

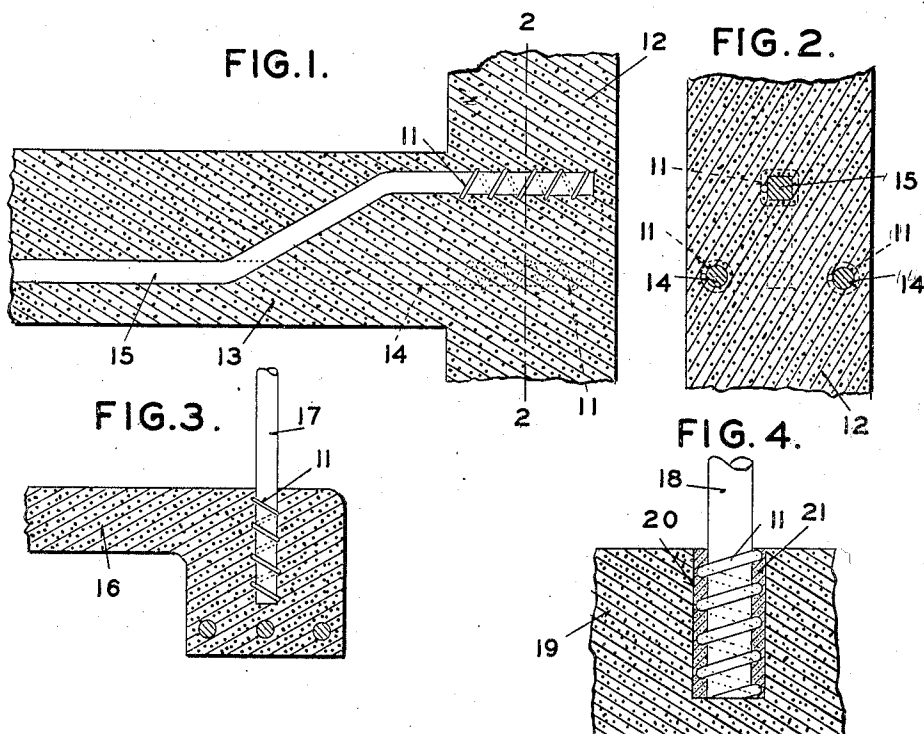
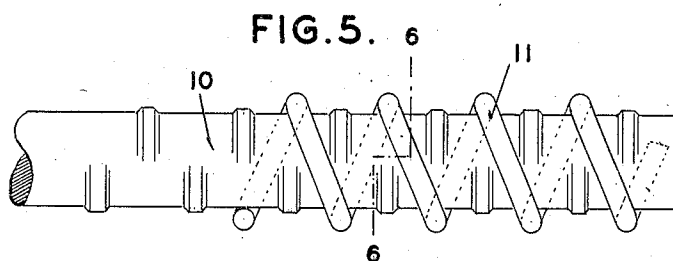
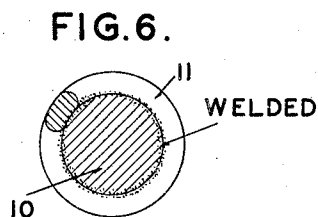
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METHOD OF MAKING EMBEDDED BARS

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METHOD OF MAKING EMBEDDED BARS

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1 Claim. (Cl. 72-111)

Bars embedded in concrete structures require bonding means in addition to the cohesion between the concrete and the surface of the bars in order that the required stresses may be carried by the bars without causing rupture between the bars and the cement. Particularly is this true at the ends of the bars where the bond stresses are greatest, or at intermediate points of the bars where abrupt change in location of the bars or sudden changes in the forces acting on the structure cause rapid change in the stresses carried by the bars.

