(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 031 670 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
30.08.2000 Bulletin 2000/35

(51) Int Cl.[7]: **E04B 1/58**

(21) Application number: **00650012.8**

(22) Date of filing: **24.02.2000**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **26.02.1999 GB 9904317**

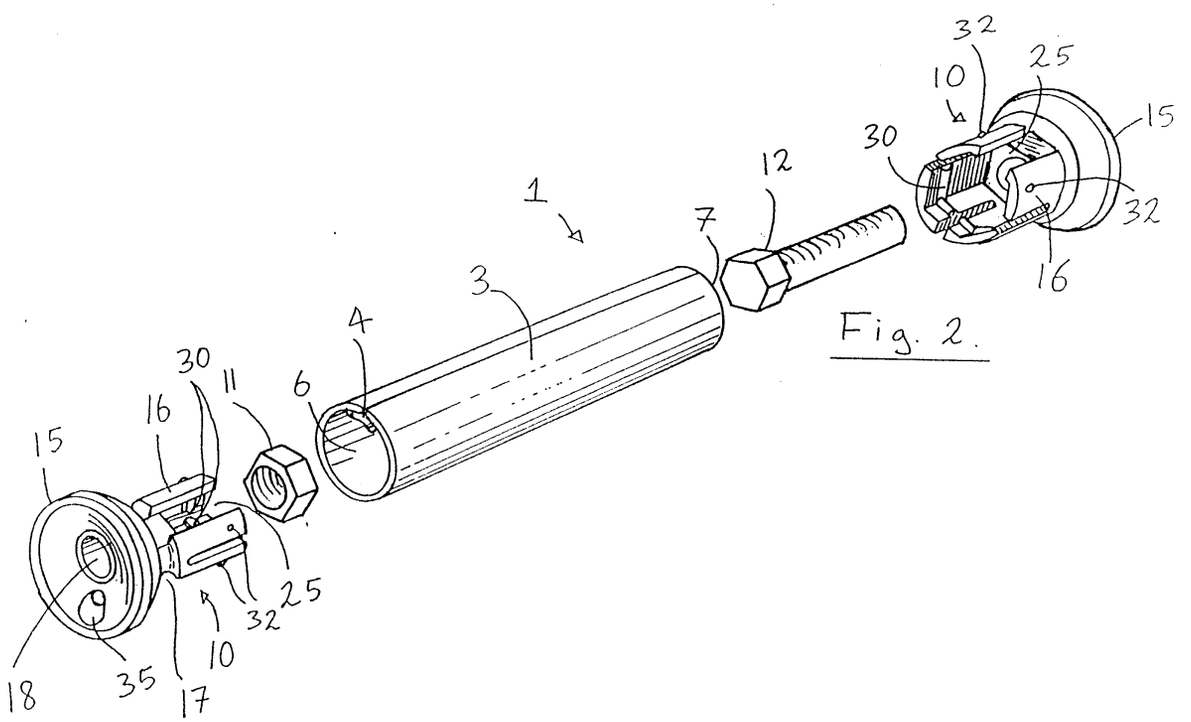
(71) Applicant: **WARD BUILDING COMPONENTS LIMITED**
Malton, North Yorkshire YO17 8PQ (GB)

(72) Inventor: **Davies, David Anthony**
Pickering, North Yorkshire YO18 8NT (GB)

(74) Representative: **O'Brien, John Augustine et al**
John A. O'Brien & Associates,
Third Floor,
Duncairn House,
14 Carysfort Avenue
Blackrock, Co Dublin (IE)

(54) An elongate structural member

(57) An elongate structural member 1 for joining support beams 2 of a wall or roof cladding system comprises a rolled tube 3 with an axially extending seam 4. A single piece plastics entrapping member 10 is inserted into opposite end openings 6, 7 of the tube 3. A threaded insert in the form of a nut 11 is held captive in a member 10 at one end opening 6 and a threaded insert in the form of a bolt 12 is held captive in another member 10 at the opposite end opening 7. Each entrapping member 10 comprises a head part 15 which is external of the tube 3 and a shank 16 which is inserted into the tube 3. A circumferentially extending groove 17 is formed between the head 15 and the shank 16 to receive a swaged part 19 of the tube 3, on assembly.



