



Europäisches Patentamt
European Patent Office
Office européen des brevets

Publication number:

**0 271 357
A2**

12

EUROPEAN PATENT APPLICATION

21 Application number: 87310925.0

51 Int. Cl.4: **H 01 R 9/09**

22 Date of filing: 11.12.87

30 Priority: 12.12.86 JP 191484/86

43 Date of publication of application:
15.06.88 Bulletin 88/24

84 Designated Contracting States: DE FR GB

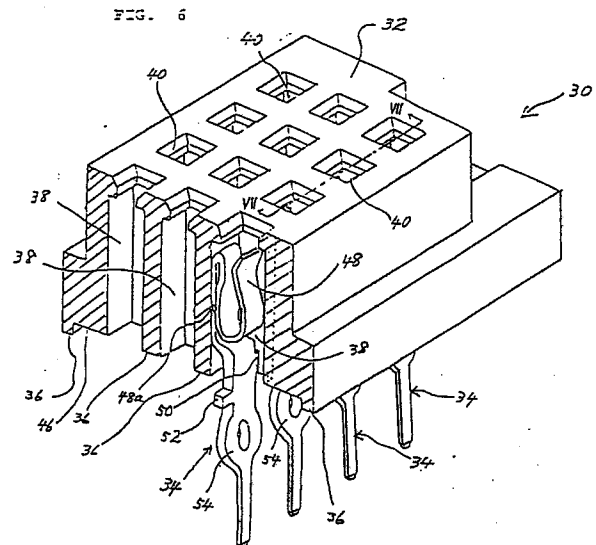
71 Applicant: **NEC CORPORATION**
33-1, Shiba 5-chome, Minato-ku
Tokyo 108 (JP)

72 Inventor: **Yoshino, Toshinori**
c/o NEC Corporation 33-1, Shiba 5-chome
Minato-ku Tokyo (JP)

74 Representative: **Pears, David Ashley et al**
REDDIE & GROSE 16 Theobalds Road
London WC1X 8PL (GB)

54 Press-fit connector.

57 A press-fit connector includes contacts (34) which may be press-fitted in respective through holes of a printed circuit board for electronic equipment. Each of the contacts is received in an associated through bore (38) of a housing (32) which is made of an insulating material, so that it is press-fitted in its associated through hole when the housing is pressed downward. Two axially offset projections (50, 52) extend out from the contact away from each other to abut against, respectively, the bottom (46) of the housing and a flat shoulder of a recess which is provided in a side wall of the through bore of the housing.



EP 0 271 357 A2

Description**PRESS FIT CONNECTOR****BACKGROUND OF THE INVENTION**

The present invention relates to a connector and, more particularly, to the structure of a press-fit connector having an insulative body which may be pressed to in turn press-fit contacts in individual through holes of a printed circuit board.

In modern electronic equipment, electrical and mechanical connection of a connector to a printed circuit board is increasingly implemented with, instead of traditional soldering, press-fit connection which is such that a press-fitting portion of a contact which is dimensioned slightly larger than the inside diameter of a through hole of a printed circuit board is press-fitted in the through hole. Various advantages are attainable with the press-fit connection such as elimination of the need for troublesome soldering steps and removal of thermal influence on the circuit board, whereby the reliability of connection is enhanced.

A prior art press-fit connector of the kind described is constituted by a contact which is to be press-fitted in a through hole of a printed circuit board, and a housing made of an insulating material and provided with a bore in which the contact may be removably received. The contact is formed with a single lance, or portion engageable with the housing, on its periphery. To press-fit the contact in a through hole of a printed circuit board, the lance is engaged with a shoulder which is provided in the bore of the housing and, then, the housing is bodily pressed. Another prior art press-fit connector includes a contact which is provided with a plurality of lances on its periphery. In this type of connector, the lances are engaged with the bottom of a housing and, then, pressed by the housing to become press-fitted in a through hole of a printed circuit board. A drawback with the single lance type press-fit connector is that the contact is apt to rotate during press-fitting and, therefore, to fall after press-fitting. On the other hand, a problem with the multiple lance type press-fit connector is that the dimension of each lance available are limited because, when the contact of one connector is press-fitted, its lances are liable to make contact with those of adjacent connectors resulting in the interconnection of unexpected connectors. This in turn reduces the area over which the bottom of the housing and the lances engage each other, thereby preventing a sufficient press-fitting function from being accomplished.

