

[54] **GROUT ACCOMMODATING SHELLS FOR EASY STORAGE AND TRANSPORT**

[76] Inventor: **Abram N. Spanel**, 344 Stockton St., Princeton, N.J. 08540

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Related U.S. Application Data

[63] Continuation of Ser. No. 821,841, May 5, 1969, abandoned.

[52] U.S. Cl. **52/706, 52/127**

[51] Int. Cl. **E04b 1/41**

[58] Field of Search **52/706, 703, 698, 52/704, 705, 577, 576, 127, 708, 709, 710, 711; 46/146; 84/376; 138/119, 121**

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Primary Examiner—Price C. Faw, Jr.

Attorney—Arthur L. Plevy

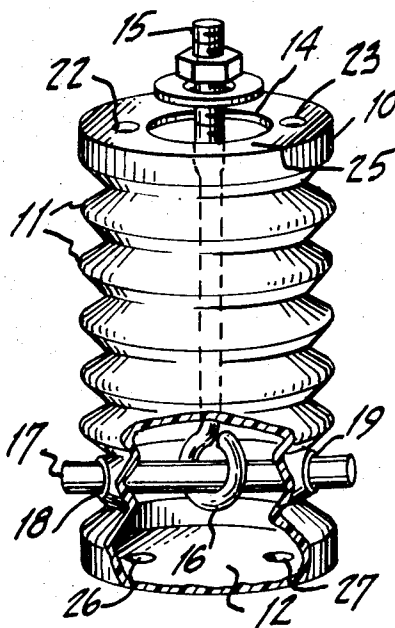
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ABSTRACT

There is disclosed outer shells for use with concrete inserts or locking sleeves fabricated from plastic or elastomeric materials, round or otherwise geometrical in cross section, a large portion of the length of the shell is accordion pleated, with the plastic pleat areas sufficiently flexible to permit the entire assembly to be compressibly collapsed along its length and held by suitable means in the collapsed position for storage and transport.

Other embodiments show elongated carton-like configurations, which are foldable for easy storage transport.

10 Claims, 11 Drawing Figures



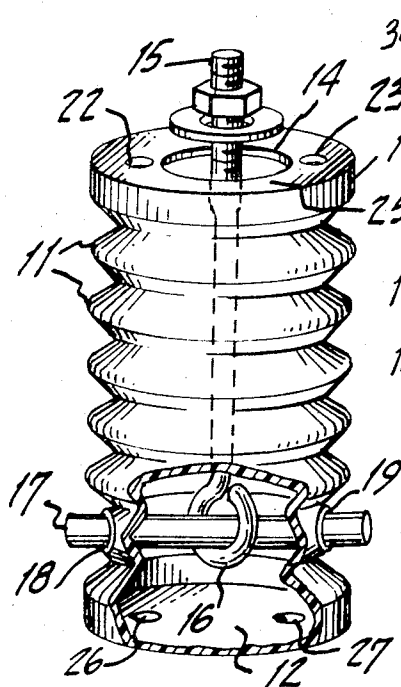


Fig. 1.

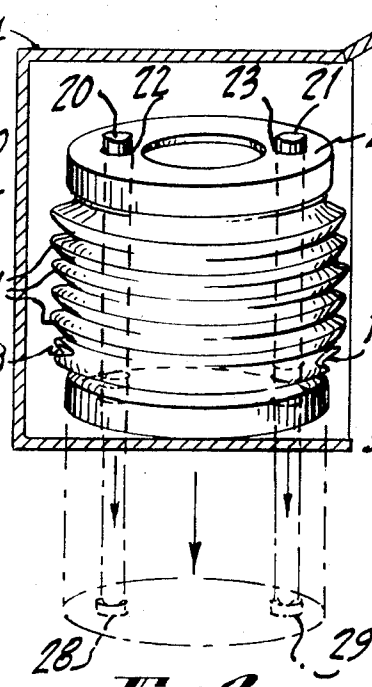


Fig. 2.

