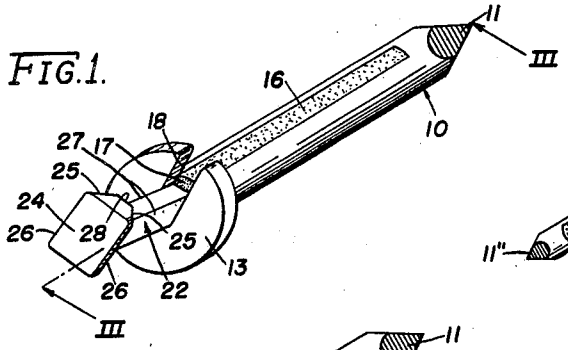
June 23, 1942. W. R. REYNOLDS 2,287,395

SELF-ANCHORING DEVICE

Filed July 15, 1940 2 Sheets-Sheet 1

FIG. 1.



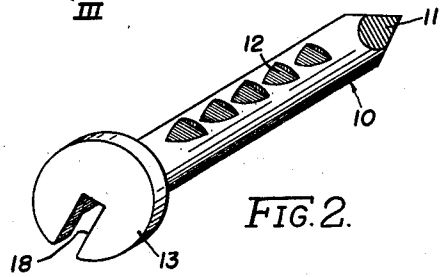


FIG. 2.

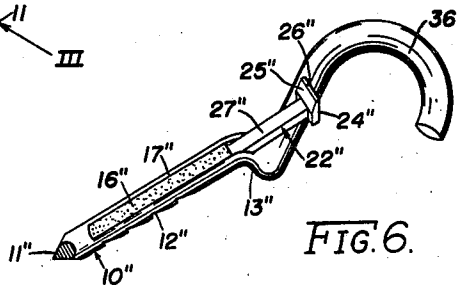


FIG. 6.

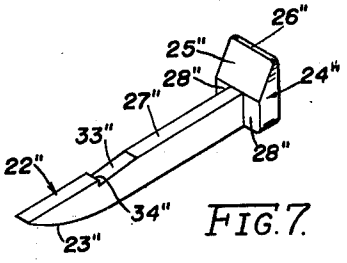


FIG. 7.

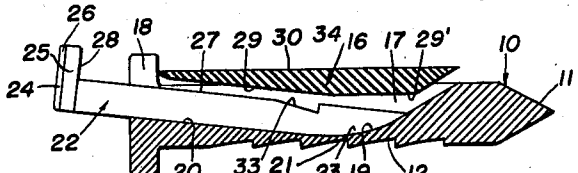


FIG. 3.

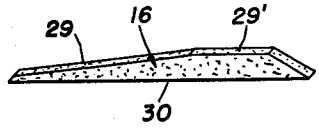


FIG. 8.

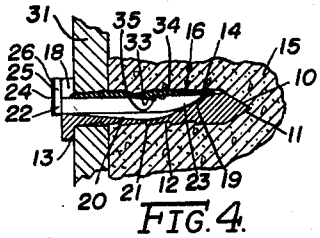


FIG. 4.

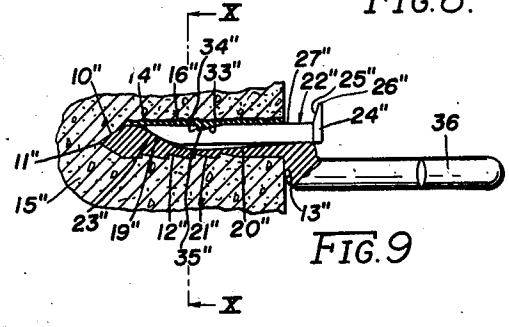


FIG. 9.

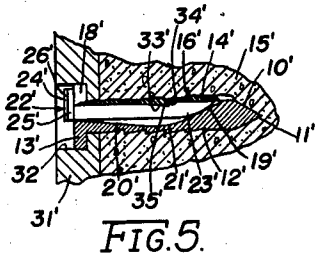


FIG. 5.

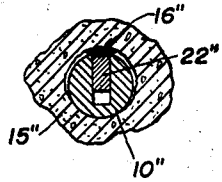


FIG. 10.

