United States Patent

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[72] Inventor William C. Babbage
Gross Pointe Woods, Mich.

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[73] Assignee Rocform Corporation
Southfield, Mich.

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[54] TIE ROD SEAL FOR PREFABRICATED WALL FORMS

4 Claims, 5 Drawing Figs.

[52] U.S. Cl. 249/43, 249/213
[51] Int. Cl. E04g 17/06
[50] Field of Search 249/38, 42, 43, 45, 46, 189, 190, 191, 196, 210, 213, 214, 216, 217, 219

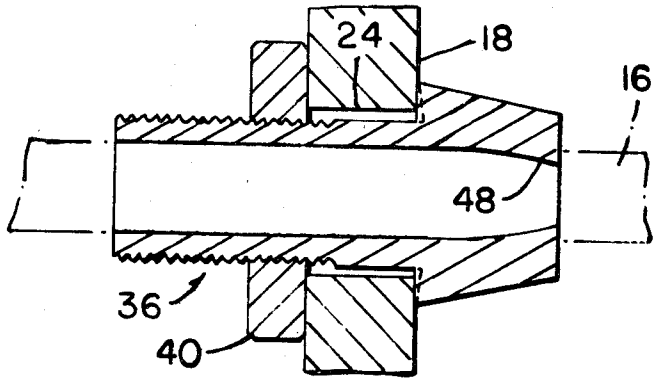
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Primary Examiner—J. Spencer Overholser
Assistant Examiner—John S. Brown
Attorney—Whittemore, Hulbert & Belknap

ABSTRACT: A tubular sealing member for sealing the hole in a wall panel through which a tie rod extends to connect the panel to a second panel of a form for composition walls. The tubular member has an enlarged head for sealing the panel around the hole, and may have an internal formation for sealed engagement with the rod. The head may be so shaped as to produce any desired architectural detail in the surface of the composite wall.



