J. KENNEDY.

EXPANSION SHIELD.

APPLICATION FILED MAR. 29, 1919.

1,410,258.

Patented Mar. 21, 1922.

2 SHEETS—SHEET 1.

Fig. 1.

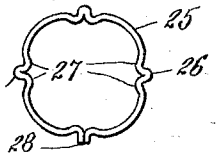


Fig. 2.

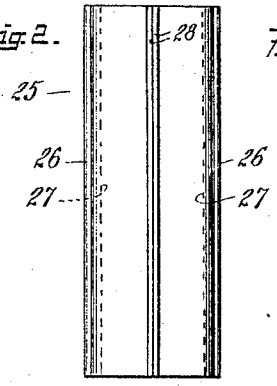


Fig. 3.

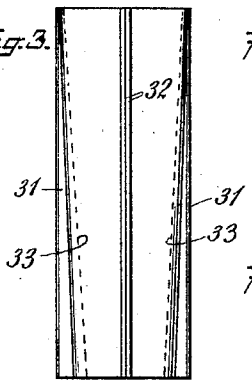


Fig. 4.

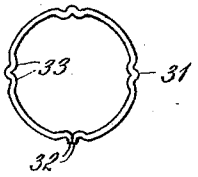


Fig. 5.

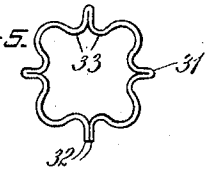


Fig. 6.

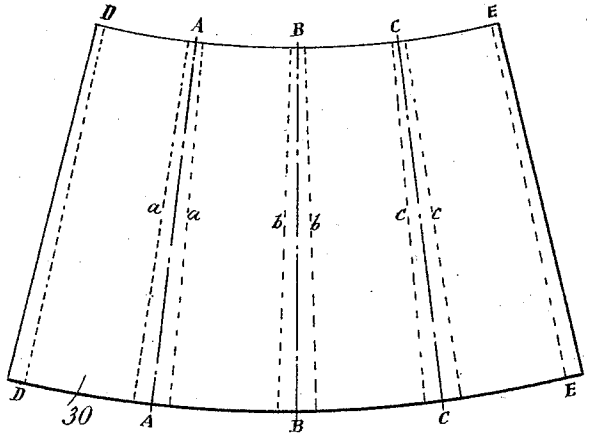


Fig. 8.

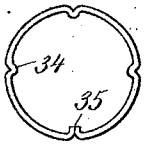


Fig. 9.

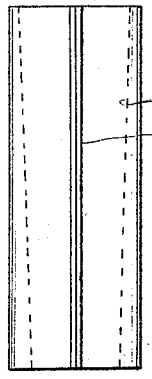


Fig. 7.

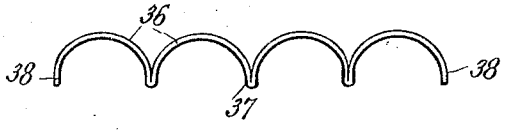


Fig. 10.

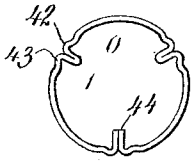


Fig. 11.



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2 SHEETS—SHEET 2.

Fig. 12.

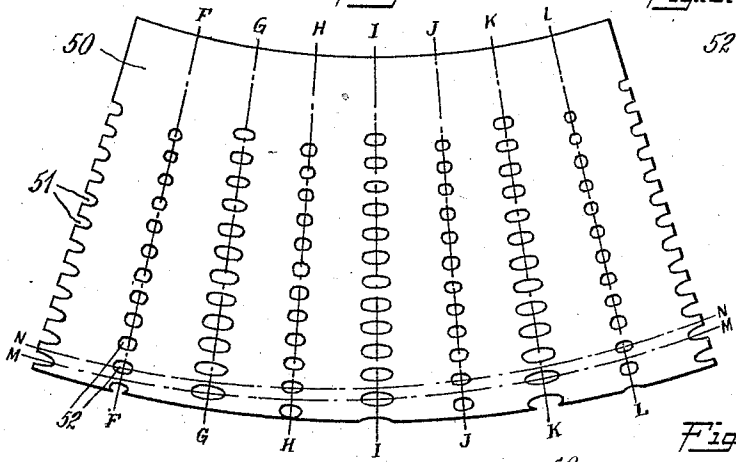


Fig. 13.

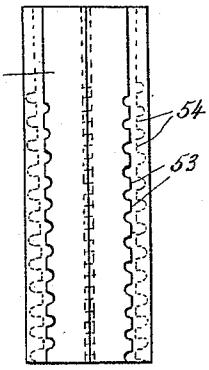


Fig. 14.