EP 1 031 670 A2

Description

Introduction

[0001] The invention relates to an elongate structural member for extending between frame parts in a building construction to reinforce the construction by adding rigidity and preventing bowing. The building constructions in which such elongate structural members are used include a wall or roof which generally comprise a plurality of frame parts which extend side by side in spaced parallel relation with an elongate member extending between an adjacent pair of frame parts. Cladding or roofing panels are generally secured to the frame parts.

[0002] Elongate structural members for extending between frame parts in such building constructions are known. UK - A - 2169678 describes such an elongate member with entrapping members at each end for a threaded insert. The threaded insert may be a bolt or a nut.

[0003] There is, however, a need for an improved structural member of this type which has fewer parts and which facilitates automated manufacturing techniques. This invention is directed towards providing such an improved structural member.

Statements of Invention

[0004] According to the invention there is provided an elongate structural member comprising: -

an elongate member having an opening in each of the opposite ends thereof;

an entrapping member in each end opening; and

a insert threaded member held by the entrapping member;

characterised in that each entrapping member is a single part having retaining means formed therein for holding a threaded insert captive in the entrapping member.

[0005] In a particularly preferred embodiment of the invention the elongate member is a rolled seam tube. Preferably each entrapping member has a slot to accommodate the seam of the rolled seam tube.

[0006] In an embodiment of the invention each entrapping member includes a circumferentially extending groove into which the elongate member is deformed for mounting the entrapping member to the elongate member.

[0007] Preferably each entrapping member has a locating means for aligning the entrapping member with the elongate member for assembly of the entrapping member with the elongate member.

[0008] In another preferred embodiment of the invention the retaining means comprises projection means which extends radially inwardly to retain a threaded insert it the entrapping member. Ideally, the projection means is an inwardly extending annular ring over which a threaded insert is fitted.

[0009] In another embodiment of the invention the entrapping member comprises a shank having a number of cut-out slots to define circumferentially spaced-apart shank elements at an insertion end of the entrapping member.

[0010] In one embodiment of the invention the entrapping member includes engagement projection means which extends radially outwardly for engagement with the interior of the elongate member.

[0011] Preferably the engagement projection means comprises a number of separate circumferentially spaced-apart bumps.

[0012] In a particularly preferred embodiment of the invention the entrapping member comprises a head part for location externally of an end of the elongate member opening and an integral shank extending into the elongate member from the head part, the threaded insert member being housed within the shank.

[0013] Preferably the entrapping member includes a circumferentially extending groove into which the elongate member is deformed is formed at a transition between the shank and the head part.

[0014] Preferably a locating means is provided in the head part for aligning the entrapping member with the elongate member.

[0015] In another aspect the invention provides an entrapping member for insertion into an end opening in an elongate member, characterised in that the entrapping member is a single part having retaining means formed therein for holding a threaded insert captive in the entrapping member.

[0016] Preferably the entrapping member has having an elongate slot to accommodate the seam of a rolled seam tube.

[0017] In a preferred embodiment of the invention the entrapping has a locating means for aligning the entrapping member with an elongate member for assembly of the entrapping member with the elongate member.

[0018] Preferably the entrapping includes a circumferentially extending groove for receiving or deformation of an elongate member on mounting of the entrapping member to the elongate member.

[0019] In one embodiment the retaining means comprises projection means which extends radially inwardly to retain a threaded insert in the entrapping member. The projection means is preferably an inwardly extending annular ring over which a threaded insert is fitted.

[0020] In a preferred embodiment the entrapping member comprises a shank having a number of cut-out slots to define circumferentially spaced-apart shank elements at an insertion end of the entrapping member.

[0021] Preferably the shank includes engagement projection means which extends radially outwardly of

the shank. Typically, the engagement projection means comprises a number of separate circumferentially spaced-apart bumps on the shank.

[0022] Preferably the entrapping member comprises a head part for location externally of an end of an elongate member opening and an integral shank extending into the elongate member from the head part, a threaded insert member being housed within the shank. Most preferably, a circumferentially extending groove into which an elongate member is deformed at a transition between the shank and the head part.

[0023] Ideally a locating means is provided in the head part for aligning the entrapping member with an elongate member.