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SELF-ANCHORING DEVICE

Filed July 15, 1940 2 Sheets-Sheet 2

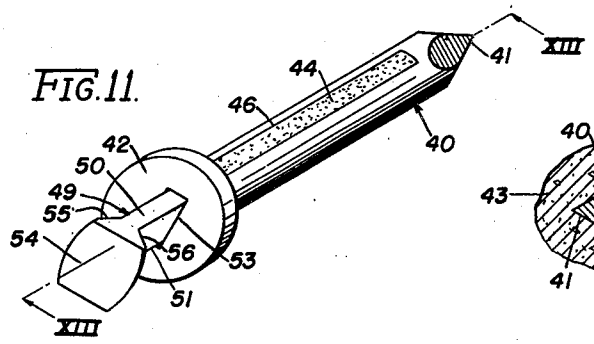


FIG. 11.

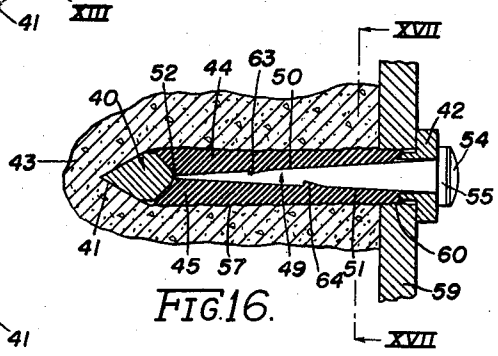


FIG. 16.

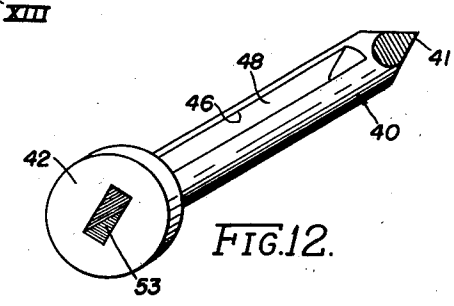


FIG. 12.

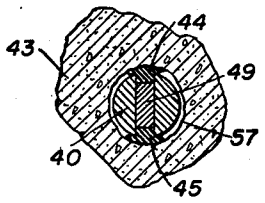


FIG. 17.

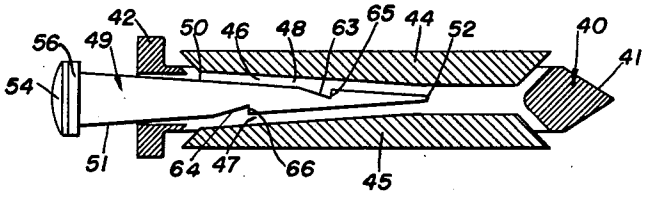


FIG. 13.

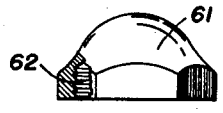


FIG. 18.

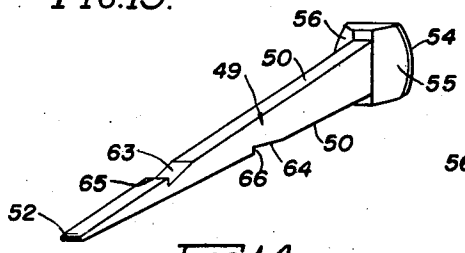


FIG. 14.

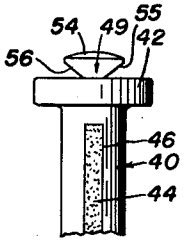


FIG. 20.

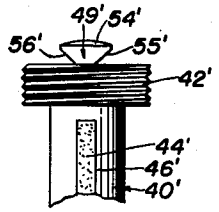


FIG. 19.

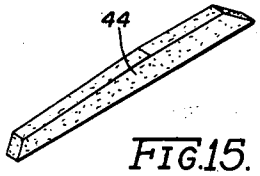


FIG. 15.

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Patented June 23, 1942 2,287,395

UNITED STATES PATENT OFFICE

2,287,395

SELF-ANCHORING DEVICE

William R. Reynolds, Chicago, Ill.

Application July 15, 1940, Serial No. 345,462

3 Claims. (Cl. 85—23)

This invention relates to anchoring devices and more particularly to self-anchoring fasteners which may take the form of lugs, plugs, nails, screws and similar fastening expedients.

It contemplates more especially the provision of a composite body member that is expansible to assume the shape of an aperture or to pierce through a wall or other surface to expand therein to serve as a secure anchoring wedge in materials that are not readily receptive to standard fasteners.