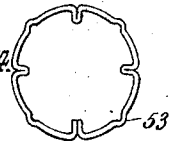


Fig. 15.

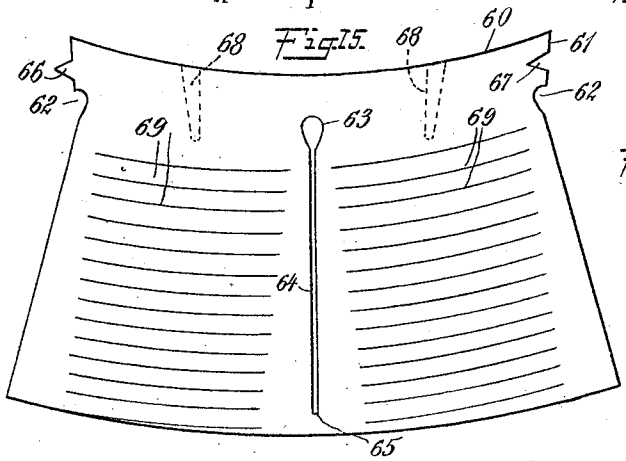


Fig. 16.

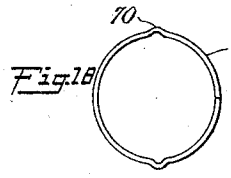


Fig. 19.

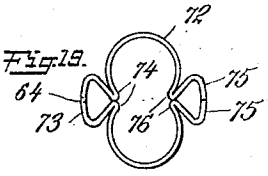


Fig. 18.

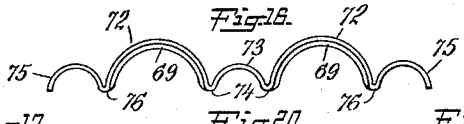


Fig. 22.



Fig. 17.

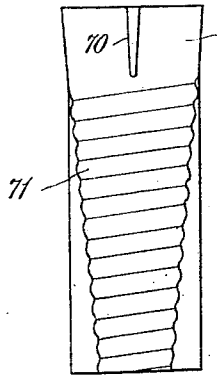


Fig. 20.

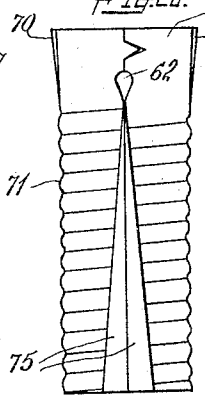


Fig. 21.

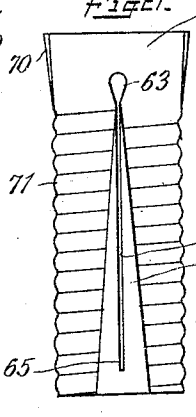
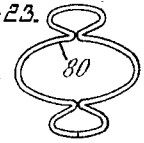


Fig. 23.



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UNITED STATES PATENT OFFICE.

JOSEPH KENNEDY, OF RICHMOND HILL, NEW YORK ASSIGNOR TO J. EDWARD OGDEN, OF MOUNTAINVILLE, NEW YORK.

EXPANSION SHIELD.

1,410,258. Specification of Letters Patent. **Patented Mar. 21, 1922.**

Application filed March 29, 1919. Serial No. 286,126.

To all whom it may concern:

Be it known that I, JOSEPH KENNEDY, a citizen of the United States of America, and a resident of Richmond Hill, Queens 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.

My invention relates to improvements in expansion shields which are designed to be used for bolt anchorages and to a new and useful method of manufacturing such shields. More specifically, it relates to expansion shields which are made of sheet metal and to a method of making such shields of sheet metal.

The object of this invention is to provide a simple and inexpensive device which may be effectively used to hold a bolt or screw in material such as brick, stone or cement with which the threaded device cannot obtain directly a secure hold.

Another object is to provide a simple and inexpensive method of making such expansion shields.

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.

In co-pending applications for patents which have matured as Patents Nos. 1,304,885, 1,304,886, and 1,304,887, dated May 27, 1919, I have disclosed certain inventions which I now believe are not adequately covered by the aforesaid patents because the inventions have been developed in different ways suggested in the the patents, and this application is a continuation in part of these applications.

Referring to the drawings:

Figure 1 is an end view of an expansion shield which is made according to and embodies the present invention. This figure is the same as Figure 14 of said Patent No. 1,304,887.

Figure 2 is a side elevation of the device shown in Figure 1.

Figure 3 is a side elevation of a modified form of the device, shown in Figure 1, as it appears when constructed with a tapered interior.

