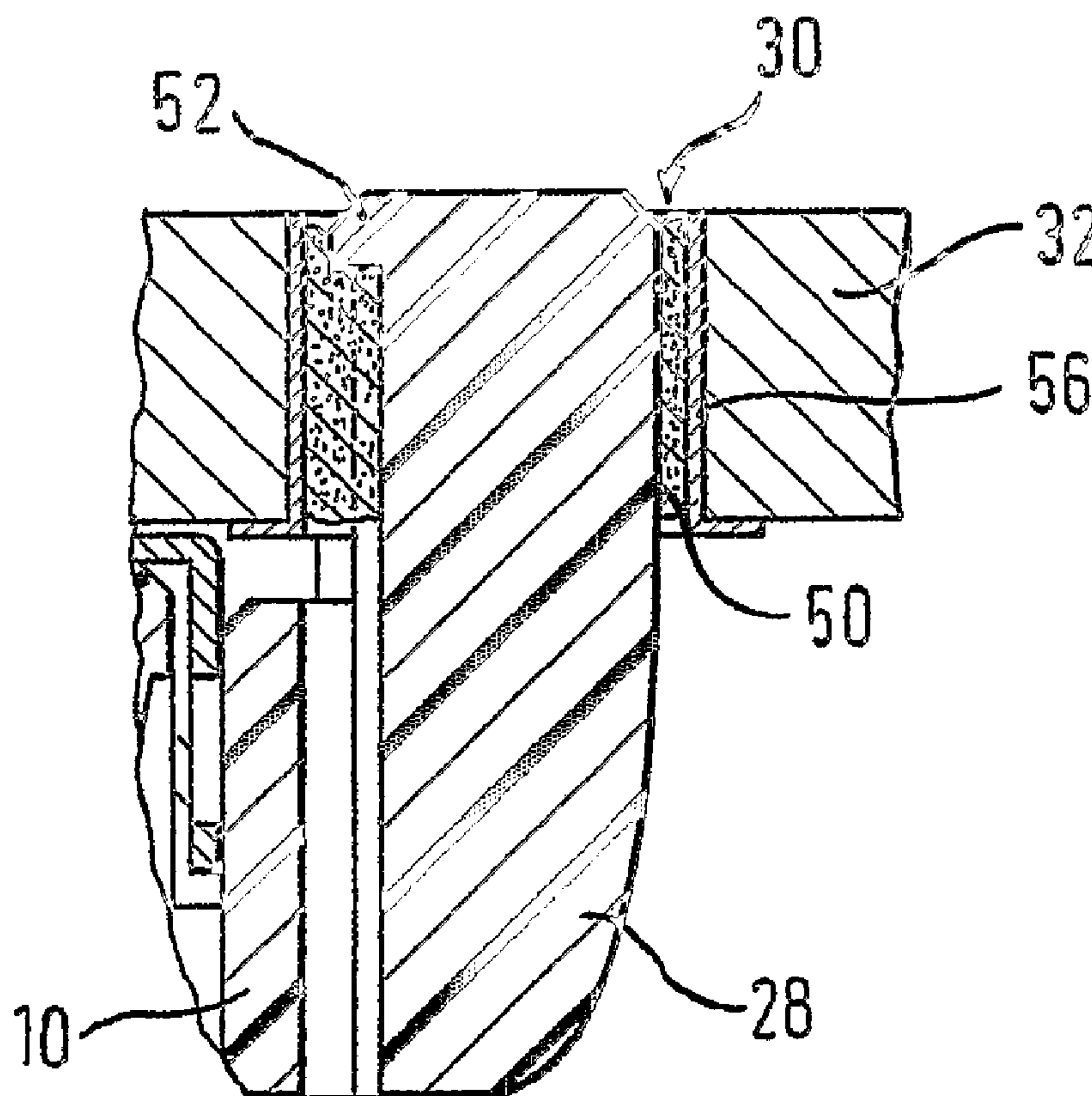




(86) Date de dépôt PCT/PCT Filing Date: 2004/07/07
(87) Date publication PCT/PCT Publication Date: 2005/01/20
(45) Date de délivrance/Issue Date: 2012/03/27
(85) Entrée phase nationale/National Entry: 2006/01/10
(86) N° demande PCT/PCT Application No.: EP 2004/007440
(87) N° publication PCT/PCT Publication No.: 2005/006821
(30) Priorité/Priority: 2003/07/14 (DE103 31 840.2)

(51) Cl.Int./Int.Cl. *H01R 4/02* (2006.01),
H01R 12/58 (2011.01), *H05K 3/34* (2006.01)
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(54) Titre : COMPOSANT DESTINE A UNE CARTE DE CIRCUIT IMPRIME ET PROCEDE DE POSE DUDIT
COMPOSANT SUR UNE CARTE DE CIRCUIT IMPRIME
(54) Title: COMPONENT FOR A CIRCUIT BOARD AND METHOD FOR INSERTING SAID COMPONENT INTO A
CIRCUIT BOARD