SUMMARY OF THE INVENTION

It is, therefore, an object of the present invention to provide a press-fit connector which solves the problems particular to the prior art press-fit connectors as discussed above.

A specific object of the present invention is to provide a reliable press-fit connector.

Another specific object of the present invention is to provide a press-fit connector which can be surely mounted on a printed circuit board and others.

It is another object of the present invention to provide a generally improved press-fit connector.

A structure of a press-fit connector of the present invention comprises at least one contact having projections which extend out away from each other from opposite sides of the contact with respect to an axis of the contact and are distant from each other in an axial direction of the contact, and a presser member having portions with which the projections of the contact are individually engageable, for pressing the contact into press-fit in a through hole.

The above and other objects, features and advantages of the present invention will become more apparent from the following detailed description taken with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Figs. 1 and 2 are views showing, respectively, a contact and a housing of a prior art press-fit connector;

Figs. 3 and 4 are views similar to Figs. 1 and 2, showing, respectively, a contact and a housing of another prior art press-fit connector;

Fig. 5 is a perspective view showing a press-fit connector embodying the present invention;

Fig. 6 is a partly sectional side elevation of the press-fit connector as shown in Fig. 1;

Fig. 7 is a section along line VII-VII of Fig. 6;

Fig. 8 is a fragmentary side elevation as viewed from the right in Fig. 6;

Fig. 9 is a fragmentary section of a printed circuit board.

DESCRIPTION OF THE PREFERRED EMBODIMENT

To better understand the present invention, a brief reference will be made to prior art press-fit connectors, shown in Figs. 1 to 4.

As shown in Figs. 1 and 2, a prior art press-fit connector is made up of a contact 10 having a lance 12 on one of its opposite sides, and an insulative housing 14 having a bore 16 for receiving the contact 10. Within the bore 16, the housing 14 is notched to have a shoulder 18 with which the lance 12 is engageable. To press-fit the contact 10 in a through hole of a printed circuit board, not shown, the housing 14 is pressed downward so that the shoulder 18 being engaged with the lance 12 urges the latter downward. In Figs. 3 and 4, there is shown another prior art press-fit connector which is constituted by a contact 20 having lances 22 and 24 on its opposite sides, and an insulative housing 26 having a straight bore 28. The lances 22 and 24 are shaped by cutting the contact 20. The contact 20 is press-fitted in a through hole of a printed circuit board by abutting flat ends 22a and 24a of the lances 22 and 24, respectively, against a flat end 26a of the housing 26 and, then, pressing the housing 26 downward.

In the connector shown in Figs. 1 and 2, the lance 12 is provided on only one side of the contact 10 and,

therefore, the position where the lance 12 and the shoulder 18 of the housing 14 abut against each other is deviated from the axis of the contact 10. In this condition, a force tending to rotate the contact 10 is developed while the contact 10 is press-fitted, resulting that the contact 10 is apt to fall after press-fitting and/or a spring, not shown, associated with the contact 10 is apt to be dislocated. In contrast, the connector shown in Figs. 3 and 4 is free from such a force because the contact 20 is provided with the lances 22 and 24 on opposite sides thereof. Nevertheless, when the contact 20 is press-fitted in a through hole of a printed circuit board, the lances 22 and 24 are liable to make contact with those of adjacent contacts. For this reason, each lance 22 or 24 cannot be designed longer than a certain limit. Generally, mechanical strength is proportional to the area of a portion for abutment. It follows that the lances 22 and 24 whose dimensions are limited as stated above are unable to achieve abutting strength great enough to guarantee firm press-fit of the contact 20 in a through hole of a printed circuit board while, at the same time, scattering in pressing force is unavoidable.

Referring to Fig. 5, a press-fit connector embodying the present invention is shown and generally designated by the reference numeral 30. The connector 30 is shown in a fragmentary sectional perspective view in Fig. 6. As shown, the connector 30 comprises a housing 32 made of an insulating material, and a plurality of contacts 34. The housing 32 is provided with a flange 36. A plurality of through bores 38 extend vertically throughout the housing 32 in order to individually receive the contacts 34. The upper end of each bore 38 merges into a window 40 which is formed through the housing 32 for receiving another contact.

The configuration of the housing 32 and that of each contact 34 will be described in detail with reference to Figs. 7 to 9 as well.