Figure 4 is a view taken from one end of the device shown in Figure 3.

Figure 5 is a view taken from the other end of the device shown in Figure 3.

Figure 6 is a plan view of a blank of sheet metal before it is bent to form the device of Figures 3, 4 and 5.

Figure 7 is an end view of a blank similar to that shown in Figure 6 stamped or bent in a manner preliminary to a final bending which forms it into a tube.

Figure 8 is an end view of a tube made from the bent stamping shown in Figure 7.

Figure 9 is a side elevation of the tube or shield shown in Figure 8.

Figure 10 is an end view of a shield similar to that shown in Figure 9 illustrating a modified form of construction.

Figure 11 is a view corresponding with Figure 7 showing an end view of a bent blank which is to be folded into a tube having both inwardly and outwardly projecting ribs or folds.

Figure 12 is a plan view of a blank perforated in a manner which provides for the projecting ribs being interrupted or toothed as suggested on page 2, line 21 of Patent No. 1,304,885.

Figure 13 is an elevation of an expansion shield made from a blank like that shown in Figure 12.

Figure 14 is a bottom plan view of Figure 13.

Figure 15 is a plan view of another form of blank, cut to be bent into a shield which also embodies my invention.

Figure 16 is an end view showing a blank of Figure 15 after it has received its first bending.

Figure 17 is a side elevation of the shield made by folding together the blank of Figures 15 and 16.

Figure 18 is a view of the shield shown in Figure 17 from one end thereof.

Figure 19 is a view of the shield shown in Figure 17 from the other end thereof.

Figure 20 is an elevation of the shield shown in Figure 17 taken at right angles to the view in the latter figure.

Figure 21 is an elevation of the same de-

vice showing the opposite side to that shown in Figure 20.

Figure 22 is an end elevation of a shield of modified form of construction which also embodies this invention.

Figure 23 is a view similar to Figure 22 which shows a shield of a still further modification of construction.

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

25 designates a tubular shield which has been formed from a sheet metal blank, parts of which has been pinched together along parallel lines to form outwardly projecting ribs 26 of double thickness, rolled or folded transversely about a central axis into tubular form and with inwardly bent portions 27 adjacent the ribs 26. The longitudinal edges of the blank are bent outwardly as shown at 28 and abut to form one of the outwardly projecting ribs near which are two of the inwardly projecting portions 27.

For some purposes it is desirable to have the bore of the shield constricted in at least one of its transverse dimensions and a convenient way of accomplishing this result is shown in Figures 3–6. In these figures, 30 designates an undivided blank of arcuate form. This is arranged to be folded or pinched together on the lines A—A, B—B and C—C to form the portions between the dotted lines *a*—*a*, *b*—*b*, *c*—*c* into tapered ribs 31. The edges of the blank are folded outwardly at the lines D—D and E—E and these parts when the tube is completed, form the rib 32. Adjacent to these ribs the metal of the blank is folded inwardly to form the parts 33 which form the bore of the shield which tapers from one end of the shield to the other. The shield itself is formed as shown by folding the metal transversely about a central axis.

It is to be noted that the exterior portions of this shield lie in a cylinder. This cylinder is of approximately the diameter of the hole into which the device is inserted. When a screw or bolt is forced into this shield the metal will be expanded and there is an excess of metal at the end of this shield which will be at the inner end of the hole and this excess of metal will become crowded about the screw or bolt to thereby effect a secure anchorage.

It is not necessary that the ribs project outwardly but it is well within the scope of this invention to have them project inwardly. A shield having inwardly projecting tapered ribs is shown in Figures 8 and 9. In these figures the ribs which are formed by pinching a part of the metal together are designated by 34 and the rib which is formed by the abutting edges of the metal, by 35. In constructing this device the metallic blank is first stamped into some such form as that shown in Figure 7 with a plurality of curved portions 36 with the parts 37 between them pinched together in such a way as to form the rib 35 in the finished shield. The ends 38 are bent into such a form that when the shield is completed by folding the metal together they will abut to form a rib such as that shown at 35 in Figure 8.

It is not necessary that the ribs have but two thicknesses of metal but they may be folded if desired, as shown in Figure 10, with portions 40—41 lying against each other and other portions 42—43 bent down over the portions 40 and 41 respectively, to thereby form ribs of four thicknesses. The rib shown at 44 has a similar number of thicknesses of metal, but is formed by the abutting edges of the blank as in the other cases. Either the inwardly projecting portions of the ribs in this Figure 10 or the outwardly projecting portions of the ribs, or both inwardly and outwardly projecting portions, may be tapered.

