

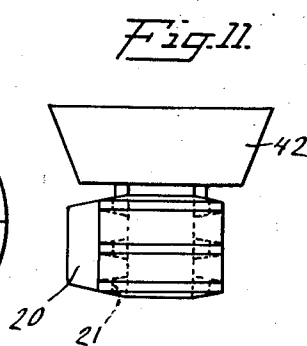
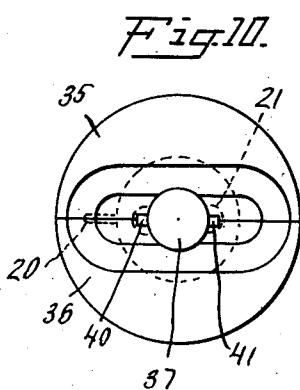
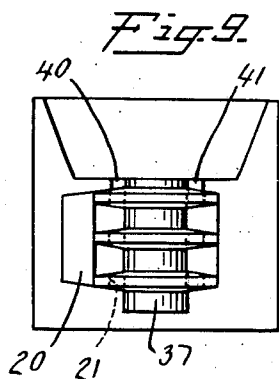
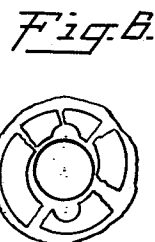
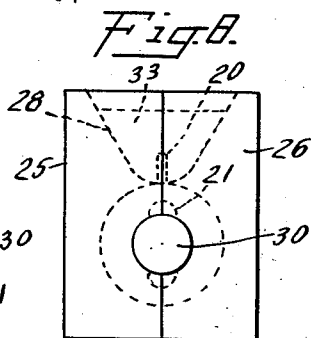
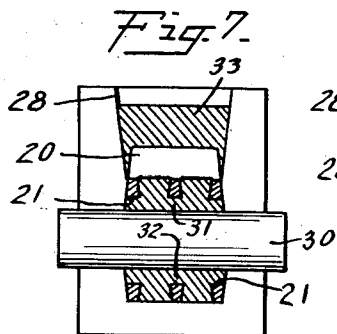
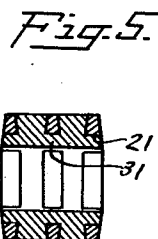
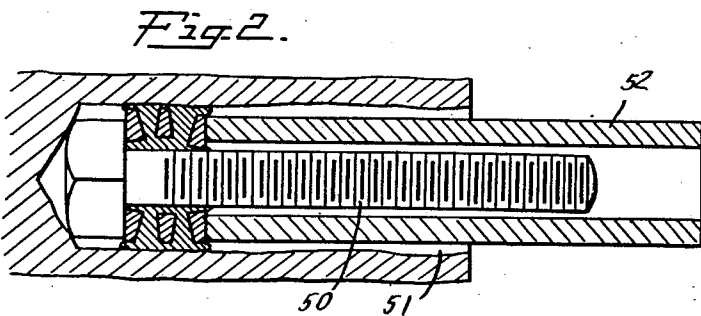
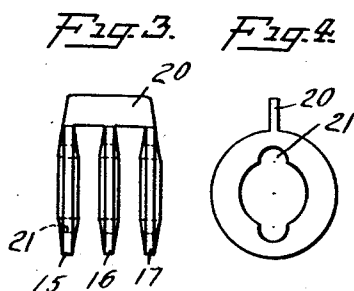
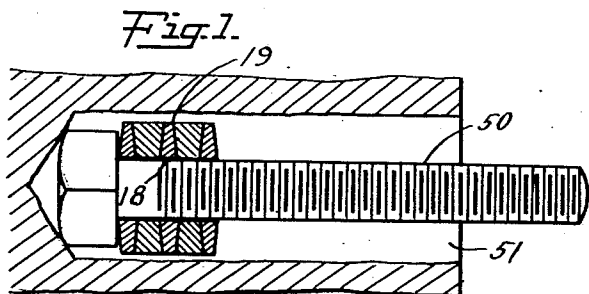
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R. E. McINTOSH

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BOLT ANCHOR

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INVENTOR  
Roy E. McIntosh  
BY  
Marshall & Hawley  
ATTORNEYS

## UNITED STATES PATENT OFFICE

ROY E. MCINTOSH, OF NEW YORK, N. Y., ASSIGNOR TO J. EDWARD OGDEN COMPANY, INC., OF EAST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY

## BOLT ANCHOR

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This invention relates to bolt anchors adapted for forming anchorages in material such as brick, stone or cementitious material not adapted to directly receive and retain a threaded element.