(57) Abrégé/Abstract:

The invention relates to a component for a printed circuit board (32) comprising a housing (10) on which at least one peg (28) is formed for engaging inside a hole (30) of the printed circuit board (32). This peg (28) has at least one detent lug (52) that projects



(57) Abrégé(suite)/Abstract(continued):

in a radial direction with regard to the peg (28) beyond the outer periphery thereof. The detent lug (52) is placed and formed on the peg (28) in such a manner that the outer periphery of the peg (28) is smaller in the area of the detent lug (52) than the diameter of the hole (30) in the printed circuit board (32). The outer periphery of the section of the peg (28) projecting into the hole (30) in the printed circuit board (32) is formed in such a manner that, between the outer periphery of this section and the inner wall of the hole (30) in the printed circuit board (32), a space having a capillarity for solder is formed over at least a portion of the outer periphery, whereby during a soldering process, solder (50) located on the surface of the printed circuit board (32) enters, by means of capillary action, the space while filling the same.

(12) NACH DEM VERTRAG ÜBER DIE INTERNATIONALE ZUSAMMENARBEIT AUF DEM GEBIET DES
PATENTWESENS (PCT) VERÖFFENTLICHTE INTERNATIONALE ANMELDUNG(19) Weltorganisation für geistiges Eigentum
Internationales Büro(43) Internationales Veröffentlichungsdatum
20. Januar 2005 (20.01.2005)

PCT

(10) Internationale Veröffentlichungsnummer
WO 2005/006821 A3(51) Internationale Patentklassifikation⁷: **H01R 12/20,**
H05K 3/34

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(21) Internationales Aktenzeichen: PCT/EP2004/007440

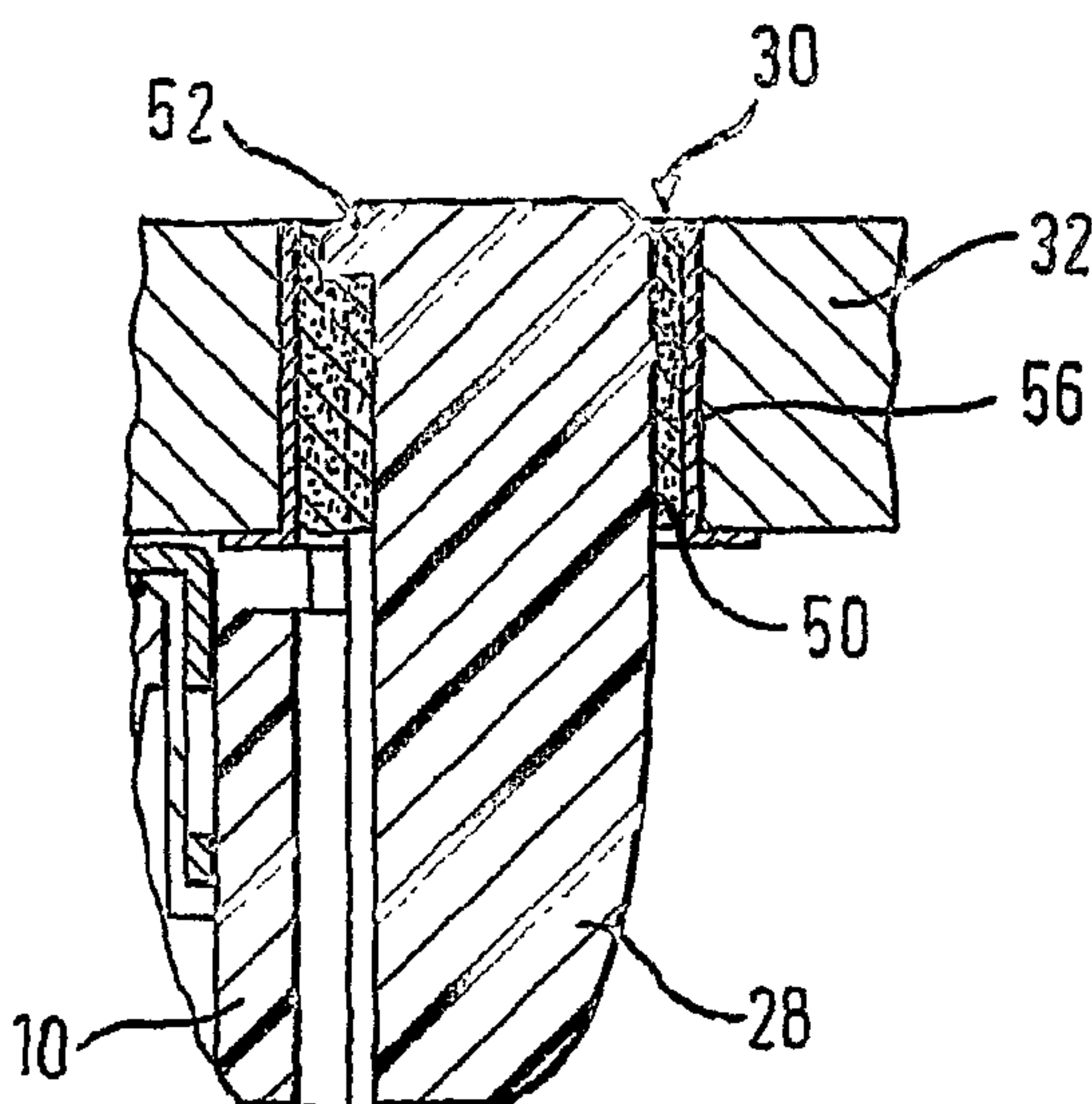
(22) Internationales Anmeldedatum:
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(25) Einreichungssprache: Deutsch