When it is desired to have both inwardly and outwardly projecting ribs the blank may be first pressed in some such form as that shown in Figure 11 in which case the part designated by 45 will form an outwardly projecting rib as will also the outwardly bent edges 46 of the blank and the parts 47 will form inwardly projecting ribs.

In Figure 12 a blank 50 is shown which has the general arcuate form of that shown in Figure 6. In this case however, the blank is provided with a plurality of indentations 51 at its edges and a plurality of perforations 52 on lines F—F, G—G, H—H, I—I, J—J, K—K and L—L, which diverge or lie in a fan-like relation. These perforations may increase in width toward the lower end of the blank along some such lines as those indicated by the dotted lines *f*—*f*.

The perforations on the lines G—G, I—I and K—K lie on transverse spiral lines such as M—M which pass through the center of two of the notches 51 on the edges of the blank and it is to be understood that the metal on these particular lines and on the edges of the blank is to be bent inwardly to form inwardly projecting ribs. The perforations on the lines F—F, H—H, J—J and L—L lie on spiral lines such as N—N which are intermediate those of the perforations previously pointed out and the metal on these lines is to be pinched together in such a way as to form outwardly projecting ribs in the finished shield.

After these ribs have been formed and the edges of the blank folded inwardly the tube is completed by folding the metal about a central axis to form a shield such as that shown at 52 in Figure 13. The construction is such that the outwardly projecting ribs will have a plurality of teeth 53 and the inwardly projecting ribs will have a plurality of teeth 54. The teeth 54 are pref-

erably so arranged that they lie in a helix of the same pitch as that of the screw which is to be used with this shield, so that the teeth of the screw will readily engage with them. The teeth 53 will lie in a helix of the same pitch but will be between the teeth 54 on the inwardly projecting ribs.

In Figure 15, 60 designates a blank of general arcuate form although the upper sides 61 are cut to flare slightly to the upper edge. Between these portions of this and the rest of the edges which flare in the other direction are indentations or notches 62 and in the center of the blank is a perforation 63 substantially in arcuate alignment with the indentations or notches 62. 64 designates a slot cut vertically in this blank but terminating at 65 short of the lower edge of the blank.

On one of the upper edges 61 is a triangular projection 66 opposite which in the other edge 61 is an indentation 67 of less angularity than that of the projection 66. The dotted lines 68—68 designate portions of this blank which are to be pinched together to form short outwardly projecting ribs 70 in the finished shield. The lines 69 designate portions of the blank which are to be stamped into corrugations which in the finished shield are designated by 71.

The first step toward forming a shield from such a blank after it has been corrugated is illustrated in Figure 16 which shows portions of the blank bent into transverse curves 72 with an intermediate curved portion 73 connected with the parts 72 along lines at 74. The outer edges of the blank are also bent to form curved portions 75—75 joined to the portions 72 along lines at 76.

The shield is then finished by folding the blank thus formed around a central axis as shown in Figures 17–21. The upper end of the shield thus formed will be substantially circular as shown at 77 in Figure 18 with the short ribs 70 projecting therefrom. This upper portion of the shield will however flare outwardly toward the upper end of the shield and this form is provided for the purpose of closely fitting the outer end of the hole and of facilitating the insertion of a bolt or screw. The parts 74 and 76 however are so arranged that when the shield is completed they will converge toward the lower end of the shield to make the interior thereof similar in cross-sectional form to an hour glass, that is, these parts will converge to restrict the bore of the shield in one of its transverse dimensions. The outer portions of the shield will substantially throughout its length, be cylindrical and of a diameter corresponding with that of the hole in which the device is to be used. The part of the shield which is formed of the portion 73 will increase in cross-sectional dimension toward the lower end of the shield and so will the opposite part of the shield which is formed of the parts 75—75. The slot 64, when used, will divide the part of the shield formed by the portion 73 throughout the greater part of the length of the shield and the opposite part formed by the portion 75 will be divided throughout the length of the shield.

When the blank is folded together to form the tubular shield, the projection 66 will register with the indentation 67 as shown in Figure 20 and will serve to hold the edges of the shield in alignment in such a manner as to maintain the corrugations 71 in helical alignment. These corrugations are provided for the purpose of forming the inner bore of the shield with the internal screw threads with which the threads of a bolt or screw may engage. It may be seen that the shield thus formed has a central chamber which diminishes from a cylindrical form at the upper end to that of the hour glass form shown in Figure 19 at the lower end. When the bolt is inserted this part of the shield will be spread apart by the threads of the bolt. The transverse length of the restricted part of the bore of this device is, however, substantially the same as that of the internal periphery of the shield at its upper end so that when the bolt is inserted the metal of this shield will substantially surround the threads of the bolt. The completed shield also has two longitudinal chambers formed within the parts formed by the portion 73 and the portions 75—75. These chambers increase in size toward the lower end of the shield so that they provide an excess of metal so that when the bolt is inserted it will be crowded between the inner surface of this shield and the wall of the hole in which the shield is inserted to thus form a secure anchorage.

