No. 685,821. Patented Nov. 5, 1901.

J. H. COOK.

EXPANSION SHIELD.

(Application filed Mar. 14, 1901.

(No Model.)

Fig.3

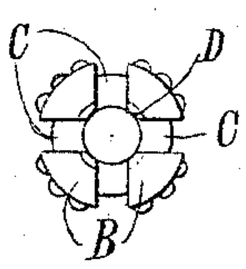


Fig.1

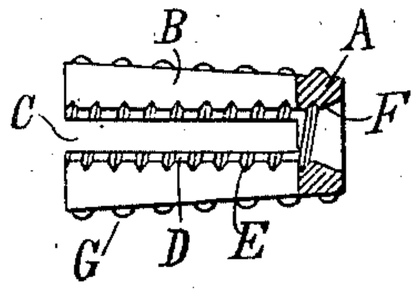


Fig.2

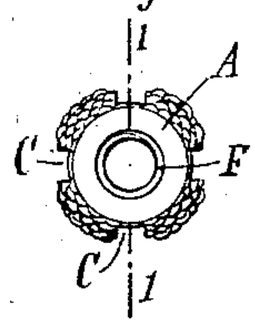


Fig.5

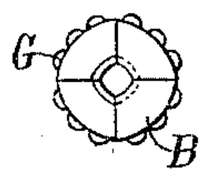


Fig.4

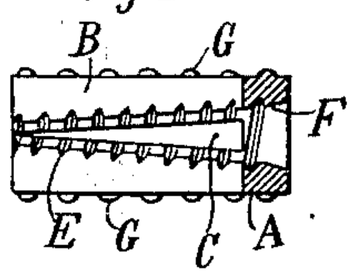
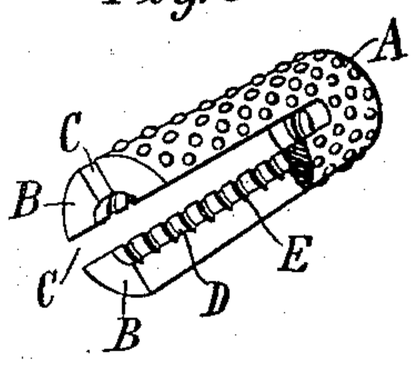


Fig.6



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UNITED STATES PATENT OFFICE.

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EXPANSION-SHIELD.

SPECIFICATION forming part of Letters Patent No. 685,821, dated November 5, 1901.

Application filed March 14, 1901. Serial No. 51,091. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. COOK, a citizen of the United States, residing in the city of New York, borough of Brooklyn, county of Kings, 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 drawings accompanying and forming part of the same.

My present invention relates to expansion-shields by which a threaded bolt is adapted to be secured to marble, slate, tiling, or other fragile material by being forced into such an expansion-shield fitted in a hole in such material.

In the accompanying drawings, in which like reference-letters refer to same parts throughout the several views, Figure 1 is an axial section through my shield, taken on the line 1 1 of Fig. 2. Fig. 2 is an end elevation of my shield looking at the head of the shield. Fig. 3 is an elevation looking at the other end of the shield, the shield in these figures being in its expanded position. Fig. 4 is an axial section of my shield when in a closed position. Fig. 5 is an end elevation of the same, and Fig. 6 is a perspective view showing the shield in its expanded position.

My expansion-shield is formed of expansible material, such as soft metal, so that the various parts of the same can yield and accommodate themselves to any cavity into which the shield may be inserted. The shield consists of a tubular head A at one end, which is connected with four longitudinally-extending sections or members B. The shield is formed in the expanded position shown in Figs. 1 to 3, and the head of the shield and members B have an exterior conical surface, the diameter of the head being considerably less than the diameter of the members B at the other end of the shield when such shield is expanded. The head is formed with a conical central bore F, which communicates with a cylindrical bore extending axially through the rest of the shield, there being grooves D formed on the interior of the members B. These grooves are intended to form the seat for the screw-bolt which is to be inserted into the expansion-shield, and in order that such bolt may be more readily inserted and grip the shield more firmly a screw-thread E is cut on the interior surface of the members B throughout the length of the same. As is clearly seen in Fig. 3, the sections or members B are separated from each other by longitudinal slots C, extending up to the head A. Since these slots are of considerable width, the sections B are quite narrow where they engage the bolt on the inside of the shield. The exterior of the shield is formed with suitable projections G to assist the shield in gripping the material into which it is inserted.

After the shield has been formed, as above described, in any suitable way the sections B are bent inward, so as to come practically in contact at the outer ends of the same, so that the shield will take the position shown in Figs. 4 and 5 and so that it will have a substantially cylindrical form for more ready insertion into a cylindrical hole. As is seen in Fig. 4, the central cavity through the shield is tapering under these conditions, and the outer end of the same adjacent to the head A is of the same diameter as in the expanded shield, as shown in Fig. 1. It will be noted also that the radial thickness of the members B varies from end to end of the same, such members being considerably thicker at their free ends than they are adjacent the head A.