Brief Description of the Drawings

[0024] The invention will be more clearly understood from the following description thereof given by way of example only with reference to the accompanying drawings, in which: -

Fig. 1 is a perspective view of an elongate structural member according to the invention;

Fig. 2 is an exploded view of the structural member of Fig. 1;

Fig. 3 is a longitudinal partially cross sectional view of the structural member of Fig. 1;

Fig. 4 is an end view of an entrapping member according to the invention and forming part of the structural member of Figs. 1 to 3;

Fig. 5 is a side view of the entrapping member of Fig. 4 with a threaded insert omitted;

Fig. 6 is a cross sectional view along the line VI - VI of Fig. 4;

Fig. 7 is the other end view of the entrapping member of Fig. 4;

Fig. 8 is a cross sectional view along the line VIII - VIII of Fig. 7;

Fig. 9 is a longitudinal cross sectional view of a tube part of the structural member of Fig. 1 prior to assembly;

Fig. 10 is a transverse cross sectional view of the tube part of Fig. 9;

Fig. 11 is an elevational, partially cross sectional view of the structural member, in use;

Fig. 12 is an exploded view of part of the assembly of Fig. 11;

Figs. 13(a) to 13(c) are views of typical arrangements of the structural members, in use; and

Fig. 14 is a longitudinal partially cross sectional view of the structural member, in use.

Detailed Description

[0025] Referring to the drawings there is illustrated an elongate structural member 1 according to the invention. The structural member 1 is in this case for joining frame parts such as support beams 2 of a construction such as a wall or roof cladding system.

[0026] The structural member 1 comprises an elongate member, in this case in the form of a rolled tube 3 having an axially extending seam 4 and a continuous opening extending the length thereof defining opposite ends openings 6, 7. An entrapping member 10 is inserted into each end opening 6, 7 and a threaded insert is held captive in each entrapping member 10. In this case the threaded insert at the end opening 6 is provided by a nut 11 and the threaded insert at the end opening 7 is provided by a bolt 12.

[0027] The entrapping members 10 are injection moulded of a plastics material in a single part from the same tool. Each entrapping member 10 comprises a head part 15 which is external of the tube 3 and a shank 16 which is inserted into the tube 3. The head part 15 has a through hole 18. At a transition between the head 15 and the shank 16 a circumferentially extending groove 17 is formed to receive a swaged part 19 of the tube 3 on assembly as illustrated particularly in Fig. 3. The shank 16 of the entrapping member 10 defines an hexagonal-shaped recess for receiving a nut 11 or the head of a bolt 12. The hexagonal shape of the recess prevents relative rotation of the nut 11 or bolt 12, in use.

[0028] The shank 16 of the entrapping member 10 has a slot 25 to accommodate the seam 4 of the tube 3. To retain the nut 11 or bolt 12 from pulling out of the entrapping member 10 the shank 16 also has a projection in the form of an annular ring 30 which extends radially inwardly. The ring 30 is sized and shaped to allow a nut 11 or bolt 12 to be push fitted into position while capturing the nut 11 or bolt 12 and preventing axial dislocation of the insert.

[0029] The shank 16 has three circumferentially spaced-apart slots 31 formed therein to define four shank elements 16(a) at an insertion end of the entrapping member 10 to facilitate insertion of the shank 16 into the elongate tube 3. Upon insertion of a threaded insert into the entrapping member 10 and upon insertion of the entrapping member 10 into a tube 3 the elements 16(a) flex slightly to engage the inside surface of the tube 3. To further engage and retain the entrapping member 10 in position in the tube 3 the shank 16 is formed with engagement projections in the form of small

bumps 32 which extend radially outwardly to engage with the inner surface of the tube 3.

[0030] Locating means for aligning the entrapping member 10 with the tube 3 for assembly is in this case provided by a locating hole 35 in the head 15 of the entrapping member 10. The locating hole 35 is provided at a pre-set position relative to the slot 25 for aligning the slot 25 with the seam 4 of the tube 3 for assembly. This arrangement greatly facilitates automated assembly of the tube 3 with the entrapping members 10.

[0031] In use, the threaded inserts 11, 12 are first inserted into entrapping members 10. This assembly may be readily automated. Once the inserts 11, 12 are in position they are held in place by the shape of the recess and the annular projections 30. The appropriate entrapping member 10 and insert assembly is inserted into the rolled tube 3 and the tube 3 is swaged to deform into the groove 17 of the entrapping member 10. Depending on the desired application the elongate structural member 1 may be provided with a nut 11 at one end and a bolt 12 at the other end, as illustrated, or may be fitted with two bolts or two nuts. One typical arrangement is illustrated in Figs. 11 to 13. In this case a spacer 40 is also provided to conform with the shape of the engaged part of the support beam 2.