It is not necessary that the constriction of the bore of the device be made in hour glass form, for example, in Figure 22 the inner end of a shield which embodies this invention, is shown with the inwardly projecting portions 78 and the abutting edges 79 symmetrically disposed.

Figure 23 shows the inner end of a shield similar in construction to that already described, but with the inner end of the bore 80 elliptical in form instead of constricted into hour glass cross-sectional form.

I have illustrated and described a number of different modifications of this invention in order to show that I do not intend to limit myself to any specific form of construction, and in fact, intend no limitations other than those imposed by the appended claims.

What I claim is:

1. An expansion shield of sheet metal with parts of the metal folded together to form ribs of a plurality of thicknesses, and folded

transversely into a tube having edges of the metal extending from one end to the other thereof.

2. An expansion shield of sheet metal with parts of the metal folded together to form tapered outwardly projecting ribs of a plurality of thicknesses, and folded transversely into a tube having edges of the metal extending from one end to the other thereof.

3. An expansion shield of sheet metal with parts thereof bent to form longitudinal indentations, and folded transversely into a tube having edges of the metal extending from one end to the other thereof.

4. An expansion shield of sheet metal with parts thereof bent to form longitudinal tapered indentations and folded around a longitudinal axis with edges of the metal extending from one end to the other of the shield.

5. An expansion shield of sheet metal with parts of the metal folded together to form ribs of a plurality of thicknesses and other parts bent to form indentations substantially parallel with said ribs, and folded transversely into a tube having edges of the metal extending from one end to the other thereof.

6. An expansion shield of sheet metal having a smaller transverse dimension near one end than at other parts thereof with parts of the metal folded together to form tapered ribs of a plurality of thicknesses, and folded transversely into a tube having edges of the metal extending from one end to the other thereof.

7. An expansion shield of sheet metal having a smaller transverse dimension near one end than at other parts thereof, with parts of the metal folded together to form tapered ribs of a plurality of thicknesses, other parts of the metal bent to form tapered indentations substantially parallel with said ribs, and folded transversely into a tube having edges of the metal extending from one end to the other thereof.

8. The herein described method of making an expansion shield which consists of cutting out a sheet metal blank having flaring sides, making longitudinally disposed bends therein to bring said sides substantially parallel, and folding said blank transversely into a tube.

9. The herein described method of making an expansion shield which consists of cutting out a sheet metal blank having flaring sides, folding together parts of said blank to form longitudinally disposed ribs and to bring said sides substantially parallel, and folding said blank transversely into a tube.

10. The process of making an expansion shield which consists in making a four-sided undivided sheet metal blank having one side of a length equal to the length of the shield, one end having a length approximately equal to the circumference of the completed shield and the opposite end having a greater length, and folding the blank transversely into a tube, with the outer portions thereof of greatest diameter lying substantially in the same cylinder.

11. The herein described method of making an expansion shield which consists of cutting out a sheet metal blank, making longitudinally disposed bends therein, and folding said blank transversely around a longitudinal axis.

12. The herein described method of making an expansion shield which consists of cutting out a sheet metal blank having flaring sides, making longitudinally disposed bends therein to bring said sides substantially parallel, and folding said blank transversely around a longitudinal axis.

13. The herein described method of making an expansion shield which consists of cutting out a sheet metal blank, making folds therein to provide an excess of metal, and folding said blank around a longitudinal axis.

14. The herein described method of making an expansion shield which consists of cutting out a sheet metal blank having flaring sides making longitudinally disposed bends therein projecting from one side of the blank, making other longitudinally disposed bends projecting from the other side of the blank, and folding said blank transversely around a longitudinal axis.

15. The herein described method of making an expansion shield which consists of cutting out a sheet metal blank having flaring sides making longitudinally disposed bends therein to form tapered depressions which will project inwardly into the finished tube, making other longitudinally disposed bends therein to form tapered ribs which will project outwardly from the finished tube and by said bends bring the sides of the blank into substantial parallelism and folding said blank transversely around a longitudinal axis.

In witness whereof, I have hereunto set my hand this 24th day of March, 1919.

JOSEPH KENNEDY.