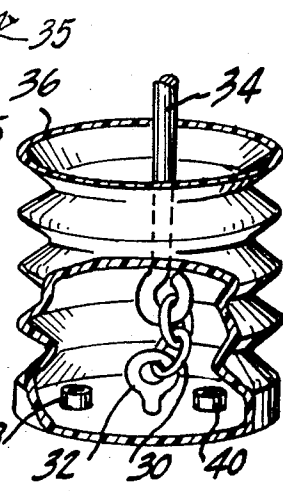


Fig. 3.

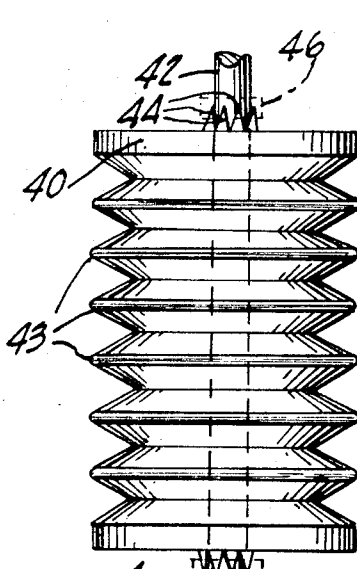


Fig. 4.

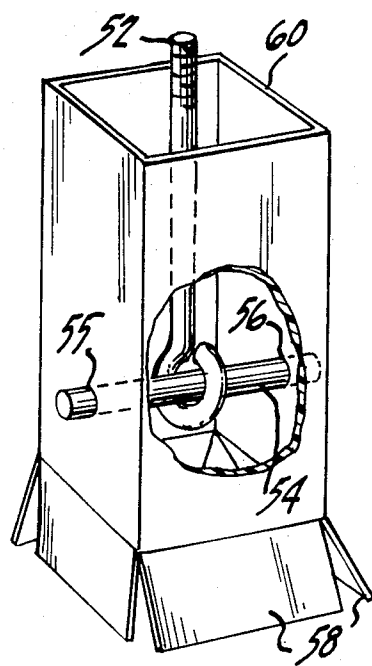


Fig. 6.

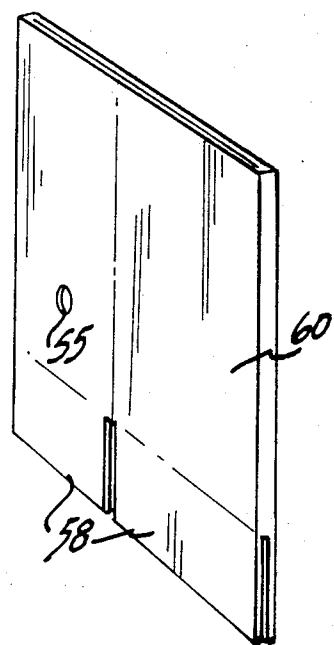


Fig. 7.