As best shown in Fig. 7, each through bore 38 is contiguous with a recess 42 at its lower end portion. Specifically, the recess 42 is formed by notching the inner side wall of the housing 32 downward and terminates at a flat upper end, or shoulder, 44. The bottom 46 of the housing 32, too, is formed flat. Each contact 34 includes a spring portion 48 having two lugs 48a, projections 50 and 52, and a press-fit portion 54. Formed by bending the upper end portion of the contact 34, the spring portion 48 is adapted for pressing engagement with another contact which may be inserted through the window 40 of the housing 32. The projections 50 and 52 extend out perpendicular to the axis of the contact 34 and away from each other. As shown in Fig. 7, the projections 50 and 52 are apart from each other in the axial direction of the contact 34 by a distance which is selected to cause the projection 52 to abut against the bottom 46 of the housing 32 when the projection 50 abuts against the shoulder 44. The upper surfaces 50a and 52a of the projections 50 and 52, respectively, are formed flat to make positive contact with the housing shoulder 44 and the housing bottom 46, respectively. Located in a lower portion of the contact 34 as viewed in the figures, the

press-fit portion 54 has resiliency.

To mount the connector 30 on a printed circuit board, the connector 30 is positioned above a printed circuit board 56, Fig. 9, such that the axis of each contact 34 is aligned with that of its associated through hole 58. In this condition, the housing 32 is pressed downward so that the press-fit portion 54 of the contact 34 is press-fitted in the associated through hole 58 of the printed circuit board 56 with the projection 50 abutting against the housing shoulder 44 and the projection 52 abutting against the housing bottom 46. Since the pressure force applied to the housing 32 is evenly distributed to the projections 50 and 52 which are located at opposite sides of the axis of the contact 34, the contact 34 is allowed to enter the through hole 58 in a vertical position without being rotated. Moreover, the entire pressure force acting on the housing 32 is imparted to the contact 34 to surely press-fit it in the through hole 58 inasmuch as the projections 50 and 52 of the contact 34 contact, respectively, the housing shoulder 44 and housing bottom 46 each over a substantial area.

In summary, it will be seen that in accordance with the present invention a force which is applied to the housing 32 for press-fitting the contact 34 in the through hole 58 of the printed circuit board 56 is allowed to act on the same axis to prevent the contact 34 from being rotated. This is because the projections 50 and 52 extending away from each other from the contact 34 are engageable with the housing 32.

Further, the projections 50 and 52 are distant from each other in the axial direction of the contact 34. Hence, the distance between the outermost ends of the projections 50 and 52 as measured in a direction perpendicular to the axis of the contact 34 can be designed substantially as great as the intercontact pitch of the connector. The contact 34, therefore, is allowed to make contact with the housing 32 over an area which is wide enough to insure mechanical strength against the press-fitting force.

Various modifications will become possible for those skilled in the art after receiving the teachings of the present disclosure without departing from the scope thereof.

Claims

1. A press-fit connector, comprising a contact (34) having projections (50, 52) which extend away from each other from opposite sides of the contact with respect to an axis of the contact, a presser member (32) having portions with which the projections of the contact are individually engageable for pressing the contact into a through hole, characterised in that the projections (50, 52) are spaced from each other in the axial direction of the contact (34).
2. A connector as claimed in claim 1, characterised in that the contact (34) has two projections (50, 52).

3. A connector as claimed in claim 1 or 2, characterised in that the presser member comprises a housing (32) made of an insulating material and formed with a through bore (38) for receiving the contact (34).

5

4. A connector as claimed in claim 3, characterised in that the portions of the presser member with which the projections (50, 52) are individually engageable comprise a flat bottom (46) of the housing and a flat shoulder (44) of a recess (42) which is provided in an inner side wall of the housing.

10

5. A connector as claimed in claim 3 or 4, characterised in that the contact (34) comprises a spring portion (48) to be received in the through bore (38) of the housing (32) and a press-fit portion (54) to be received in the through hole.

15

6. Use of a connector as claimed in any of claims 1 to 5, characterised in that the through hole into which the contact (34) is pressed is formed through a printed circuit board (36).