There are innumerable types of standard fasteners such as nails, screws and anchoring lugs possessing wedging expedients to enable the permanent attachment thereof to surfaces composed of materials that are not readily pierced by the usual or standard fastening expedients. Surfaces defined by walls and other bodies of non-yielding material such as brick, plaster, tile, cement, terrazzo, granite, slate, marble and materials possessing similar characteristics do not readily receive attaching expedients such as nails, screws or self-wedging anchoring expedients of known design and construction. Numerous types of expansible sleeves of ductile material have also been employed for this purpose; however, these have not proven entirely satisfactory and are expensive in construction as well as ineffective in operation for their intended purpose.

One object of the present invention is to simplify the construction and improve the operation of devices of the character mentioned.

Another object is to provide an improved anchoring fastener for embedding in non-yielding material such as brick, plaster, tile, cement, terrazzo, granite, slate, marble and materials possessing similar characteristics.

Still another object is to provide a composite anchor consisting of ductile and non-ductile elements relatively expansible for ready expansion into a non-yielding body.

A further object is to provide an anchoring fastener with a wedging element serving to deform a portion thereof for expansion along a fractional part of the circumferential surface thereof.

A still further object is to provide an anchoring fastener with a wedging member displaceable between ductile and non-ductile portions of a fastening body.

Still a further object is to provide an anchoring fastener consisting of a non-ductile body member having a ductile portion complemental thereto for relative expansion responsive to a wedging element disposed therebetween or to be inserted therein.

Other objects and advantages will appear from the following description of an illustrative embodiment of the present invention.

In the drawings:

Figure 1 is a perspective view of an anchoring fastener in its initial complete form preparatory to use and embodying features of the present invention.

Figure 2 is a perspective inverted view of a non-ductile portion of the anchoring body shown in Figure 1.

Figure 3 is a sectional view taken substantially along line III—III of Figure 1.

Figure 4 is a fragmentary sectional view in elevation of a wall portion showing the anchoring fastener of the type illustrated in Figure 1.

Figure 5 is a sectional view in elevation conforming with Figure 4 except for the modified showing of the positioning of a fastener head in panelling that may be covered with a concealing plastic to render such undetectible from the exterior surface.

Figure 6 is a perspective view of an anchoring fastener of the type shown in Figure 9 preparatory to use and embodying features of the present invention.

Figure 7 is a perspective view of a wedging element of the type shown in assembled position in Figures 6, 9 and 10.

Figure 8 is a perspective view of a ductile portion of the anchoring fastener shown in Figures 1, 3 and 6.

Figure 9 is a fragmentary sectional view in elevation of a wall portion showing an anchoring fastener of the hook type embodying features of the present invention.

Figure 10 is a sectional view taken substantially along line X—X of Figure 9.

Figure 11 is a perspective view of a modified anchoring fastener with its initial complete form preparatory to use and embodying additional features of the present invention.

Figure 12 is a perspective view of a non-ductile portion of the anchoring body shown in Figure 11.

Figure 13 is a sectional view in elevation taken substantially along line XIII—XIII of Figure 11 except for the ductile inserts being shown in an abnormally displaced inoperative position to clarify the illustration.

Figure 14 is a perspective view of a wedging element of the type shown in assembled position in Figures 11 and 13.

Figure 15 is a perspective view of a ductile

insert of the type for the anchoring fastener shown in Figures 11, 13 and 16.

Figure 16 is a fragmentary sectional view in elevation of a wall portion showing an anchoring fastener of the type illustrated in Figures 11 and 13 after the wedging element has been driven to its extreme inward position.

Figure 17 is a sectional view taken substantially along line XVII—XVII of Figure 16.

Figure 18 is a fragmentary sectional view of a screw cap which is capable of use as a substitute for the type of head shown on the wedging element illustrated in Figures 11, 13, 14 and 16.

Figure 19 is a fragmentary view in elevation of a modified non-ductile portion having a threaded extremity serving as a complement for a screw head retainer of the type shown in Figures. 18.

Figure 20 is a fragmentary end view in elevation of a wall anchoring fastener illustrated in Figures 11, 13, 14, 16 and 17 wherein its wedging bar is provided with an undercut head to enable prying engagement of a claw hammer thereunder to effect its removal.