(26) Veröffentlichungssprache: Deutsch

(30) Angaben zur Priorität:
103 31 840.2 14. Juli 2003 (14.07.2003) DE(71) **Anmelder** (*für alle Bestimmungsstaaten mit Ausnahme
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Fridolfing (DE).(81) **Bestimmungsstaaten** (*soweit nicht anders angegeben, für
jede verfügbare nationale Schutzrechtsart*): AE, AG, AL,
AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH,
CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES,
FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,
KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD,
MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG,
PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM,
TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM,
ZW.

[Fortsetzung auf der nächsten Seite]

(54) **Title:** COMPONENT FOR A PRINTED CIRCUIT BOARD AND METHOD FOR FITTING A PRINTED CIRCUIT BOARD
WITH THIS COMPONENT(54) **Bezeichnung:** BAUTEIL FÜR EINE LEITERPLATTE UND VERFAHREN ZUM BESTÜCKEN EINER LEITERPLATTE
MIT DIESEM BAUTEIL(57) **Abstract:** The invention relates to a component for a printed circuit board (32) comprising a housing (10) on which at least one peg (28) is formed for engaging inside a hole (30) of the printed circuit board (32). This peg (28) has at least one detent lug (52) that projects in a radial direction with regard to the peg (28) beyond the outer periphery thereof. The detent lug (52) is placed and formed on the peg (28) in such a manner that the outer periphery of the peg (28) is smaller in the area of the detent lug (52) than the diameter of the hole (30) in the printed circuit board (32). The outer periphery of the section of the peg (28) projecting into the hole (30) in the printed circuit board (32) is formed in such a manner that, between the outer periphery of this section and the inner wall of the hole (30) in the printed circuit board (32), a space having a capillarity for solder is formed over at least a portion of the outer periphery, whereby during a soldering process, solder (50) located on the surface of the printed circuit board (32) enters, by means of capillary action, the space while filling the same.(57) **Zusammenfassung:** Die Erfindung betrifft ein Bauteil für eine Leiterplatte (32) mit einem Gehäuse (10), an dem wenigstens ein Zapfen (28) zum Eingriff in ein Loch (30) der Leiterplatte (32)

ausgebildet ist, wobei der Zapfen (28) wenigstens eine Rastnase (52) aufweist, welche in radialer Richtung bzgl. des Zapfens (28) über dessen Aussenumfang hinausragt. Hierbei ist die Rastnase (52) am Zapfen (28) derart angeordnet und ausgebildet, dass der Aussenumfang des Zapfens (28) im Bereich der Rastnase (52) kleiner ist als der Durchmesser des Loches (30) in der Leiterplatte (32), wobei der Aussenumfang des in das Loch (30) in der Leiterplatte (32) hinein ragenden Abschnittes des Zapfens (28) derart ausgebildet ist, dass sich zwischen dem Aussenumfang dieses Abschnittes und der Innenwandung des Loches (30) in der Leiterplatte (32) über wenigstens einen Teil des Aussenumfangs ein derartiger Zwischenraum mit Kapillarität für Lot ergibt, dass während eines Lötvorgangs auf der Oberfläche der Leiterplatte (32) befindliches Lot (50) durch Kapillarwirkung in den Zwischenraum hinein und diesen ausfüllend eindringt.

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(84) **Bestimmungsstaaten** (soweit nicht anders angegeben, für jede verfügbare regionale Schutzrechtsart): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), eurasisches (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), europäisches (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Veröffentlicht:

— mit internationalem Recherchenbericht

— vor Ablauf der für Änderungen der Ansprüche geltenden Frist; Veröffentlichung wird wiederholt, falls Änderungen eintreffen

(88) **Veröffentlichungsdatum des internationalen Recherchenberichts:**

14. April 2005

Zur Erklärung der Zweibuchstaben-Codes und der anderen Abkürzungen wird auf die Erklärungen ("Guidance Notes on Codes and Abbreviations") am Anfang jeder regulären Ausgabe der PCT-Gazette verwiesen.