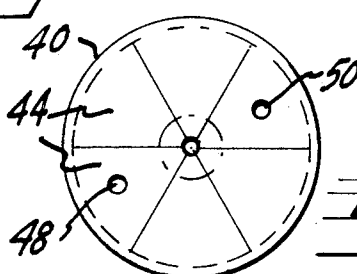
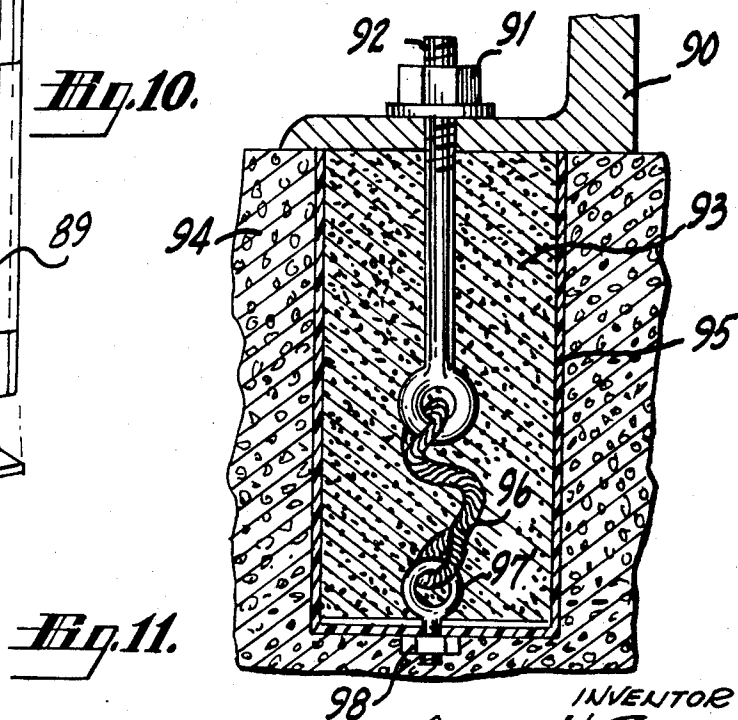
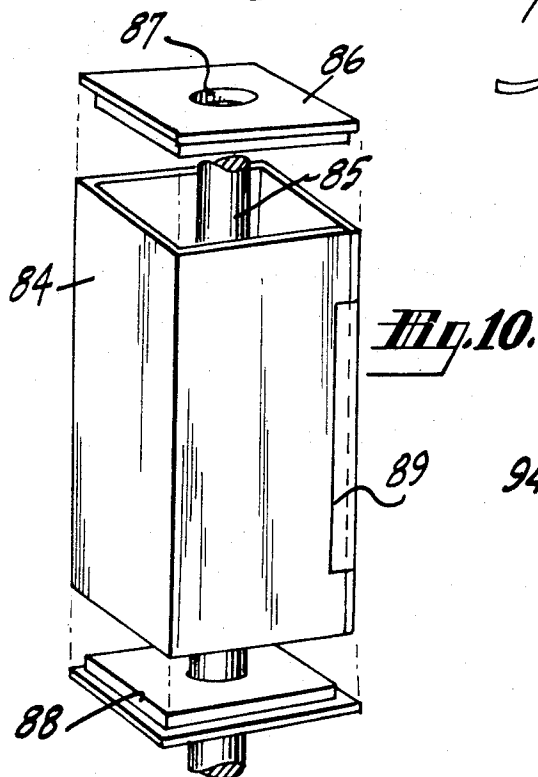
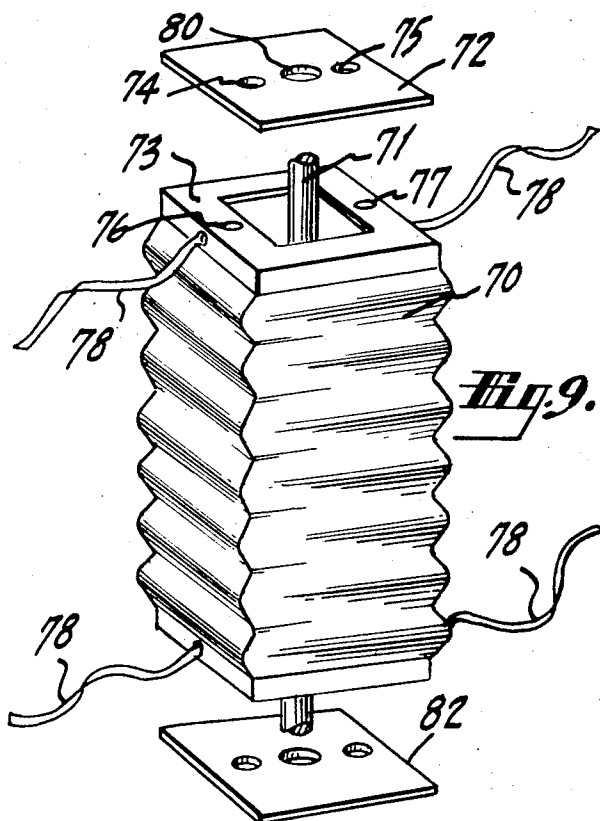
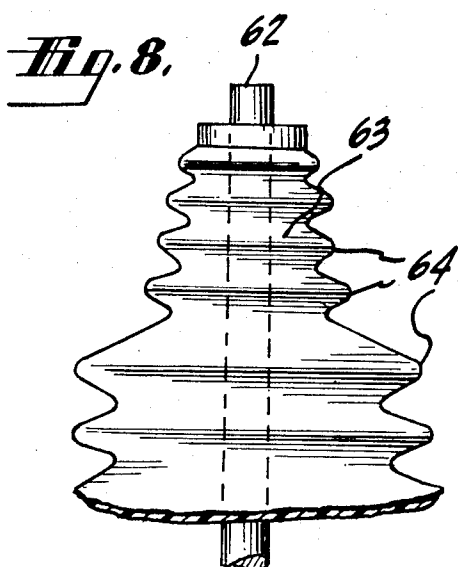