The structure selected for illustration preferably though not essentially comprises a substantially non-ductile cylindrical body member 10 terminating in a rounded, flat or pointed piercing extremity 11 of the type generally found on standard fasteners such as nails. The cylindrical body 10 is preferably though not essentially formed in any approved manner with circumferential or partially circumferential ridges 12 spaced along the length thereof at uniform distances to offer increased resistance toward accidental removal from the aperture formed by providing the body 10 in a yielding body with the pointed extremity 11 serving as a penetrating medium if desired but usually installed in a previously drilled aperture.

The circumferential ridges 12 may serve effectively in instances where the cylindrical fastener body 10 is displaced in an aperture of relatively larger size and anchored therein through an expanding feature to be hereinafter described. In any event, the circumferential ridges 12 may be varied in their extent of protrusion depending upon the dictates of commercial practice and the uses to which the cylindrical fastener body 10 is put in that such may vary in size, shape and design to meet the requirements of different materials and functions for which the cylindrical body 10 is intended.

For instance, the ridges 12 may be provided with sharp circumferential edges or serrations to offer increased resistance when inserted in comparatively large apertures provided in non-yielding materials such as brick, plaster, tile, cement, terrazzo, granite, slate, marble and materials possessing similar characteristics. In the present embodiment, the cylindrical fastener body 10 terminates in an enlarged head 13 that may be disposed axially or offset from the cylindrical body 10 depending upon the purpose and the requirements thereof in any particular situation.

In order to rigidly anchor the cylindrical fastener body 10 in an aperture 14 provided in a wall 15 of non-yielding material such as brick, plaster, tile, cement, terrazzo, granite, slate, marble and materials possessing similar characteristics, a comparatively ductile insert strip 16 is cold-pressed or hot-poured into a longitudinal groove 17 provided along the length of the cylindrical body 10 through the head 13 as at 18 and terminating short of the pointed extremity 11 in a curved or arcuate end surface 19.

The groove 17 is of substantial depth and inclined inwardly along the bottom 20 thereof to extend within a comparatively short distance of an external body surface 21 at the merging point with an outwardly curved and inclined slot terminus 19. An elongated bar member 22 of comparatively lesser width than the depth of the longitudinal fastener body groove 17, is displaceable therein through the head end 18 so that its curved tip 23 will conform substantially with the arcuate groove terminus 19 for engagement therewith while the bar member still extends for a short distance above the fastener body head 13 (Figure 3). Should commercial practice so dictate, the bottom 20 of the groove 17 may extend horizontally to fully support the wedge bar 22 in its operative position. In that event, the groove bottom 20 would not incline downwardly toward the arcuate end surface 19 as illustrated and described.

To this end, the elongated bar 22 serves as a wedging member and is provided with an enlarged head 24 for receiving the driving impacts that displace the wedging bar inwardly within the fastener body groove 17. It will be observed that the wedge bar head 24 has oppositely inclined undercut surfaces 25 which extends from the head edges 26 thereof to the side bar edges 27, thereby merging with horizontal end shoulders 28 projecting beyond the edges of the wedging bar 22. The shoulders 28 serve as a stop for the wedging bar 22 when displaced inwardly along the fastener body groove 17 to its maximum extent in contact with the fastener head 13.

In this position (Figure 4), the inclined wedging bar head surface 25 still permits the insertion of the claws of a hammer thereunder to effect the removal thereof. To this end, the entire fastener body 10 and its component parts may be removed from the aperture 14 provided in any wall 15. This is rendered possible owing to the ductile character of the insert strip 16 which is provided with an inclined edge 29 merging with the bottom parallel edge 29' that has a somewhat greater depth than is initially provided therefor in the fastener body groove 17 after the wedging bar 22 has been inserted in position (Figure 3). Consequently, the fastener body 10 and its component parts may be removed and re-used in the same or other aperture.

The ductile insert strip 16 which is preferably though not essentially composed of soft lead or alloys possessing the same physical characteristics, is cold-pressed or poured in hot according to the best method of manufacture in any suitable manner into the fastener body groove 17 with the straight edge 30 thereof extending outwardly to emerge and continue the external surface of the fastener body 10 that otherwise has been interrupted by the elongated groove 17 provided therein. This results in a unitary self-anchoring fastener consisting, in this instance, of essentially three component parts which are the comparatively non-ductile fastener body 10, the non-ductile wedging bar 22, and the comparatively ductile insert strip 16 which is complemental to the elongated groove 17 when cold-pressed or poured hot therein to hold the wedging bar 22 in its initial position (Figure 3).