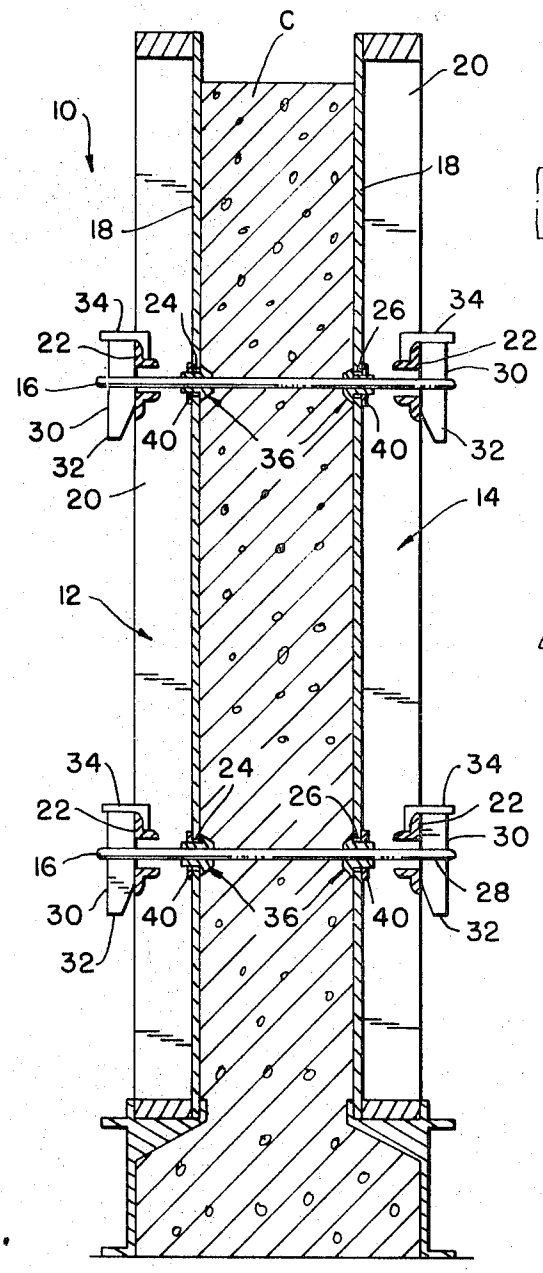


FIG. 1

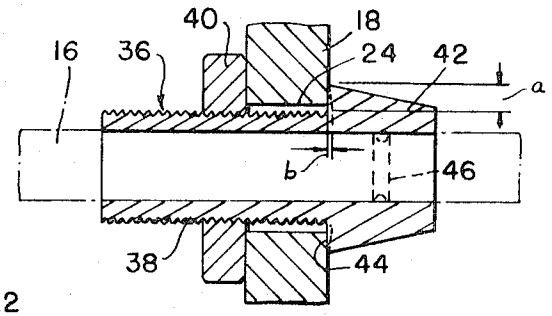


FIG. 2

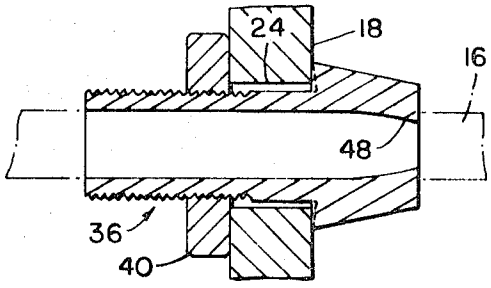


FIG. 3

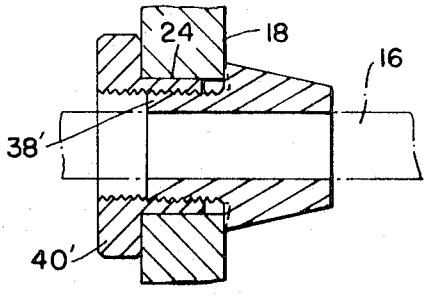


FIG. 5

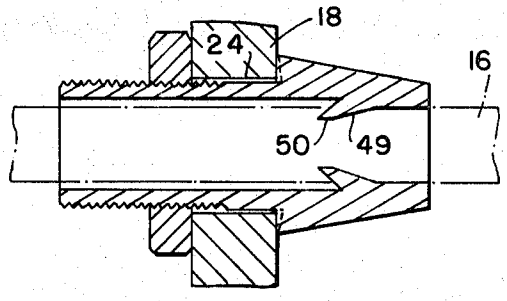


FIG. 4

INVENTOR
WILLIAM C. BABBAGE

BY Whittemore, Hulbert & Belknap
ATTORNEYS

TIE ROD SEAL FOR PREFABRICATED WALL FORMS

SUMMARY OF THE INVENTION

It is an essential object of the invention to provide improved sealing means for preventing leakage of composition material through the tie rod opening in a wall panel of a collapsible form for composition walls.

Another object is to provide a tubular sealing member adapted to be sleeved on the tie rod.

Another object is to provide a tubular member having an enlarged head on the inner end adapted to seal the inner surface of the panel surrounding the opening.

Another object is to provide a tubular sealing member having internal means adapted to have sealed engagement with the tie rod.

Another object is to provide a tubular sealing member having improved means for removably securing the same to the panel.

Another object is to provide a tubular sealing member constructed so as to form a recess or depression in the composition material and thereby produce an architectural detail in the surface of the cast composition wall.

Other objects and features of the invention will become apparent as the description proceeds, especially when taken in conjunction with the accompanying drawings, wherein:

FIG. 1 is a vertical sectional view of a collapsible wall form including tie rod sealing means, all in accordance with my invention.

FIG. 2 is an enlarged sectional view of a portion of FIG. 1, the tie rod being shown in dot-dash lines, and dotted lines being employed to indicate the configuration of the outer end of the head of the tubular member in its natural free state condition before the nut is tightened. Dotted lines are also provided to show a modified internal design for improved sealing contact with the rod.

FIG. 3 is similar to FIG. 2 but shows a modification of the invention.

FIG. 4 is similar to FIG. 2 but shows a further modification.

FIG. 5 is similar to FIG. 2 but shows still another modified form of the invention.