Fig. 5.

INVENTOR
ABRAM N. SPANEL



INVENTOR
ABRAM N. SPANIEL

GROUT ACCOMMODATING SHELLS FOR EASY STORAGE AND TRANSPORT

This is a continuation of application Ser. No. 821,841, filed May 5, 1969, and now abandoned.

This invention relates to grout accommodating shell configurations for use in concrete constructions, and more particularly, to such shell configurations adaptable for easy storage and transportation, by utilizing compressible and foldable embodiments.

In the manufacture of many commercial items, if they are of any appreciable size, there always arises the question of space used in storage, as available in active stockrooms and warehouses, as well as in transportation vehicles. Obviously, when such items are relatively large the problems of storage and transportation may be formidable. Certain materials, such as steel, glass, wood or even very hard plastic items or containers are not generally subjected to compression or folding and hence require large storage and transportation volume capacity, resulting in large storage and transportation costs.

Containers made of paper, cardboard, flexible or semi-rigid plastics, and other types as elastomeric compounds are however compressible from their maximum container size. Accordingly, even huge cartons are shipped flat by the carton maker to the manufacturer, and as folded or compressed, arrive at their destination neatly creased. Obviously if such a container were to reach the manufacturer of finished products in a rumpled or crumpled condition, such containers would not be useable.

The problems are compounded by industrial products of relatively large dimensions, and especially those that weigh little but take up a great deal of space in storage and transportation.

Specifically, in the concrete construction field apparatus is available and referred to as bolt fastening devices, locking sleeves and so on. Such devices, in general, enable the builder or constructor to couple steel beams and other forms to concrete, to strengthen the concrete in flexure and tension modes and generally to facilitate the construction of buildings, piers, bulk heads, etc., using the beneficial properties of steel or concrete extensively.

If reference is made to my copending application entitled "CONCRETE INSERT APPARATUS" Ser. number 792,731 filed on Jan. 21, 1969 now U.S. Pat. No. 3,597,893, certain embodiments of such concrete inserts or bolt fastening devices are shown. If reference is again made to still another of my copending applications entitled "LOCKING SLEEVES AND RINGS FOR USE IN CONCRETE CONSTRUCTION," Ser. No. 817,815, filed Apr. 21, 1969, and now U.S. Pat. No. 3,548,554, examples of locking sleeves for reinforcing steel bars and so on, are shown.

Both types of devices involve the use of grout accommodating outer shells of various configurations and sizes cooperating with bolts, rods and so on.

The devices to be permanently embedded in concrete or cement, are made of rigid, semi-rigid or flexible plastic and are clearly bulky and space consuming and therefore are expensive to store and transport.

Certain of these shells, as explained, in my above noted copending applications may run from 4 inches to 12 inches in diameter and from 6 inches to 48 inches or more in length. One may readily see that such bulky

units place an inordinate cost-burden in warehousing and transportation.