The invention has for its salient object to provide an anchor that is simple and practical in construction, comprises a minimum number of parts, and will form an efficient anchorage.

Another object of the invention is to provide an anchor that can be easily and quickly expanded to anchoring position and is particularly effective in oversized holes.

Another object of the invention is to provide a simple and inexpensive method of making an anchor constructed in accordance with the invention.

Further objects of the invention will appear from the following specification taken in connection with the drawing, which forms a part of this application, and in which

Fig. 1 is a sectional elevation showing an anchor constructed in accordance with the invention disposed in a wall opening prior to expansion;

Fig. 2 is a view similar to Fig. 1 showing the method of expanding the anchor and the anchor in expanded position;

Fig. 3 is an elevational view showing a plurality of washers and a web retaining the washers in spaced relation to each other;

Fig. 4 is an end elevation of the construction shown in Fig. 3;

Fig. 5 is a sectional elevation of the anchor; Fig. 6 is an end elevation of the expanded anchor;

Fig. 7 is an elevational view showing one-half of a two part mold and one method of forming the anchor;

Fig. 8 is an end elevation of the mold shown in Fig. 7;

Fig. 9 is a view similar to Fig. 7 but showing one-half of a two part mold and another method of forming the mold;

Fig. 10 is a top plan view of the construction shown in Fig. 9; and

Fig. 11 is an elevational view showing the anchor as it is taken out of the mold shown in Figs. 9 and 10.

The invention briefly described consists of a bolt anchor comprising a plurality of washers formed of relatively hard metal, preferably frangible, and a body portion of relatively soft or ductile metal which forms a bond for holding the washers in spaced relation and is adapted to be expanded by pressure exerted longitudinally of the axis of the anchor. The washers are preferably tapered in cross section, being thicker at the inner periphery than at the outer periphery thereof. When the washers are cast, a web connects them and holds them in spaced relation to each other.

The washers and connecting web are placed in a mold and a core is placed in the central opening of the washers. At their inner peripheries the washers are recessed or notched, the recesses being disposed in alinement to permit the relatively soft metal to flow longitudinally of the axis of the washers. Two different methods of forming the anchor are shown. In one method the washers are supported with their axis horizontal and the connecting web extends into the pouring spout. As the soft metal is poured into the mold, the spaces between the washers are filled and the washers are bonded together by one or more longitudinally extending webs of soft metal, these webs being formed in the recesses. After the metal has been poured and the mold sections have been separated, the soft metal sprue is broken off and the web which connected the washers will be broken off with the sprue.

In another form of the invention the washers are supported with their axis vertical, as shown in Figs. 9, 10 and 11.

Further details of the invention will appear from the following description.

In the particular form of the invention illustrated in the drawing, a plurality of washers 15, 16 and 17 are cast with an integral connecting web 20. The washers are preferably tapered in cross section, being thicker at their inner periphery, as shown at 18, than at their outer periphery, as shown at 19.

The washers are provided with alined recesses or notches 21 which extend radially

from the inner periphery and in the form of the invention shown in Fig. 4 two sets of recesses are illustrated at diametrically opposite points.

5 Figs. 7 and 8 illustrate one method of forming the anchorage. In these figures there is shown a mold comprising two sections 25 and 26. The washers and connecting web 20 are placed in the mold, as shown in Fig. 8, with  
10 the connecting web 20 extending upwardly into the pouring spout 28. A core 30 extends through the mold and through the openings in the washers, as shown in Fig. 7.

15 The soft metal is melted and poured into the pouring spout 28 and fills the spaces between the washers and flows longitudinally in the mold, forming a pair of bonding or connecting portions 31 and 32.

20 When the anchor is removed from the mold, the soft metal sprue 33 which is formed in the gate opening and web 20 are broken off, leaving the anchor in the form shown in Fig. 5.

25 In the method illustrated in Figs. 9, 10 and 11, the washers and web are supported vertically between a pair of mold sections 35 and 36 and a central core 37 extends through the washers. The melted soft metal is poured through openings 40 and 41 and fills the  
30 spaces between the washers and also the recesses 21. The anchor as it is removed from the mold is shown in Fig. 11. The sprue 42 is then broken off and the web 20 is also broken off, leaving the anchor in the form  
35 shown in Fig. 5.