In the initial position of the wedging bar 22, the arcuate extremity 23 contacts the correspondingly arcuate terminus 19 of the fastener body groove 17 with a sufficient portion extending outwardly beyond the fastener body head

13 to provide for further displacement simultaneous with the lateral urge imparted to the ductile insert strip 16 which flows into the aperture 14 so that the comparatively non-ductile body 10 will tightly embrace the wall thereof to fully fill and become securely wedged therein in conjunction with the ductile strip 16.

During this wedging displacement of the elongated bar 22 and the longitudinal displacement of the ductile insert strip 16, the arcuate edge 23 of the wedging bar 22 rides along the curved terminus 19 of the fastener body groove 17 to accomplish this expanding retention between the comparatively non-ductile and ductile elements 10—16 of the fastener. By so doing, it will be apparent that the circular ridges 12 on the fastener body 10 will become laterally embedded in the material 15 surrounding the aperture 14 so that removal would be impossible until the wedging bar 22 has been detached or removed from the fastener body groove 17 by utilizing a claw hammer in the manner described supra.

It should be understood that the ductile insert strip 16 flows to fill all of the crevices defining the aperture 14 in a non-yielding body 15 formed from brick, plaster, tile, cement, terrazzo, granite, slate, marble and materials possessing similar characteristics. To the end of fastening a veneered panel 31 to a wall 15 composed of brick, plaster, tile, cement, terrazzo, granite, slate, marble and materials possessing similar characteristics, the aperture 14 extends through both the non-yielding body 15 and the panel 31 so that the fastener body head 13 will engage the surface of the panel 31 and, thereupon, the wedging bar head 24 is driven for inward displacement to effect the lateral expansion of the ductile insert strip 16 so that the entire composite fastener body 10 will be expanded to frictionally engage the wall defining the aperture 14.

This will securely hold the panel 31 adjacent to the non-yielding wall body 15 for permanent connection thereto. So that the fastener body head 13 of the wedging bar head 24 can be concealed in situations where appearance is of primary significance, the aperture 14 in the non-yielding wall body 15 that extends into the panel 31' may communicate with a countersunk hole or aperture 32 which is of larger diameter to completely receive the fastener body head 13 together with the wedging bar head 24 after being driven or inserted to its extreme inward position.

After the panel 31' has been attached to the non-yielding wall body 15 in a manner shown in connection with the embodiment illustrated in Figure 9, the countersunk aperture 32 may be filled with plastic material to cover and conceal the fastener body head 13 and wedging bar head 24, thereby conforming to the surface of the panel 31 and affording complete concealment to the fastener body heads 13—24. So that the component elements of the anchoring fastener such as the body 10, the ductile insert 16, and the wedging bar 22 may be held in their initial assembled association preparatory to use (Figure 1) without any possible accidental separation therebetween, the wedging bar 22 is preferably provided with a transverse notch 33 presenting a shoulder 34 against ductile material 35 which becomes lodged therein and comprises a part of ductile insert strip 16 that is cold-pressed or hot-poured into the groove 17.

This precludes the wedging bar 22 from becoming accidentally detached from the fastener body groove 17 and maintains the component elements as an assembled unit prior to the actual use thereof as a fastener. While the ductile insert element 16 primarily flows laterally responsive to the wedging action of the longitudinally disposed bar, a slight axial flow of the material insert 16 also takes place in the direction of bar displacement along groove 17.

In the modified embodiment shown in Figures 6, 7, 9, and 10, the fastener body 10'' terminates in an offset shoulder 13'' that has an open loop formed thereon to define a hook 36 in lieu of the enlarged head comprising a part of the fastener body 10 in the previously described embodiment. Save for this difference, the fastener body 10'' with its ductile insert strip 16'' and wedging bar 22'' are substantially the same as that embodied and shown as part of the fastener described in the previous embodiment.

In this instance, however, the wedging bar head 24'' is provided with an inclined undercut end surface 25'' which extends from the head edge 26'' to the bar edge 27'' to merge with a horizontal side shoulder 28''. Other well known heads may be utilized in conjunction with the fastener body 10'' of the general type described herein, since the preferred embodiments are illustrative rather than of essential design in that different installations may require fastener heads of still other types to meet the requirements of commercial practice.