This factor is worsened by considering the relatively low production cost of such items, which may therefore actually be exceeded by the storage and shipping costs.

It is therefore an object of the present invention to provide grout accommodating shells for use in a concrete construction which are adaptable to be economically stored and transported.

A further object is to provide grout accommodating shells of such configuration and materials, enabling them to be easily compressed or folded during storage or shipment and easily uncompressed for use at a construction site.

These and other objects of the present invention are implemented by making relatively thin, cylindrical shells of plastic or elastomeric materials, round or square in cross section. The major portion of the length of the shell is accordion pleated, with the plastic pleat areas or recesses therein sufficiently flexible to permit the entire bulk assembly via its flexible accordion-like surface to be compressedly collapsed and held in the collapsed state by suitable means to thereby substantially reduce the volume required for shipping and storage.

Other embodiments utilize shell configurations formed as elongated carton-like structures, which because of predetermined creases therein can be collapsed during storage and shipment and easily reassembled for use on a construction site.

These and other objects of the present invention will become clearer if reference is made to the specification when read in conjunction with the accompanying drawings in which:

FIG. 1 — is a perspective view with a partial section showing an accordion-like shell insertable in concrete according to this invention.

FIG. 2 — is a perspective view showing the compressed state of the accordion-like shell shown in FIG. 1.

FIG. 3 — is a partial perspective view of still another embodiment of a concrete insert device.

FIG. 4 — is a perspective plan view of an alternate embodiment of an accordion grout accommodating shell for use in reinforcing concrete constructions.

FIG. 5 — is a top view of an embodiment according to FIG. 4.

FIG. 6 — is a perspective view showing a "carton-like" shell configuration according to this invention.

FIG. 7 — is a perspective view of the embodiment of FIG. 6 in a collapsed position suitable for storage.

FIG. 8 — shows a partial front view of an alternate embodiment of grout accommodating shell.

FIG. 9 — is a perspective view showing another embodiment of a grout accommodating accordion-like shell.

FIG. 10 — is a perspective view of still another embodiment according to the invention.

FIG. 11 — is a partial sectional view of an insert device employing a shell according to the invention, further showing the coupling thereof to a maching leg secured thereby on a concrete foundation.

Referring to FIG. 1 there is shown a concrete insert comprising a relatively thin cylindrical shell 10. The shell 10 has an outer surface which possesses a plurality of pleats 11 thereon, giving the same an "accordion-

like" appearance. The bottom end 12 of the shell is closed and the top end has a large hole 14.

A bolt 15 having a threaded end also has an eye end 16 which encircles a rod or member 17. The rod 17 is coupled to the shell 10 via two accommodating openings 18 and 19 located on opposing sides thereof. Such a device as shown is suitably positioned prior to the insertion of concrete which will form a wall foundation or other structure. The concrete is then poured and thus surrounds the entire shell 10. The pleated surfaces 11 as shown in FIG. 1, serve with the concrete surrounding the same to firmly and rigidly secure the assembly within the concrete. The inner related bolt 15 may then be positioned to cooperate with an accommodating hole in the leg of a heavy machine or other device which is to be positioned on the concrete floor. Grout is then poured into the hollow confines of the cylindrical shell 10 to surround the bolt 15 and secure the entire assembly to the concrete. The hardening of the grout and the pleated accordion profile of the shell 10 serves to prevent the pulling of the assembly out of the floor or construction. The combined action thus prevents the machine from moving or "walking" due to its own vibrating modes. Other advantages and desirable features of the uses of such insert devices are more clearly explained in my above first-noted copending application.

As one can see from the FIG. 1 the shell 10 may be for example 6 inches long and of suitable diameter, thus primarily determining the total volume of the grout or concrete inserted and its resulting structural strength.