Referring now more particularly to the drawings, and especially to FIGS. 1 and 2 thereof, the wall form there illustrated is generally indicated at 10 and comprises a pair of vertically upright wall sections 12 and 14 which are disposed in parallel spaced relation and are connected together by suitable means including the tie rods 16.

The wall sections may be identical in construction and as seen each comprises a flat panel 18 and a supporting frame structure 20 on the outer surface of the panel to reinforce and strengthen the panel. The panels 18 are vertical and parallel to one another and disposed in spaced relation to support the composition material C to be cast between the wall sections. The inner surfaces of the panels are substantially smooth and uninterrupted to impart the same surface characteristics to the composition wall cast.

Walers 22 are provided on each wall section. The walers 22 are secured to the frame structure 20 of the wall sections and are preferably in the form of angle irons of the configuration shown extending horizontally and at the same level. The tie rods 16 extend across the space between the wall sections through aligned openings 24 and 26 in the panels 18 and have slots 28 in their outer ends. Clips 30 are provided which have legs 32 adapted to extend into the slots. The clips have hook portions 34 adapted to engage over the walers 22 to thus secure the wall sections together. Hence the pressure of the weight of material cast between the walls is prevented from separating the wall sections and of course it will be understood that a sufficient number of tie rods and clips will be employed to hold the wall sections of the form together as required.

There are a pair of sealing members 36 provided for each tie rod to seal the openings in the panels of the wall sections through which the tie rod extends. These sealing members are provided to prevent the leakage of composition material

through the openings 18. Composition material which might leak through these openings would run down the panels and would streak the supporting structure beneath the form. For example, if the form is set up on top of a lower section of concrete wall already cast, the composition material leaking through the openings would run down the form and streak the lower section of the concrete wall. Because of their sealing qualities, these sealing members essentially provide a monolithic surface for the material cast.

Each sealing member comprises an elongated tubular member or sleeve 38 which as shown in FIGS. 1 and 2 has an internal surface configuration of uniform circular cross section throughout its length which closely receives the tie rod. The outer end portion of the sleeve 38 is externally threaded and a nut 40 threads on the outer end of the sleeve to removably secure the sleeve to the panel.

The inner end of the sleeve in the space between the panels is formed with an enlarged head 42 which is frustoconically shaped as illustrated. The outer end of the head has an annular shoulder providing a sealing surface 44 which, in its natural free state condition, flares radially and axially outwardly as shown in dotted lines in FIG. 2. When the nut 40 is threaded up tight on the sealing member, the surface 44 flattens into substantially a radial plane to engage the inner surface of the panel in surface-to-surface sealed relation around the opening in the panel. When the nut 40 is drawn up tight the nut becomes substantially self-locking because of a slight deformation of the threads on the sleeve.

The material of the sealing sleeve 38 may of course vary but it is preferably of a suitable plastic having a durometer hardness in the range of 90–92. The sleeve may for example be made of polyethylene. Obviously other materials may be used and the hardness of the material may vary from the preferred range indicated above. However, the material of the sleeve should be relatively rigid and of sufficient strength and firmness to retain its essential form even though tightly clamped by the nut and yet be deformable to the extent necessary to cause the annular surface 44 to flatten against the panel face when the nut is tightened.

The amount of flare or relief of the annular surface 44 in the free state condition of the head 42 may vary but it has been found that when using a sleeve having a dimension *a* of one-fourth inch, a relief or flare indicated by dimension *b* of one thirty-second inch produces satisfactory results. Obviously, however, the relief may be more or less than that indicated without departing from the invention.

Not only does the sealing member 36 seal the opening 24 or 26 by snugly embracing the tie rod and by sealing the inner surface of the panel around the opening but the head being of frustoconical shape provides an attractive architectural detail in the surface of the composition wall cast. Obviously the shape of the head may be varied to change the appearance of the architectural detail. When the wall sections are removed the head of the sealing member will obviously pull out of the cast wall easily because of the taper of its outer surface. If it is desired to plug or fill the cone-shaped recess in the composition wall after the form is removed, this can be readily accomplished because of the enlarged size of the recess. Moreover, the taper of the recess left in the wall causes the fill material to compress as it is pressed in.