The operation of my shield is as follows: A substantially cylindrical hole is formed in any material—such as brick, tiling, or wood—to which it is desired to secure a screw-bolt, and the shield while in the contracted position shown in Fig. 4 is inserted into said hole, the head of the shield A being outward. A screw-bolt is then readily inserted into the conical cavity in the head of the shield and readily engages the threads cut on the inside of the members B. The screw is driven home as far as desirable into the shield and forces its way gradually along the tapering bore between the members B, keeping in engagement with the interior threads cut upon the same and at the same time forces such members radially outward. Since the screw engages the members B upon the comparatively narrow inner edges of the same, the force with which the members are driven out radially is much less than would be the case if the screw were in engagement with such members

throughout its whole periphery. The members B, therefore, are forced out radially with a gentle pressure and come into engagement with the walls of the cavity into which the shield is inserted and conform accurately to such cavity, the slight projections G upon the exterior of the shield assisting in this action. The members B are, formed, as has been stated, with a threaded interior surface, so as to give a screw inserted into the shield a much better grip upon them and so as to render the insertion of such screw very much more easy than would be the case if the screw cut its own thread upon the interior of these members. My shield in operation is therefore very much more reliable and also allows a screw to be attached more readily to material than other shields having an unthreaded bore. The projections G are forced into any slight depressions that there may be in the interior of the hole and therefore give the shield an increased grip upon material into which it is inserted. The shield will grip the material more tightly near the ends of the members B than near the head of the shield if a screw is inserted throughout the whole length of the shield, because the members B have a greater radial thickness at their free ends, and the insertion of a screw throughout the whole shield will therefore cause a greater radial pressure at the free ends. It will be seen, therefore, that if the material is at all yielding, so that the bottom of the hole can be enlarged slightly in diameter under the radial pressure of the shield, a dovetail action will take place, which will hold the screw within the shield firmly in place. This radial pressure of the shield against the material into which it is inserted is so gradual and gentle that even the most fragile material will not be broken, and yet the shield engages the material in such a way as to firmly hold the screw within the same to such material.

While I have shown four members attached to the head of the shield, I do not wish to be limited to this exact construction. Any number of members could be used, and, indeed, if the shield is made of sufficiently soft material the longitudinal slots need not extend from the exterior of the shield to the longitudinal bore of the same, or, indeed, under some conditions the shield need not be slotted at all. The exterior of my shield may be formed either with suitable projections, as shown, or with ribs to engage the material into which the shield is inserted, or, if desired, it may be made plain. I have shown each one of the members B as being provided with a single screw-engaging rib upon the inner surface of the same. It is possible, however, to form such members with several screw-engaging ribs, so that they will still engage the screw throughout only a portion of the periphery of the same and so that they will still act to expand the shield radially in a gentle manner.

I do not wish to be limited to the exact proportions and constructions which I have shown and described, because many variations could be made by persons skilled in the art without destroying the advantages which result from my invention.

The exact scope of my invention will be set forth in the appended claims.

What is claimed as new is—

1. In an expansion-shield, consisting of a block of soft expansible material, ribs formed upon the interior of such block, having a screw-thread cut upon such ribs throughout the length of the same to be engaged by the thread of a screw.

2. In an expansion-shield, consisting of a block of soft expansible material, provided with a cavity in the same, the walls of such block being of varying thickness longitudinally of the block, ribs formed upon the interior of such block and a screw-thread cut upon such ribs.

3. In an expansion-shield, consisting of an expansible block of soft material formed with a longitudinal hole in the same, the walls of such block being of varying thickness longitudinally of the block and the interior of such cavity in the block being formed with screw-threads arranged to engage a screw-bolt inserted therein.

4. In an expansion-shield, consisting of a block of soft expansible material, the walls of such shield being of varying thickness longitudinally of the block and a screw-thread being formed throughout the interior of said block so as to be engaged by a screw inserted into said block.

5. In an expansion-shield, a tubular head, a series of longitudinally-extending members connected to said head, such members having a conical exterior surface and a cylindrical screw-threaded interior surface arranged to be engaged by the screw inserted into said shield throughout a portion of the periphery of the same, such members being arranged to yield radially so as to give the shield a substantially cylindrical form.

6. In an expansion-shield, a tubular head, a series of longitudinally-extending members of expansible material connected to said head, such members being of greater radial thickness at their free ends than adjacent such head, and being formed with a screw-thread upon the interior surface of such members.

7. In an expansion-shield, formed of expansible material, a tubular head, a series of members having a roughened conical exterior surface attached to such head, there being longitudinal slots between such members, a longitudinal threaded bore being formed through the shield between such members arranged to be readily engaged by a screw-bolt inserted into such shield to expand the same.

8. In an expansion-shield formed of expansible material and a head provided with a tapering hole, a longitudinally-slotted body integral with said head having a longitudinal

threaded bore in alinement with the conical hole in the head, such shield having a roughened conical exterior surface so that the radial thickness of the shield is less at the head of the same than at the other end, whereby the slotted body of the shield is arranged to be contracted to a substantially cylindrical form.

9. In an expansion-shield formed of expansible material, a tubular head formed with a conical hole, a longitudinally-slotted body attached to the same formed with a roughened conical exterior surface and a threaded cylindrical inner bore in alinement with the conical hole in the head, the slots in the body of the shield forming ribs which are adapted to engage a screw inserted into the bore of the shield throughout only a portion of the periphery of the same whereby the shield is arranged to be expanded with a gentle radial pressure gradually increasing away from said tubular head by a screw engaging the threads upon the bore of the shield.

10. In an expansion-shield consisting of a tubular block of soft expansible material having a cavity formed therein, said block being threaded throughout the length of such cavity to receive a bolt inserted in said cavity and being formed to engage said bolt through only a small portion of the periphery of the same so as to yieldingly force the expansible material outward.

11. In an expansion-shield consisting of a block of soft expansible material having a tubular head, a plurality of sections connected therewith, and separated from each other by longitudinal slots and provided with interior projections formed by the intersection of the slots, said sections being threaded internally throughout their entire extent to be readily engaged by a screw.

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