However, the outer shell 10 may be fabricated from a plastic or elastomeric material, a compounded cellulosic paper bond or vulcanized fiber board and may be relatively thin. Accordingly in conjunction with the pleated or accordion-like configuration, the entire shell may be easily compressed as shown in FIG. 2. Thus the compressed shell 10 is held compressed in its shipping container. A shipping container 34 is shown in FIG. 2. The container 34 is a conventional type as used for the transport of goods, having five closed sides and an opening for insertion of the shell 25. As can be seen, the shell 25 will remain in a compressed state during shipping due to the forces exerted on the shell by the opposite sides of container 34. A lid 35 is shown to enable closing of the container during transport.

Many other means attachable to the shell 25 may be utilized as well to cause the same to remain in a compressed or collapsed state during shipment. The rods or sticks inserted through the holes 22 and 23 around the flange 25 surrounding the top open surface, facilitates decompressing said shell and even enabling one to pull it out to its original length size before it was compressed. Each stick 20 and 21 may have diameters smaller than the cooperating holes thereby enabling grout or cement to be poured through said holes and into the said shell, the holes thus serving a dual purpose. The inserted sticks may have their ends positioned adjacent to the periphery in the bottom surface of the shell by accommodating collars or half-collars 28 and 29 located on the bottom surface of the shell 10.

The sticks or rods 20 and 21 fabricated from plastic, wood and so on serve to hold the shell 10 in its extended state as already described.

When a construction job calls for the use of such an insert device the shell 10 is pulled out of its shipping

container, the shell is expanded by the sticks and promptly put to use in its substantially expanded form as shown in FIG. 1 or, in other words, extended to any desired predetermined length, the length of the sticks doing the predetermining.

The rod 17 is then inserted through one accommodating hole as 18, the bolt 15 is then placed therein and the rod pushed through the other accommodating hole 19, thereby forming and assembling the insert apparatus shown in FIG. 1. It will be clear that protruding rod 17 shown in FIG. 1 may be used in FIG. 3 and FIG. 11 with a chain or cable between it and the bolt to which it is attached.

Referring to FIG. 3 there is shown a cylindrical accordion-like outer shell member 36 having a broken away top section. The unit shown has a top opening surrounded by a flange similar to that shown in FIG. 1. The closed bottom surface has a hole disposed about the central axis of the shell 10 which hole accommodates an eye bolt 32 secured thereto by a nut or other conventional means. The eye bolt 32 is coupled via a chain 30 fabricated from steel or other suitable construction material. The other end of the chain 30 being coupled to the eye of the bolt 34. The aforementioned holes, in the top surface, as shown in FIG. 1, accommodate sticks or rod-like structures which are also of a larger diameter than the hole and in this instance coupled to and are positioned in the collars or half-collars 38 and 40 in the bottom surface of the shell 36 fabricated on the inside of the shell as shown. In this manner the sticks are inserted into the top holes, they expand the thin elastomeric shell 36 and co-act with the stick accommodating half-collars 38 and 40. The shell again has its outside pleated surface inserted in concrete and the inside hollow filled with grout or cement which surrounds and secures the chain 30 and bolt 34 as described in my U.S. Pat. No. 3,597,893.

The holes located on the flange of the top surface as shown in FIG. 1, can also serve as grout spouts to enable pouring of grout therethrough after shell is inserted in accommodating concrete and surrounded thereby.

FIG. 4 shows a shell 40 having a cylindrical or tubular configuration, having the major surface thereof defined by pleats 43, giving the shell 40 the accordion-like appearance. The shell 40 is again fabricated as a relatively thin-skinned shell of plastic or elastomeric material easily compressible for storage and transit due to the accordion structure facilitated by the pleat sections. The shell 40 on both the top and bottom surfaces thereof has perforations forming pie-like wedge sections 44 as more clearly shown in the top view of FIG. 5. The unit or shell is compressed as the abovementioned unit and when used in a construction job is expanded. The shell 40 is then forced over a structural supporting rod 42 which forces the wedges upward about the rod as shown. If the shell 40 does not fully expand a friction tape 46 fixes the pie-shaped wedge ends 44 to the rod. The shell 40 may now be fully expanded by pulling the bottom end downward until the predetermined length is obtained. The bottom wedges may be pulled downward by the workman to surround the rod 42, as shown, and these wedge ends are taped to the rod as well. Thus the shell 40 is fully expanded and the entire unit can be placed in a suitable hole to aid in reinforcing a poured concrete construction. For exam-

ples of other utilities of such devices see my U.S. Pat. No. 3,548,554.