20

25

30

35

40

45

50

55

60

65

4

FIG. 1
PRIOR ART

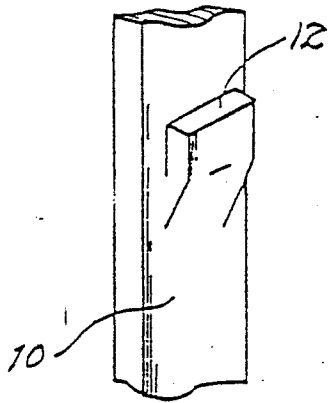


FIG. 2
PRIOR ART

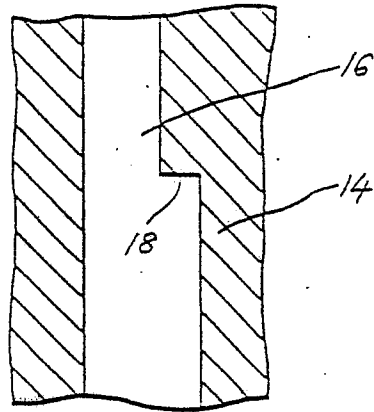


FIG. 3
PRIOR ART

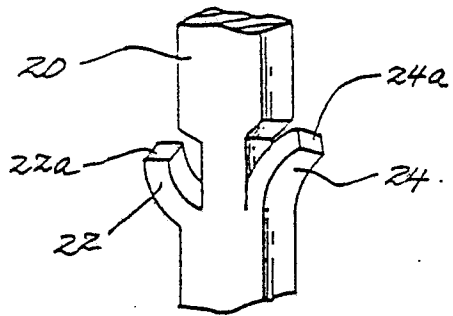
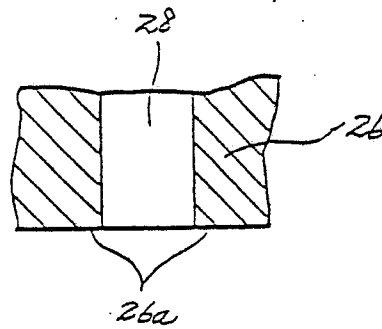


