield left ready to receive another threaded member.

Several modifications have been illustrated and described in order to show that this invention is not limited to any particular form of construction, and I intend no limitations other than those imposed by the appended claims.

What I claim is:

1. A sheet metal expansion shield having internal means for engaging screw threads and having a closed end.
2. An expansion shield having an internally threaded bore and a closed end.
3. An expansion shield of sheet metal having screw threads impressed therein, and having a closed end.
4. An expansion shield comprising a closed end screw receiving member, and an external member having portions arranged to be forced away from the axis of the screw receiving member by the movement of said screw receiving member.
5. An expansion shield comprising a closed end screw receiving member provided with means for engaging screw threads, and an external member having portions arranged to be forced away from the axis of the screw receiving member by the movement of said screw receiving member.
6. An expansion shield comprising a closed end screw receiving member of sheet metal having screw threads impressed therein, and an external member provided with screws threads arranged to engage the threads of said screw receiving member and having parts arranged to be expanded thereby.
7. A sheet metal expansion shield comprising a closed end screw receiving member having internal means for engaging screw threads, and having external screw threads near one of its ends and an external projection spaced from its external screw threads,

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an external member provided with screw threads arranged to engage the external threads of the screw receiving member, and to be compressed between its threaded part and the external projection on said screw receiving member.

8. An expansion shield comprising a closed end screw receiving member having internal means for engaging screw threads, and having external screw threads near one of its ends and an external projection spaced from its external screw threads, an external member provided with screw threads arranged to engage the external threads of the screw receiving member, and to be compressed between its threaded part and the external projection on said screw receiving member, said external member being creased transversely.

9. An expansion shield comprising a closed end screw receiving member having internal means for engaging screw threads, and having external screw threads near one of its ends and an external projection spaced from its external screw threads, an external member provided with screw threads arranged to engage the external threads of the screw receiving member, and to be compressed between its threaded part and the external projection on said screw receiving member, said external member being creased transversely and constructed with zig-zag folds.

10. An expansion shield comprising a closed end screw receiving member of sheet metal having screw threads impressed therein near its closed end and an externally projecting flange spaced from said screw threads, an external member provided near one of its ends with screw threads arranged to engage the screw threads of the screw receiving member, and having a collapsible portion between its screw threads and said flange.

11. An expansion shield comprising a closed end screw receiving member of sheet metal having screw threads impressed therein near its closed end and an externally projecting flange spaced from said screw threads, a closed end external member of sheet metal provided near its closed end with screw threads arranged to engage the screw threads of the screw receiving member and having laterally expansible portions between its screw threads and said flange.

12. An expansion shield comprising a closed end screw receiving member of sheet metal having screw threads impressed therein near its closed end and an externally projecting flange spaced from said screw threads, a closed end external member of

Aside from the main object of conventional screw threads arranged to engage the screw threads of the screw receiving member, said external member being creased transversely

between its screw threads and the flange of the screw receiving member, and constructed with zig-zag folds between the creases.

13. An expansion shield comprising a screw receiving member having internal means for engaging screw threads, and having external screw threads near one of its ends and an external projection spaced from its external screw threads, an external member provided with screw threads arranged to engage the external threads of the screw receiving member, and to be compressed between its threaded part and the external projection on said screw receiving member.

14. An expansion shield comprising a screw receiving member having internal means for engaging screw threads, and having external screw threads near one of its ends and an external projection spaced from its external screw threads, an external member provided with screw threads arranged to engage the external threads of the screw receiving member, and to be compressed between its threaded part and the external projection on said screw receiving member, said external member being creased transversely and constructed with zig-zag folds.

15. An expansion shield comprising a screw receiving member of sheet metal having screw threads impressed therein and an externally projecting flange spaced from said screw threads, an external member provided near one of its ends with screw threads arranged to engage the screw threads of the screw receiving member, and having a collapsible portion between its screw threads and said flange.

16. An expansion shield comprising a screw receiving member of sheet metal having screw threads impressed therein and an externally projecting flange spaced from said screw threads, an external member of sheet metal provided with screw threads arranged to engage the screw threads of the screw receiving member, said external member being creased transversely between its screw threads and the flange of the screw receiving member, and constructed with zig-zag folds between the creases.

17. An expansion shield comprising a screw receiving member provided with means for engaging screw threads and means for limiting the rotation of a screw therein, and an external member having portions arranged to be forced away from the axis of the screw receiving member by the movement of said screw receiving member.

18. An expansion shield comprising a screw receiving member of sheet metal having screw threads impressed therein, means for limiting the rotation of a screw in said member, and an external member having a portion provided with screw threads arranged to engage the threads of said screw

receiving member and another portion arranged to be expanded thereby.

19. An expansion shield comprising a screw receiving member having internal screw threads near one of its ends and an external projection spaced from its external screw threads, means for limiting the rotation of a screw in said member, an external member provided with screw threads arranged to engage the external threads of the screw receiving member, and having a portion to be compressed between its threaded part and the external projection on said screw receiving member.

20. An expansion shield comprising a rotatable screw receiving member provided with means for engaging screw threads and means for limiting the rotation of a screw therein, and an external member having a portion arranged to be forced away from the axis of the screw receiving member by the movement of said screw receiving member, said external member having a closed end.

21. An expansion shield comprising a screw receiving member of sheet metal having screw threads impressed therein, means for limiting the rotation of a screw in said member, and an external member having a portion provided with screw threads arranged to engage the threads of said screw receiving member and another portion arranged to be expanded thereby, said external member having a closed end.

22. An expansion shield comprising a screw receiving member having internal means for engaging screw threads, external screw threads near one of its ends and an external projection spaced from its external screw threads, means for limiting the rotation of a screw in said member, an external member provided with screw threads arranged to engage the external threads of the screw receiving member, and to be compressed between its threaded part and the external projection on said screw receiving member, said external member having a closed end.

23. An expansion shield comprising a screw receiving member having internal

means for engaging screw threads, external screw threads near one of its ends and an external projection spaced from its external threads; means for limiting the rotation of a screw therein, an external member provided with screw threads arranged to engage the external threads of the screw receiving member, and to be compressed between its threaded part and the external projection on said screw receiving member, said external member being creased transversely and constructed with zig-zag folds.

24. An expansion shield comprising a hollow rotatable inner member having external screw threads near one of its ends and an external projection spaced from its screw threads, and a closed end external member having internal screw threads near its closed end and a collapsible portion between its closed end and the external projection of the inner member.

25. An expansion shield screw receiving member, means for rotating said screw receiving member within an external member and means for causing the rotation of said screw receiving member to force portions of said external member away from the axis of said screw receiving member.

26. An expansion shield screw receiving member, means for rotating said screw receiving member within an external member when a screw has reached a predetermined position therein, and means for causing the rotation of said screw receiving member to force portions of said external member away from the axis of said screw receiving member.

27. An expansion shield screw receiving member, means for rotating said screw receiving member within an external member in unison with an entering screw after the screw has entered said receiving member a predetermined distance, and means for causing the rotation of said screw receiving member to force portions of said external member away from the axis of said screw receiving member.

In witness whereof, I hereunto set my hand this 17th day of June, 1920.

JOHN EDWARD OGDEN.