FIG. 6 shows a locking sleeve shell 60 for a bolt member 52. The shell 60 is fabricated from a suitable material such as plastic or elastomeric, or mixed and compounded cellulosic paper board, vulcanized fiber board and the like. The shell 60 is much like a folding elongated carton and as such has appropriate creases on the surface thereof to facilitate easy folding for shipping and storage. As can be seen from the figure the elongated carton-like member has flaps 58 surrounding the bottom opening thereof, which flaps are folded over the bottom opening, as done for a cardboard carton, and then secured together by a suitable tape. Such tape is of the well known type impervious to water and of high tensile strength.

A bar or rod is inserted through holes 55 and 56 and is encircled by the shell 60. The entire unit is placed in an accommodating concrete construction. Concrete is poured around the shell 60, which serves to position the rod 52 desirably. A grout spout or suitable hole, not shown, is utilized to permit the pouring in of a suitable grout within the hollow confines of the elongated carton-like member 60.

FIG. 7 shows the member 60 of FIG. 6 folded by means of the above-mentioned creases, as would be the case in storage or transit.

Referring to FIG. 8 there is shown a sectional view of a locking sleeve utilized as above shown in FIGS. 4, 5, 6 and 7. The top and bottom ends have a pleated cone-like appearance. The cone 63 having pleats 64, is easily compressible and further is used to accommodate rods 62 of varying diameters by cutting off corresponding sections of the cone member 63.

FIG. 9 shows a locking sleeve 70 having an accordion type surface.

A top rectangular ring or cover 72 has a hole 80 for accommodating rods 71 of various diameters. Such rectangular rings as 72 can be prefabricated with holes 80 to accommodate rods of various diameters. There is a flange 73 about the top-end surface and a flange about the bottom surface, not shown. The top flange 73 has two holes 74 and 75 on opposing sides of the hole 80. The bottom ring 82 has a corresponding hole to accommodate the rod and two similar, stick-accommodating blind holes or half-collars to enable forced expansion of the shell. To fix bottom rectangular ring 82 to shell 70 as well as top ring 72, cooperating tie strings 78 are provided. With the bottom 82 sealed, the grout or cement poured into the shell 70 will not leak out, and after the grout is fully poured the top ring 72 like the corresponding bottom ring 82 may be secured by the mentioned tie strings 78 much like shoes are laced or tied.

FIG. 10 shows an elongated carton-like sleeve 84, having an open top and bottom and creased to be folded as a carton member is folded. The rod 85 is again inserted through hole 87 in the top cover 86 and a similar bottom ring or cover 88. The holes as 87 can be made of various diameters for accommodating various size rods 85.

FIG. 11 shows an insert of the type as shown above for FIG. 3 coupling a machine leg 80 to a concrete floor. The uncompressed shell 95 has an eye bolt 97 coupled to the bottom surface thereof and held in place by a nut 98. The eye end of the bolt 97 is encircled by

a flexible steel cable 96 which at its other end encircles the eye end of another eye bolt 92.

The outer shell 95 is inserted in a hole cut into a cement floor or on a foundation located where concrete is to be poured. The concrete is thus poured surrounding the shell 95. Hardening of the concrete 94 causes the floor or slab surface to be formed. A machine 90 is then positioned over the top opening of the shell. The bolt 92 is completely positioned within the area of the top open surface. The bolt 92 is then inserted through the accommodating hole in the machine leg and a nut 91 secures the bolt to the leg. Grouting 93 is now poured into and encompasses the hollow confines of the shell 95 to surround the cable 96, the bolt 92 to firmly secure them within the shell and within the concrete floor.