[0032] The invention provides an elongate structural member and entrapping member which are extremely efficient in use and are cost effective to produce because minimum parts are utilised and the assembly is readily automated.

[0033] Many variations on the specific embodiments of the invention described will be readily apparent and accordingly the invention is not limited to the embodiments hereinbefore described which may be varied in construction and detail.

Claims

1. An elongate structural member (1) comprising: -

an elongate member having an opening (6), (7) in each of the opposite ends thereof;

an entrapping member (10) in each end opening (6), (7); and

a threaded insert member held by the entrapping member (10);

characterised in that each entrapping member (10) is a single part having retaining means formed therein for holding a threaded insert captive in the entrapping member(10).

2. A structural member (1) as claimed in claim 1 wherein each entrapping member (10) includes a circumferentially extending groove (17) into which the elongate member is deformed for mounting the entrapping member (10) to the elongate member, and a locating means for aligning the entrapping member (10) with the elongate member for assembly of the entrapping member (10) with the elongate member, preferably the elongate member is a rolled seam tube (3), and each entrapping member (10) has a slot (25) to accommodate the seam (4) of the rolled seam tube (3).

3. A structural member (1) as claimed in any of claims 1 or 2 wherein the retaining means comprises projection means which extends radially inwardly to retain a threaded insert in the entrapping member (10), preferably the projection means is an inwardly extending annular ring (30) over which a threaded insert is fitted.

4. A structural member (1) as claimed in any preceding claim wherein the entrapping member (10) comprises a shank (16) having a number of cut-out slots (31) to define circumferentially spaced-apart shank elements (16(a)) at an insertion end of the entrapping member (10), the shank (16) preferably includes engagement projection means which extends radially outwardly of the shank (16) for engagement with the interior of the elongate member, preferably the engagement projection means comprises a number of separate circumferentially spaced-apart bumps (32).

5. A structural member (1) as claimed in any preceding claim wherein the entrapping member (10) comprises a head part (15) for location externally of an end of the elongate member opening (6), (7) and an integral shank (16) extending into the elongate member from the head part (15), the threaded insert member being housed within the shank (16), with a circumferentially extending groove (17) into which the elongate member is deformed formed at a transition between the shank (16) and the head part (15), preferably a locating means is provided in the head part (15) for aligning the entrapping member (10) with the elongate member.

6. An entrapping member (10) for insertion into an end opening (6), (7) in an elongate member to form a structural member (1) as claimed in any preceding claim, characterised in that the entrapping member (10) is a single part having retaining means formed therein for holding a threaded insert captive in the entrapping member (10).