FIG. 4 PRIOR ART



0271357

FIG. 5

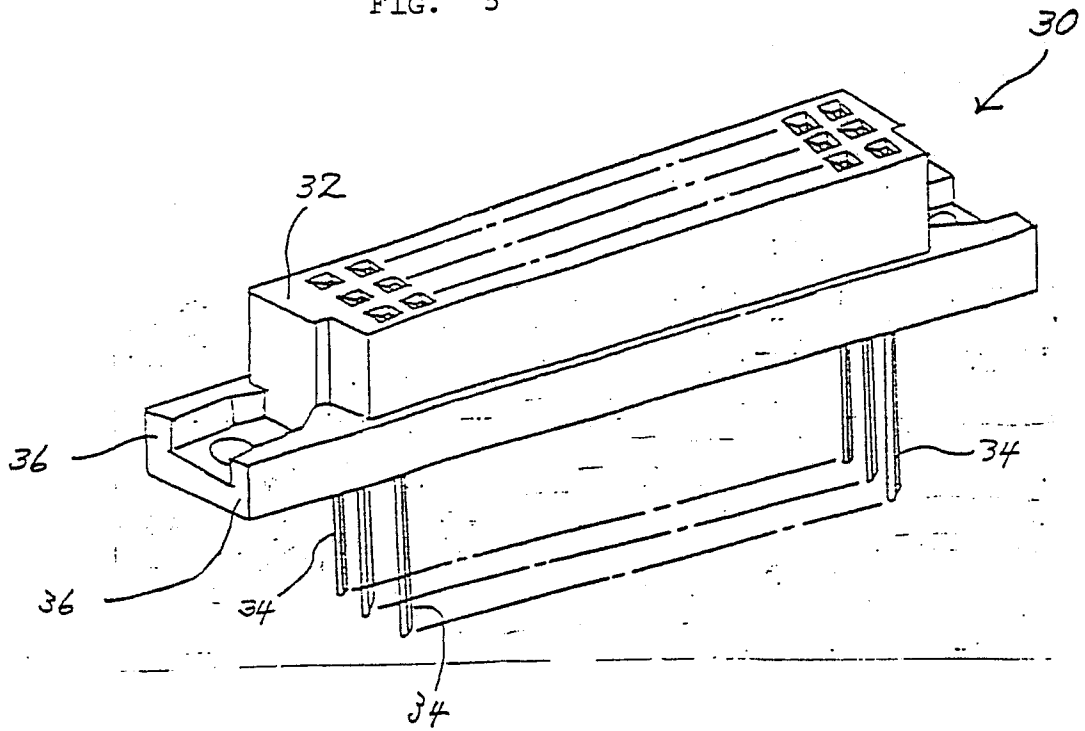


FIG. 6

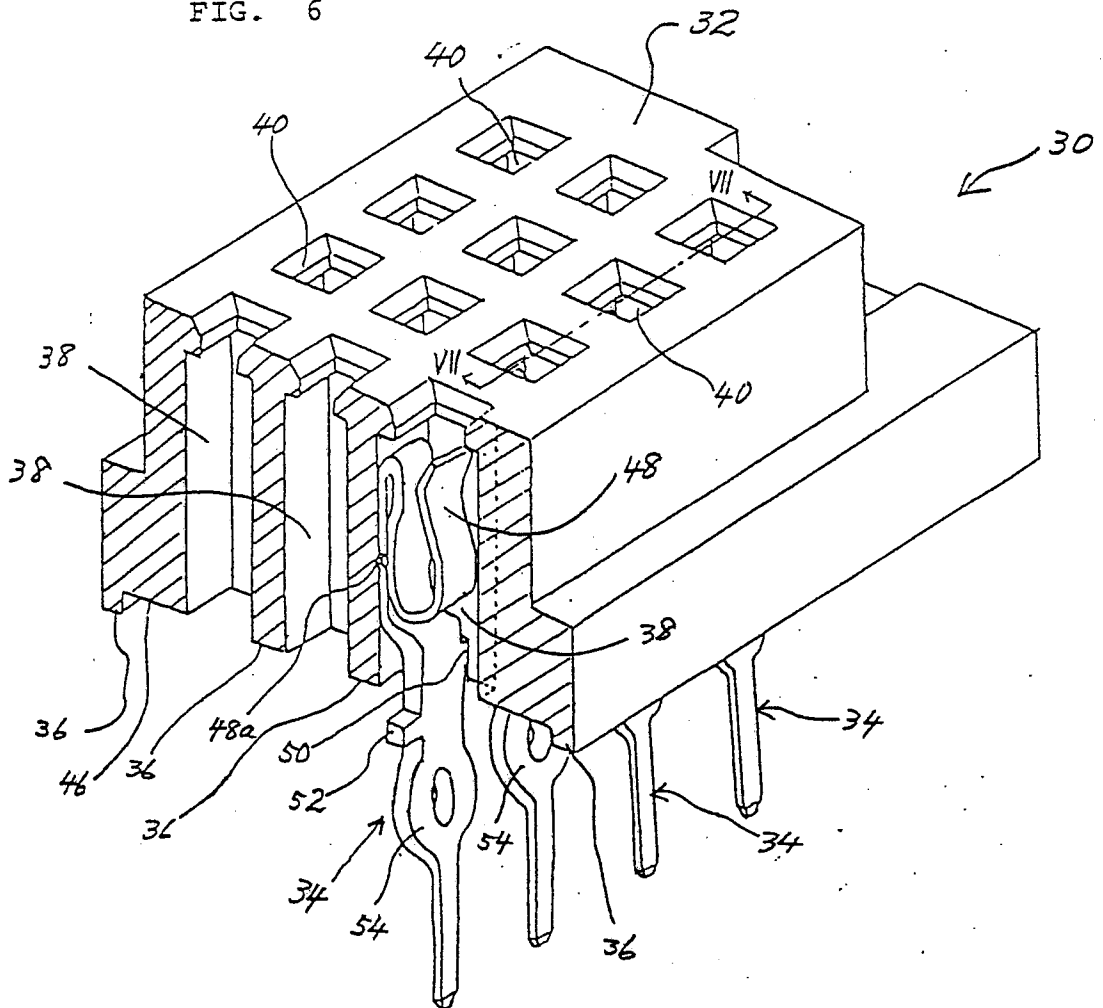
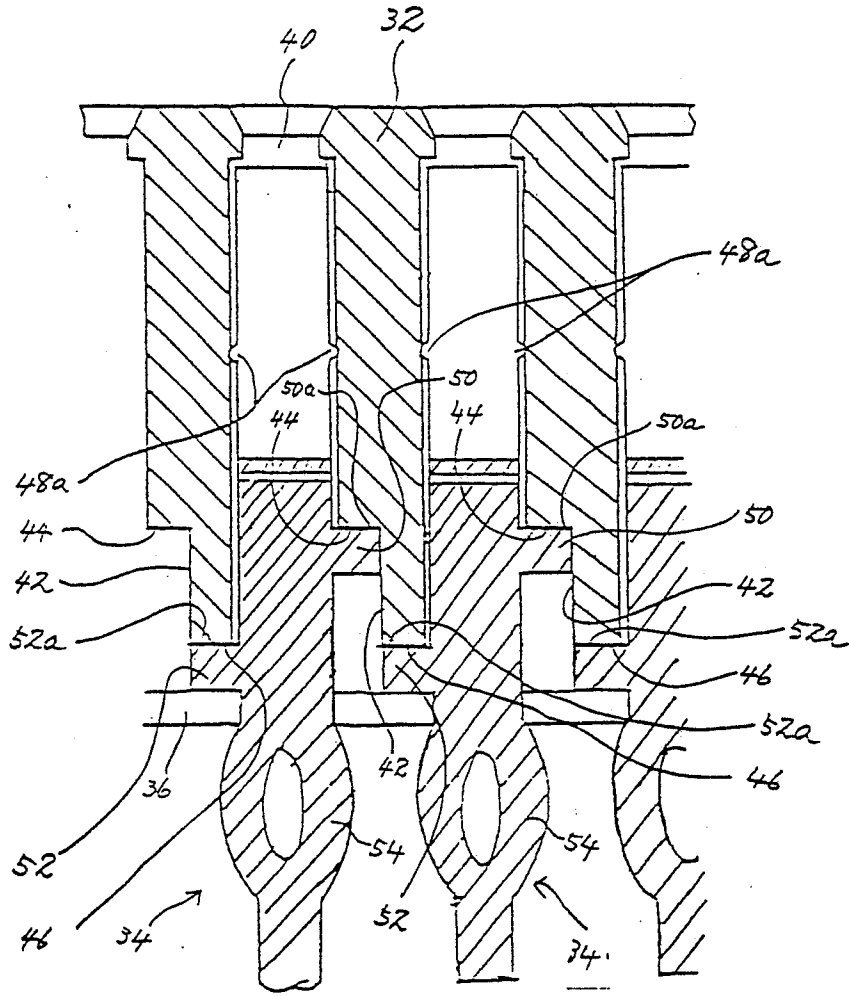