What is claimed is:

1. Apparatus for use in a concrete construction for surrounding and positioning a rod or a bolt used for strengthening said construction or for securing a machine or other device thereto, comprising,
 - a. a thin shelled longitudinal tubular member of a predetermined length disposed about a given axis, said member having a top and a bottom end, said member having a given cross sectional configuration about said axis and having a major continuous surface thereof disposed about said axis said surface including means thereon permitting said member to be in either one of two states, said first state corresponding to said tubular member disposed about said given axis and substantially of a given volume, said second state corresponding to the activation of said means to cause said given volume to be substantially reduced,
 - b. means coupled to and disposed within the hollow confines of said member for adapting said member for use in said concrete construction.
2. The article of manufacture according to claim 1 wherein said means on said major surface comprises,
 - a. a plurality of flexible accordion-like pleats distributed along the length thereof adapting said member to be compressed along said given axis to substantially reduce said volume.
3. The article of manufacture according to claim 1 wherein said means on said surface comprises a plurality of creases parallel to said given axis and along said length for adapting said member to be collapsed by reducing the cross sectional area perpendicular to said given axis and thusly reducing said volume.
4. The apparatus according to claim 1 wherein said means coupled to and disposed within the hollow confines of said member, comprising,
 - a. a rod mounted relatively parallel to said given axis and of a length greater than said predetermined length so as to extend beyond said top and bottom ends.
5. The apparatus according to claim 4 further comprising,
 - a. an annular ring having an aperture located thereon of a diameter sufficient to accommodate said rod, and
 - b. means coupling said annular ring to one of said ends of said longitudinal member to surround and position said rod.
6. The apparatus according to claim 4 wherein at least one of said ends has located on a surface thereof a plurality of perforations forming a wedge shaped con-

figuration and adapted to surround any one of a plurality of different dimensioned cross sectioned rods.

7. A grout accommodating shell configuration, for use in a concrete construction, comprising,

- a. a relatively thin-shelled longitudinal tubular member of a predetermined length disposed about a given axis, said member fabricated from a compressible elastomeric material, said thin-shelled member having the major surface thereof about said given axis defined by a plurality of pleat-like protrusions giving said member an accordion-like construction,
- b. means coupled to said thin-shelled member attachable to hold the same in a first compressed position to cause said member to assume a length substantially less than said predetermined length, whereby when said means are removed said elastomeric thin-shelled member assumes a second position wherein said length is between the said compressed length and said predetermined length, and
- c. means coupled to and disposed within the hollow confines of said longitudinal member for adapting said member for use in said concrete construction.

8. The grout accommodating shell configuration according to claim 7, further comprising a grout substance coupled within the hollow confines of said tubular member for fixedly securing said means coupled therein, and interposed between said pleat-like protrusions, for preventing said shell from being pulled out of said concrete construction.

9. The grout accommodating shell according to claim

8 wherein said means coupled to and disposed within the hollow confines of said member comprises,

- a. a rod rigidly mounted between opposing sides of said longitudinal tubular member within the hollow confines thereof, said rod as positioned within said member being substantially perpendicular to said given axis,
- b. a bolt member coupled to said rod member and an opposite threaded end, protruding from said open face end, and
- c. means coupled to said threaded end of said bolt for securing said bolt to utilization means external to said concrete construction.

10. In combination with concrete insert apparatus of the type employing a rod assembly positionally variable within an outer shell for insertion into a concrete construction, the improvement in said shell comprising,

- a. a longitudinal tubular member of a predetermined length having a top open faced end surrounded by a flange having at least a first aperture thereon, said member fabricated from a compressible material and having the major surface thereof defined by a plurality of pleat-like ridges giving said member an accordion-like construction, said member further having on a surface opposite to said open face end a second aperture of the same relative dimension as said first, and
- b. at least one rod of a diameter smaller than said first and second apertures forceably inserted there-through to expand said accordion-like structure.

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