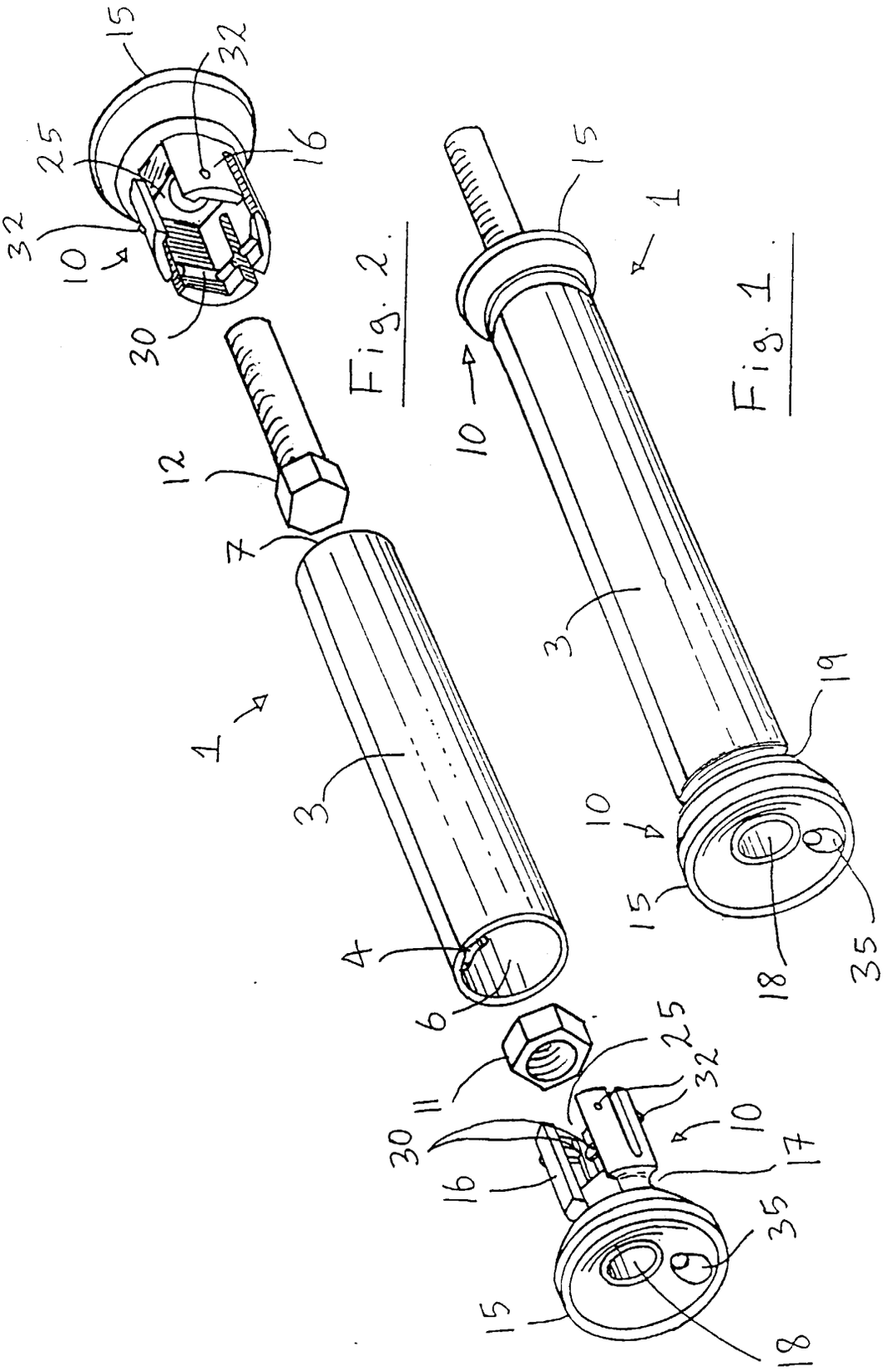
7. An entrapping member (10) as claimed in claim 6 having an elongate slot (25) to accommodate the seam (4) of a rolled seam tube (3), a locating means for aligning the entrapping member (10) with an elongate member for assembly of the entrapping

member (10) with the elongate member, and including a circumferentially extending groove (17) for receiving a deformation of an elongate member on mounting of the entrapping member (10) to the elongate member.

8. An entrapping member (10) as claimed in claim 6 or 7 wherein the retaining means comprises projection means which extends radially inwardly to retain a threaded insert in the entrapping member (10), preferably the projection means is an inwardly extending annular ring (30) over which a threaded insert is fitted.

9. An entrapping member (10) as claimed in any of claims 6 to 8 comprising a shank (16) having a number of cut-out slots (31) to define circumferentially spaced-apart shank elements (16(a)) at an insertion end of the entrapping member (10), the shank (16) preferably includes engagement projection means which extends radially outwardly of the shank (16), preferably the engagement projection means comprises a number of separate circumferentially spaced-apart bumps (32) on the shank (16).

10. An entrapping member (10) as claimed in any of claims 6 to 9 comprising a head part (15) for location externally of an end of an elongate member opening (6), (7) and an integral shank (16) extending into the elongate member from the head part (15), a threaded insert member being housed within the shank (16), with a circumferentially extending groove (17) into which an elongate member is deformed formed at a transition between the shank (16) and the head part (15), preferably a locating means is provided in the head part (15) for aligning the entrapping member (10) with an elongate member.


15
32
25
16
32
10
30
12
7
1
3
4
6
11
30
16
25
32
10
17
35
15
18
Fig. 2.
15
1
10
3
19
10
15
18
35
Fig. 1.