Among means heretofore employed to secure anchoring of the bars at their ends are the following:

The ends of the bars have been provided with semicircular hooks. The ends of the bars have been upset with or without threading of the upset portion. The ends of the bars have been provided with plate structure positioned within or just outside of the concrete and secured to the bars by welding or by a threaded connection. All these means can be utilized only at the ends of the bars and necessarily extend for a considerable distance at one side of or around the bars, thus creating a crowded condition not conducive to the best results in pouring concrete and carrying the stresses. Such stresses may, therefore, be highly concentrated and improperly distributed, producing a tendency to split or crush the material in which the bars are embedded.

The bond strengthening means commonly used in an intermediate portion of a bar consists in providing the bar with deformations or protrusions formed in the operation of rolling the bar. These protrusions, due to their method of formation, can only be of relatively small size and must be distributed uniformly along the bar. They are, therefore, insufficient to provide the necessary bond between the bar and the concrete at the points of greatest stress.

The object of my invention is to provide a form of bond strengthening means for bars enclosed in cementitious material which may be applied at any point or points along the bar and which may be made of any desired size and so distributed around and along the bar as to avoid concentration of stresses between the bar and the concrete which are liable to cause localized crushing of the concrete, and also to avoid any eccentric location of the anchoring and bond strengthening means.

In the accompanying drawing, which illustrates some applications of my reinforcing bar anchorage, Figure 1 is a vertical section through

a beam structure; Figure 2 is a section taken on the line 2-2 of Figure 1; Figure 3 is a vertical section through another form of beam in which the bar consists of a hanger rod having short embedment; Figure 4 shows the anchorage applied to an embedded bolt; Figure 5 is an enlarged side view of a deformed bar embodying my invention; and Figure 6 is a section taken on the line 6-6 of Figure 5.

In carrying out my invention I utilize any usual form of reinforcing bar having round, square, or other cross-section, and either plain or deformed. In Figure 5 I have shown in detail a deformed bar 10 to which a spiral anchorage 11 is applied. The anchorage is formed of a spiral wire. This spiral may be pre-formed, compressed to increase its internal diameter, passed over the bar, and allowed to expand into firm contact therewith, or it may be wound directly upon the rod. Either at the time of or after application, the coil is welded to the rod so as to form substantially an integral structure therewith. It will be evident that the wire size, the number of turns, and pitch, i. e., the distance between successive turns, may be chosen so that the maximum bond strengthening effect is obtained exactly where desirable and without liability of crushing or splitting the concrete.

In Figures 1 and 2 I have shown a structure including an upright 12 and a beam 13 in which structure are embedded in the bottom of the beam two round reinforcing bars 14 and one square reinforcing bar 15 bent up into the top of the beam over the support. The ends of the bars at the supporting element 12 where the maximum bond stresses occur in the structure illustrated are provided with spiral anchorages 11.

In Figure 3 I have shown a beam and slab structure 16 which is wholly or partially supported by a suspension rod 17 having the spiral anchorage 11 applied to substantially the entire portion of the bar embedded in the concrete.

In Figure 4 I have shown a structure in which the bar is in the form of a bolt 18 applied to a block 19 of concrete, stone, or masonry. In this construction a hole 20 is drilled in the block, which hole is of the same or but slightly greater diameter than the external diameter of the anchoring coil 11 carried on the bolt. Grouting 21 fills the space around the bolt. The grouting may be firmly packed in the opening by rotating the bolt, the spiral 11 acting as a screw propeller to perform the packing operation.

While I have shown the spiral anchorages as

being applied adjacent the ends of the bars, it is evident that they may be applied at any intermediate portion or portions of the bar where excessive bond stresses may occur over limited 5 lengths of the bar and so provide for any contingency of design. I also desire it to be understood that by the term "welding" I wish to include soldering, brazing, or equivalent means.

Having fully described my invention, what I

claim as new and desire to secure by Letters Patent of the United States is:

The method of providing a bar with anchoring means which comprises pre-forming a coil, compressing the coil, applying it to the bar, allowing 5 it to expand into intimate contact therewith, and welding it thereto to form a substantially integral part thereof.

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