The anchor is expanded in the manner shown in Figs. 1 and 2. A headed bolt 50 is passed through the anchor and the anchor and bolt are inserted in the wall opening or  
40 hole in the manner shown in Fig. 1. A pipe or tubular member 52 is placed around the shank of the bolt and is tamped with a hammer or other suitable tool, thus forcing the soft or ductile metal body portion of the  
45 anchor to be expanded laterally into gripping engagement with the wall opening. The hard metal of the washers is preferably frangible and breaks into fragments under the pressure exerted by the expanding tool.  
50 As the hard metal washers are broken, the soft metal fills the spaces between the fragments and since the washers are tapered the soft metal will be forced laterally and outwardly. As a matter of fact, the broken  
55 fragments of the hard metal washers function in a manner similar to the aggregate in concrete and reinforce the anchor.

60 Anchors such as that described may be used singly or, if desired, a plurality of such anchors may be used and in this case they are expanded successively.

65 Although certain specific embodiments of the invention have been particularly shown and described, it will be understood that the invention is capable of modification and that

changes in the construction and in the arrangement of the various cooperating parts may be made without departing from the spirit or scope of the invention, as expressed in the following claims. 70

What I claim is:

1. A bolt anchor comprising a body portion of relatively soft metal having a central opening therethrough, and a plurality of spaced washers of relatively hard metal surrounding said opening and embedded in said soft metal body portion, said washers having openings coaxial with the opening in the soft metal and being held in spaced relation by said soft metal. 75

2. A bolt anchor comprising a body portion of relatively soft metal, and a plurality of spaced washers of relatively hard metal embedded in said soft metal body portion, said washers being wedge-shaped in section and held in spaced relation by said soft metal. 80

3. A bolt anchor comprising a body portion of relatively soft metal having a central opening therethrough, and a plurality of spaced washers of relatively hard frangible metal surrounding said opening and embedded in said soft metal body portion, said washers having openings coaxial with the opening in the soft metal and being held in spaced relation by said soft metal. 85

4. A bolt anchor comprising a plurality of relatively hard metal washers having their axes coincident and disposed in spaced relation to each other, and a body portion of relatively soft metal embedding said washers and bonding the washers in spaced relation to each other. 90

5. A bolt anchor comprising a plurality of alternately arranged, successive transverse sections of elements of relatively hard metal and of relatively soft metal, said sections being bonded together into an integral unit. 95

6. A bolt anchor comprising a plurality of alternately arranged, successive transverse layers of elements of relatively hard metal and of relatively soft metal, said layers being bonded together into an integral unit, the layers of hard metal being tapered and thicker at the portions nearest the axis of the anchor. 100

7. A bolt anchor comprising a plurality of alternately arranged, successive transverse, apertured layers of elements of relatively hard metal and of relatively soft metal, said layers being bonded together into an integral unit, said anchor having a central bore or opening therethrough formed by said apertures. 105

8. A bolt anchor comprising a plurality of apertured washers of relatively hard metal arranged in spaced relation with their axes coinciding and the openings therein in substantial alinement, and a body portion of ductile metal filling the spaces between the 110

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washers and forming a bond to hold the washers.

5 9. A molded bolt anchor unit comprising a structure having spaced oppositely facing outwardly tapered portions of relatively hard metal, and a sleeve of relatively soft material disposed between said tapered portions and filling the space therebetween prior to expansion of the anchor.

10 10. A molded bolt anchor unit comprising a structure having oppositely facing portions inclined relative to the axis of the anchor and away from each other and formed of relatively hard metal, the parts of said portions  
15 remote from the axis being farther apart than the parts nearer the axis, and a sleeve of relatively soft material disposed between said portions and filling the space therebetween prior to expansion of the anchor.

20 11. A molded bolt anchor unit comprising a structure having oppositely facing portions inclined relative to the axis of the anchor and away from each other and formed of relatively hard metal, and a sleeve of relatively  
25 soft material disposed between said portions and filling the space therebetween prior to expansion of the anchor.

12. A molded unit for a bolt anchor comprising a structure having a plurality of oppositely facing portions held in spaced relation by an integral member, said portions and member being formed of relatively hard material, and a sleeve of relatively soft material disposed between and filling the space  
35 between the oppositely facing portions.

13. A molded bolt anchor unit comprising a structure having spaced oppositely facing tapered portions of relatively hard metal, and a sleeve of relatively soft material disposed  
40 between said tapered portions and filling the space therebetween prior to expansion of the anchor.

14. A bolt anchor unit comprising a body portion of relatively soft metal and a plurality of spaced washers of relatively hard frangible metal, said washers surrounding the bolt and being held in spaced relation by said soft metal and the spaces between the washers being filled thereby.

50 ROY E. McINTOSH.

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