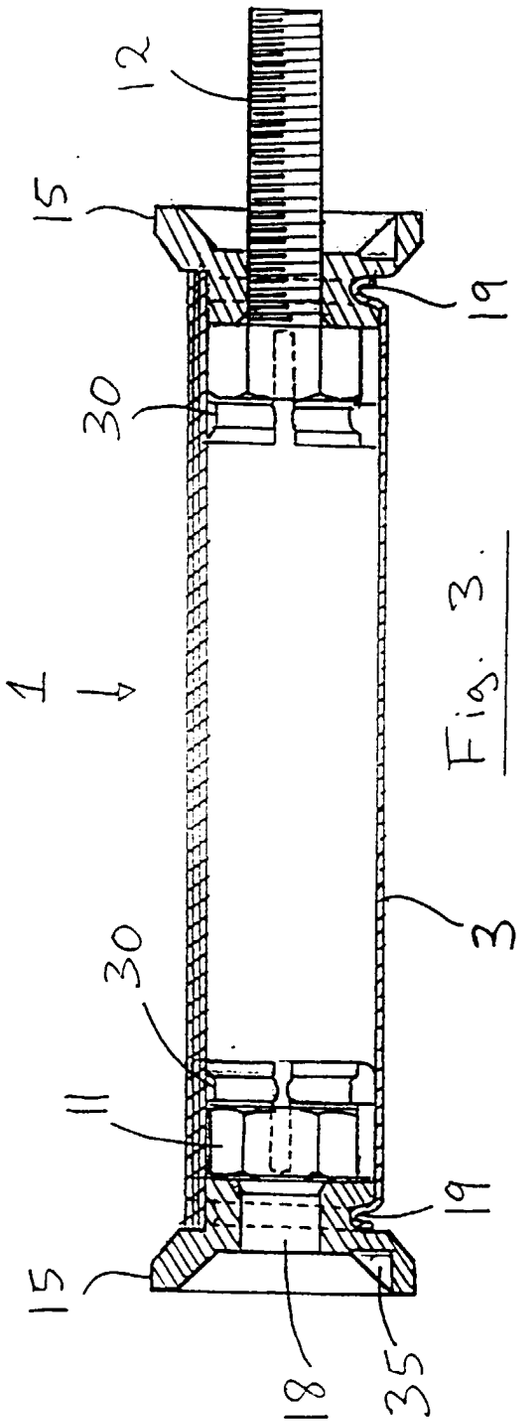


Fig. 3.

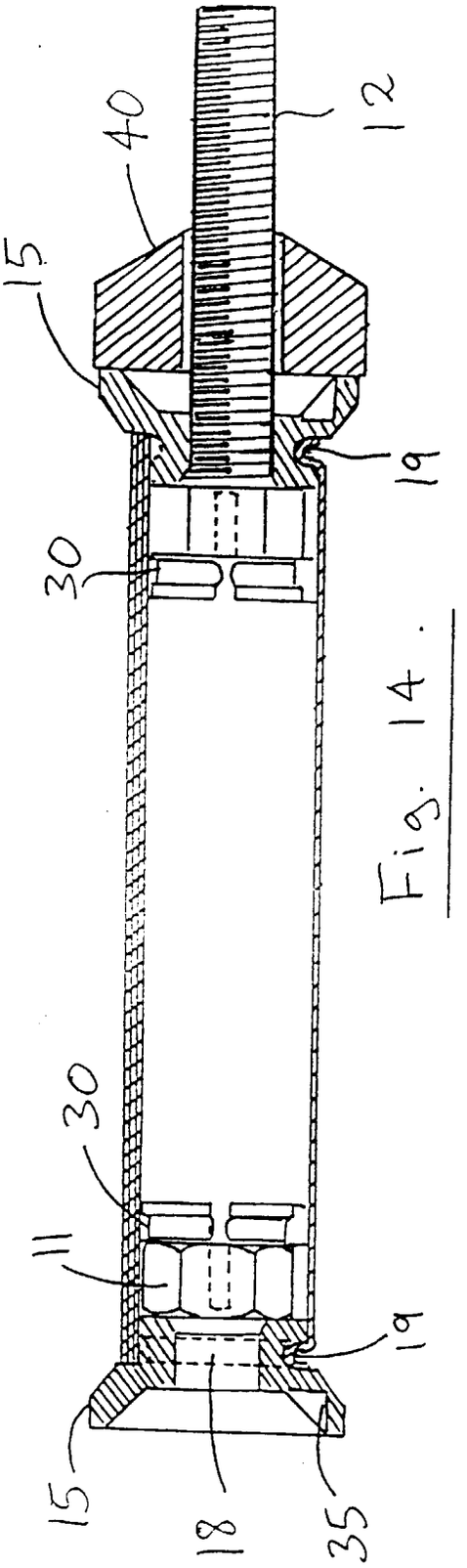


Fig. 14.