In a still further modified embodiment shown in Figures 11 to 17 inclusive, the substantially non-ductile cylindrical body member 40 has any suitable insert extremity 41 which is adapted to be driven into a wall or inserted in a preformed aperture in the manner described in connection with the preferred embodiment. The other end of the cylindrical body 40 terminates in an inward head 42, in this instance of circular configuration, formed axially of the elongated cylindrical body member 40; however, this may be varied within a wide range depending upon the dictates of commercial practice.

So that the cylindrical fastener body 40 may be securely anchored in a wall 43 of material which is not receptive to nails or screws, compartively ductile insert strips 44 and 45, in this instance two, are cold-pressed or hot-poured into diametrically opposed longitudinal grooves 46 and 47 provided along the length of the cylindrical body member 40 between the solid extremity 41 and the head 42 thereof. The diametrically opposed longitudinal grooves 46—47 communicate with each other to provide a slot 48 along the hollow axial interior of the cylindrical body member 40 that receives an elongated bar or wedging member 49. It should be noted that the slot 48 serves as a continuation of the diametrically opposed insert-grooves 46—47, and the ductile inserts 44—45 are initially shaped to correspond with the shape of the slots 46—47 when the wedging bar 49 is in its initial inoperative position.

The elongated bar or wedging member 49 has converging edges 50 and 51 that preferably though not essentially terminate in a pointed extremity 52 for insertion into a correspondingly shaped slot 53 provided axially through the fastener body head 42, the slot 53 being sized to loosely receive the largest cross-section of the wedging member 49 to extend therethrough in communication with the central slot

48 of the fastener body 40. The wedging bar 49 terminates in an enlarged head 54 for receiving the driving impacts that displace the wedging bar 49 inwardly through the fastener head 42 and within the fastener body slot 48. The enlarged head 54 serves as a stop for the wedging bar 49 when displaced inwardly along the fastener slot 48 to its maximum extent in contact with the fastener body head 42 (Figure 16).

In the modified embodiment shown in Figure 20, the wedging bar head 54' is provided with undercut shoulders 55 and 56 so that when the head 54' is driven down in contact with the fastener body head 42' or any other surface, the wedging bar head 54' still permits the insertion of the claws of a hammer thereon to effect the removal thereof. Thereupon, the entire fastener body 40 and its component parts may be removed from the aperture 57 provided in any wall 43. This is rendered possible owing to the ductile character of the insert strips 44—45 that may be preformed for cold-pressed reception into the diametrically opposed slots 46—47 or hot-poured therein depending upon the dictates of commercial practice.

The absence of the wedging bar 49 upon removal will enable a pulling urge effected upon the fastener body 40 to inwardly deform and displace insert strips 44—45 into the cylindrical fastener body slot 48 to loosen the entire fastener body 40 from its surrounding aperture 57. Consequently, the unitary self-anchoring fastener consisting, in this instance, of the substantially non-ductile elongated body 40, the comparatively ductile insert strips 44—45, and the comparatively non-ductile wedging bar 49, may be re-used in the same aperture 57 or other situations depending upon the requirements thereof.

During the outward displacement of the inserts 44—45 responsive to the inward displacement of the wedging bar 49, it should be understood that the ductile inserts 44—45 flow to fill all of the crevices defining the aperture 57 in a non-yielding body 43 formed from brick, plaster, tile, cement, terrazzo, granite, slate, marble and materials possessing similar characteristics. For that matter, the entire circumferential wall of the aperture 57 when provided in such substantially non-yielding material, is of minutely irregular configuration for the entire extent thereof so that the cold flowing ductile inserts 44—45 will assume the shape thereof and tenaciously grip these irregularities to serve as a complement thereof and preclude any possible removal of the fastener body 40.

It should also be observed that a mirror or any suitably veneered panel 59 may be fastened to the wall 43 that is not otherwise receptive to the usual fasteners by providing an aperture 60 in the panel 59 for alignment with the aperture 57 in the wall 43. This enables the fastener body 40 to be inserted therethrough so that its head 42 will rest against the panel 59. The wedging bar head 54 is then tapped by any suitable instrument such as a hammer for inward displacement to move the ductile inserts 44—45 outwardly and thus effect the anchored engagement with the wall 43 and possibly the surface defining aperture 60 in the panel 59 itself.