FIG. 7



0271357

FIG. 8

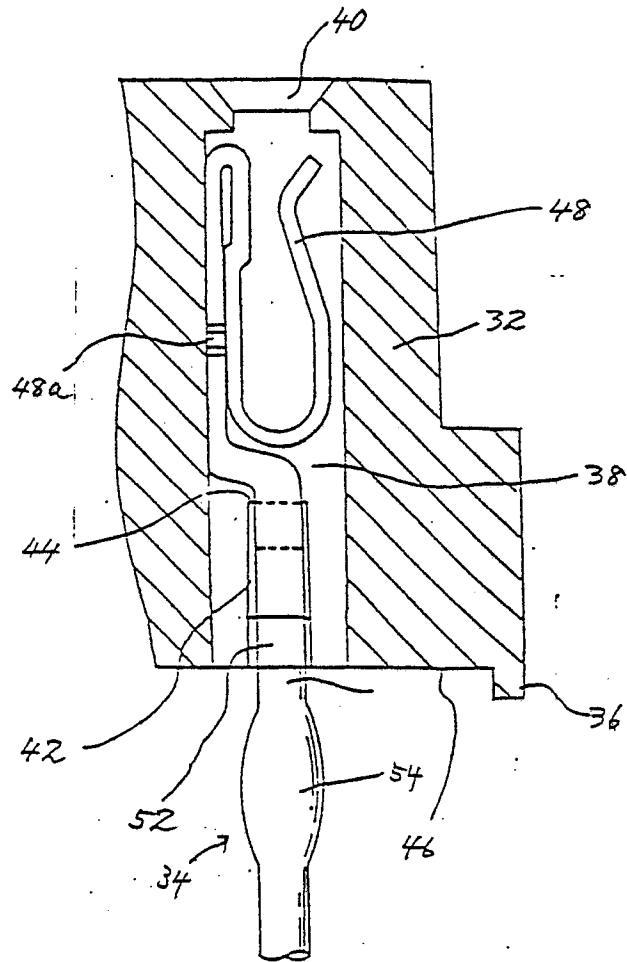


FIG. 9