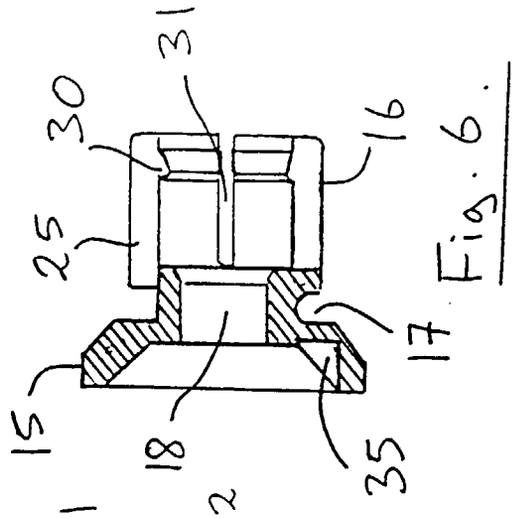


Fig. 6.

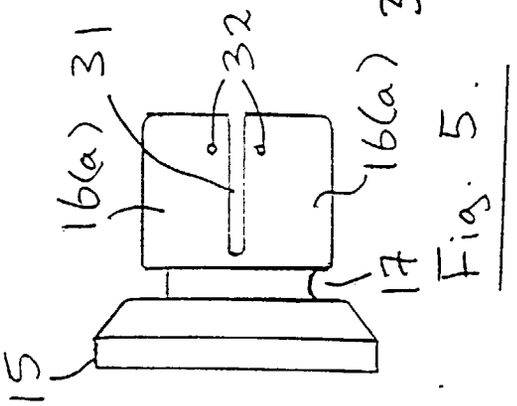


Fig. 5.

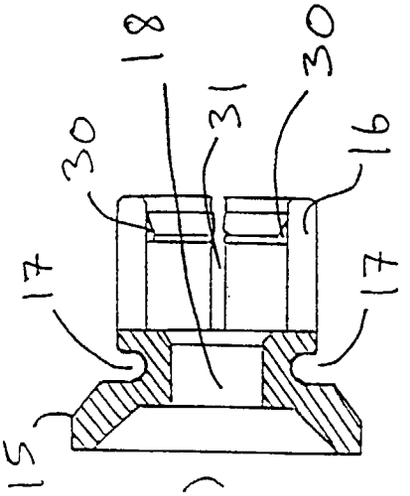


Fig. 8.

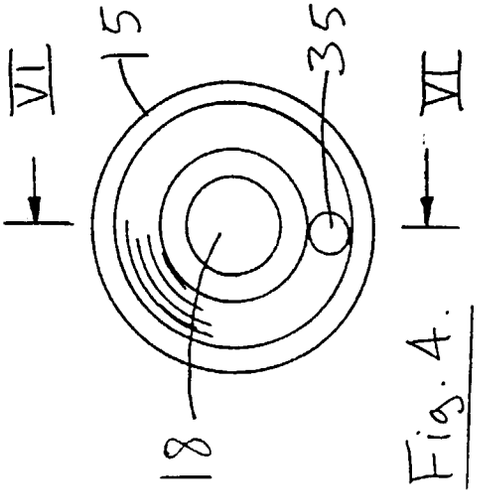


Fig. 4.