In such situations, however, it is far more desirable to employ a modified elongated fastener body 49' having an enlarged threaded head 42' that receives a wedging bar head 54' within the confines thereof for the reception of a correspondingly threaded cap 61 thereover. The cap 61 which is threaded at 62 to mesh with the threads 42' is preferably of ornamental exterior configuration to impart a desirable appearance to the panel 59 and conceal the wedging bar head 54' and fastener body head 42' from view. It should be apparent, however, that in all other respects the fastener body 40' with its elongated grooves and ductile inserts, is of identical construction with the previously described embodiment.

It will be observed that the component elements of the anchoring fastener 40, the ductile inserts 44—45 and the wedging bar 49 may be held in their initial assembled association preparatory to use (Figure 11) without any possible accidental separation therebetween. To this end, the converging edges 50—51 of the wedging bar 49 are preferably provided with transverse notches 63 and 64 that are longitudinally offset from each other to present outwardly facing shoulders 65 and 66. The transverse notches 63—64 are filled with the ductile material of the inserts 44—45 when these are cold-pressed or hot-poured into their initial positions to fill the diametrically opposed slots 46—47.

Consequently, the wedging bar 49 will be precluded from accidental outward displacement from its initial position in the fastener body slot 48 and the other component parts thereof will be maintained as an assembled unit prior to actual use thereof as an anchoring fastener. This enables the anchoring fastener 40 together with its component elements to be assembled as a single unit for convenience in the stocking, sale and use thereof. With this arrangement, the inserts 44—45 are displaced outwardly simultaneously owing to the uniform converging inclination of the wedging bar edges 50—51 to effectively anchor the member 40 in consequence thereof.

It will be apparent from the foregoing description that a composite self-anchoring fastener has been provided which consists essentially of comparatively non-ductile and ductile elements that can be expanded to substantially assume the shape of an aperture for secure engagement therewith. Apertures provided in non-yielding bodies such as brick, plaster, tile, cement, terrazzo, granite, slate, marble and materials possessing similar characteristics are not of perfectly cylindrical contour and for that reason the ductile portion assumes precisely the shape thereof to securely anchor the remaining portion of the fastener body and present an appreciably greater resistance to removal than presented by fastener bodies of known design consisting entirely of non-ductile or ductile elements and not composite portions of each. Further, it will be observed that self-anchoring devices of the character described are comparatively inexpensive in structure and very effective in operation for their intended purpose.

Various changes may be made in the embodiment of the invention herein specifically described without departing from or sacrificing any of the advantages of the invention or any features thereof, and nothing herein shall be construed as limitations upon the invention, its concept or structural embodiment as to the whole or any part thereof except as defined in the appended claims.

I claim:

1. In a fastener, the combination with an elongated shank portion of substantially non-ductile material, there being a groove extending longi-

tudinally through said shank portion to communicate with the circumferential surface thereof, a wedging member disposed axially of said shank portion for longitudinal displacement in said groove, there being a notch in an edge of said wedging member, and a comparatively ductile material filled into said groove against said wedging member to complete the surface of said non-ductile grooved shank portion and become lodged in said wedging member notch, said wedging member serving to effect the lateral and longitudinal displacement of said ductile insert relative to said shank portion.

2. In a self-anchoring fastener, the combination with an elongated shank element of substantially non-ductile material, having an inner straight surface and a curved camming surface along the length thereof, an elongated wedging member of non-ductile material disposed longitudinally along said straight inner surface of said non-ductile shank element surface for longitudinal displacement relative to said shank camming surface to effect radial displacement coincident with its longitudinal displacement, and a comparatively ductile elongated shank element complemental to said non-ductile shank element to substantially complete the external engaging surface of said non-ductile shank element with said wedging member disposed therebetween to effect their radial separation.

3. In a self-anchoring fastener, the combination with an elongated non-yielding shank element of substantially non-ductile material having an inner surface and camming portion proximate to the insertion end thereof, a non-yielding wedging member disposed along said inner and camming surface of said non-ductile shank element for longitudinal displacement relative thereto in the direction of said camming portion, and an elongated yielding ductile shank element complemental to the inner surface and camming portion of said non-yielding elongated shank element to substantially complete the external engaging surface of said non-ductile shank portion with said wedging member disposed therebetween to effect their radial separation.

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