FIG. 2 illustrates a modification in dotted lines according to which the sleeve 38 is provided with a seal in the form of an integral internal annular rib 46, shown in its natural free state condition. The rib has the arcuate cross section shown for improved sealing engagement with the tie rod. Due to the somewhat deformable nature of the sleeve, the rib 46 will be capable of yielding by slight compression or expansion to enhance the sealing contact around 360° upon the outer surface of the tie rod.

FIG. 3 shows a further modification which is the same as the structure shown in FIG. 2 except that the internal surface of the sleeve tapers radially inwardly at the inner end of the sleeve to provide the seal, as indicated at 48. The taper is

shown in the free state condition of the sleeve. The purpose of the inward taper is to improve the sealing contact between the sleeve and the tie rod. This sealing contact is enhanced by virtue of the ability of the sleeve to deform slightly by compression of the inner surface of the sleeve at the inner end where the taper is provided and also by virtue of the ability of the sleeve to expand slightly to receive the tie rod.

FIG. 4 shows still another modification in which the structure shown is substantially the same as that shown in FIG. 2 except that an integral annular lip **49** is provided on the inner surface of the sleeve to provide the seal. This lip is inclined radially inwardly and axially outwardly at substantially the angle shown and its inner surface **50** is substantially cylindrical and parallel to the axis of the sleeve. The lip is shown in its natural free state condition and it will be understood that the lip will deform slightly when the rod is inserted, by slight compression and also by flaring radially outwardly to increase the sealing engagement with the rod.

FIG. 5 shows a further modification of the structure of FIG. 2 which is like FIG. 2 except that a shorter sleeve 38' is provided, and the nut 40' has a tubular extension which fits into the opening **24** for threaded engagement with the sleeve. The tubular extension seals the opening **24**.

The sealing members shown in FIGS. 3 and 4 may be full threaded up to the head if desired, as in FIG. 2.

It will be understood that in each of FIGS. 2–5 a sealing member, like one of those described, may also be employed to seal the tie rod opening in the other panel. In some applications, however, the sealing members may be used to seal the tie rod openings in one panel only.

In all of the forms of the invention described, the sealing member prevents the leakage of composition material through the openings in the wall panels. The tapered heads on the sealing members also provide flaring recesses or depressions in the surface of the wall cast which may be plugged or filled and which causes the fill material to be tightly compressed when introduced into the recesses because of the outward flare of the recesses. In those instances where it is desired not to fill the depressions formed by the heads of the sealing members but only to fill the holes left by the tie rod between the depressions, the depressions provide the designated architectural detail to enhance the appearance of the composition wall. The heads need not be round but may be of any other shape required to produce the desired architectural detail.

It will be understood that while in most instances the two sealing members used for each rod to seal the panel openings will be identical, obviously this is not necessary. It will also be understood that these sealing members may be used with other wall panels and tie rods than those specifically shown in the drawings.

What I claim as my invention is:

1. A collapsible form for composition walls comprising wall sections adapted to be supported in opposed, spaced relationship, said wall sections having confronting panels between which composition material may be cast, means for connecting said wall sections together including a tie rod extending between said wall sections through aligned openings in the panels thereof, and means for sealing the opening in one of said panels to prevent leakage of composition material including a tubular member formed of relatively rigid, though slightly deformable material and extending through said opening in said one panel and sleeved on said rod, said tubular member having an enlarged head on the inner end thereof disposed in the space between said panels and abutting the inner surface of said one panel in sealed relation around the opening thereof, and means threaded on the outer end of said tubular member to removably secure it to its panel, said tubular member having on its inner surface an annular radially inwardly projecting seal engaging said rod in sealed relation therewith.

2. The form defined in claim **1**, wherein said seal comprises an annular rib.

3. The form defined in claim **1**, wherein said seal comprises an annular lip inclined radially, inwardly and axially outwardly.

4. The form defined in claim **1**, wherein said seal comprises a portion of said inner surface of said tubular member at the inner end thereof which portion tapers radially inwardly in an axially inward direction.