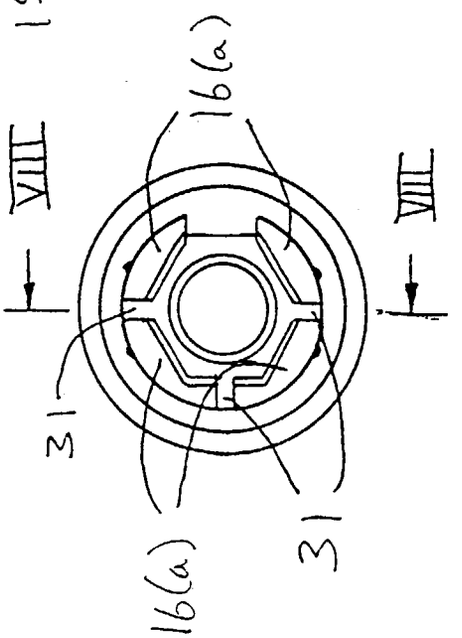
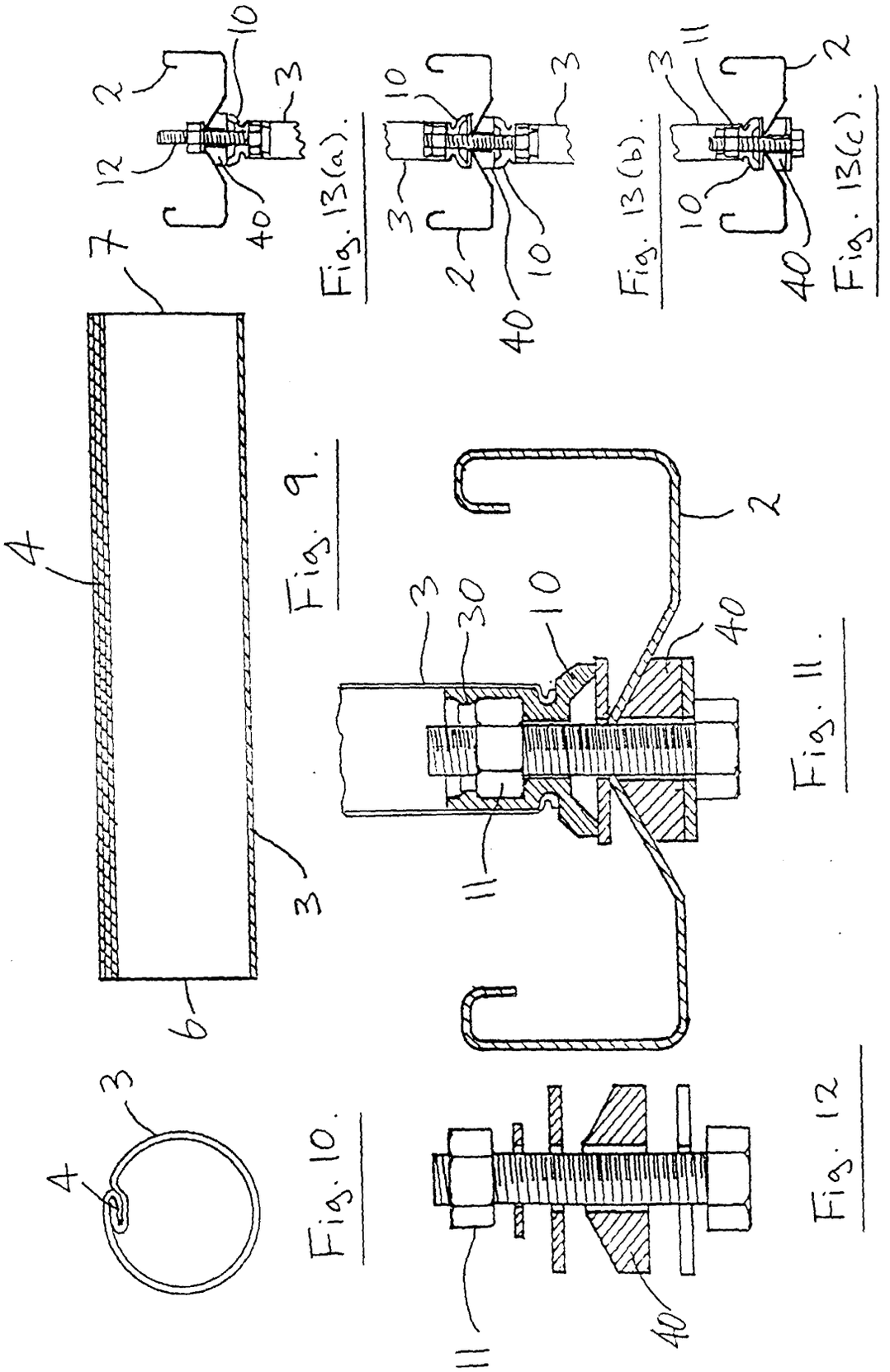


Fig. 7.


2
10
12
3
40
7
4
6
3
Fig. 13(a).
Fig. 13(b).
Fig. 13(c).
Fig. 9.
Fig. 10.
Fig. 11.
Fig. 12
30
11