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Component for a circuit board and method for inserting said
component into a circuit board

Description

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The present invention relates to a component for a circuit board, having a housing on which at least one peg is designed for engaging in a hole in the circuit board, whereby the peg has at least one detent lug which projects
10 in the radial direction relative to the peg beyond its outer periphery, according to the preamble of claim 1. The invention also relates to a method for inserting a component of this type into a circuit board, according to the preamble of claim 6.

15 In order to equip a circuit board with components, for some components, it is necessary additionally to fasten them mechanically to the circuit board with a peg having a latching device. By this means, the peg penetrates a hole in the circuit board, whereby a detent lug on the
20 penetrating end of the peg latches onto the side of the circuit board opposed to the component and thereby mechanically fixes the component once it has been inserted. It is, however, disadvantageous herein that the placement force alone is 10 N, which cannot be achieved with
25 conventional component inserting machines. This applies all the more to the force required for latching, which is usually in the range of 60 N to 110 N. Therefore, formerly such components have had to be inserted and latched manually. However, this entails a high cost.

30 It is an object of the invention to improve a component and a method of the aforementioned type such that fitting and locking of this component in a circuit board can be carried out by machine reliably and at low cost.

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This aim is achieved according to the invention with a component of the aforementioned type having the features disclosed in claim 1 and by a method having the process steps disclosed in claim 6. Advantageous embodiments of the invention are disclosed in the further claims.

With a component of the aforementioned type, it is provided according to the invention that the detent lug is designed and arranged on the peg such that the outer periphery of the peg is smaller in the region of the detent lug than the diameter of the hole in the circuit board, whereby the outer periphery of the section of the peg protruding into the hole in the circuit board is designed such that between the outer periphery of this section and the inner wall of the hole in the circuit board, over at least a portion of the outer periphery there is an intermediate space with capillarity for solder, such that solder situated on the surface of the circuit board during a soldering procedure penetrates by capillary action into the intermediate space, filling it.

With a method of the above type, the following steps are provided according to the invention: application of soldering paste on the circuit board round at least a portion of the periphery of the hole, placement of the component onto said circuit board with the peg in the hole in said circuit board, heating of the solder arranged round the hole such that the solder penetrates by capillary action into the intermediate space with capillarity, and cooling of the solder which has penetrated into the hole, such that it hardens.

This has the advantage that for fitting and locking the component on the circuit board, it is not necessary to apply a particularly great force, so that this work can be carried out automatically by machine in a production line

for circuit boards with a component inserting machine and a hot air furnace, whereby after the soldering procedure in the hot air furnace, locking of the component is automatically achieved by the solder that has penetrated
5 into the hole in the circuit board. At the same time, a tolerance-free form-fit takes place between the peg and the inner periphery of the hole in the circuit board in a plane of the circuit board. The insertion of components with locking can therefore be carried out very economically,
10 simultaneously producing large holding forces and with little tolerance.

A form-fitting connection without tolerance in the direction along a longitudinal axis of the hole in the circuit board is thereby achieved that the detent lug is
15 designed and arranged on the peg such that with the component placed fully on the circuit board, the detent lug is arranged within the hole in the circuit board.

For further promotion of the capillary action, the periphery of the peg is designed in the longitudinal
20 direction over the whole section situated in the hole in the circuit board with at least one cut-out.

A particularly good form-fit between the solder penetrating into the hole in the circuit board and the circuit board is thereby achieved that the hole in the
25 circuit board is metallised.

The peg is made, for example, of plastics, so that no mechanically strong connection between said peg and the solder arises.

The invention will now be described in greater detail
30 by reference to the drawings, in which:

Fig. 1 shows a plan view of a preferred embodiment of a component placed on a circuit board,

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Fig. 2 shows a view of the detail X of Fig. 1 before a soldering procedure,

Fig. 3 shows a sectional view along the line A-A of Fig. 2,

5 Fig. 4 shows a view of the detail X of Fig. 1 after a soldering procedure, and

Fig. 5 shows a sectional view along the line B-B of Fig. 4.

Fig. 1 shows a preferred embodiment of a component for
10 a circuit board 32. The component comprises a housing 10 onto which two pegs 28 are formed. In Fig. 1, the component is placed on the circuit board 32, whereby each peg 28 engages in a metallic hole 30 in the circuit board 32.

Figs. 2 and 3 additionally illustrate the condition of
15 the component inserted into the circuit board before the soldering procedure, whereby metallising 56 of the hole 30 is visible. Soldering paste 50 is applied round a portion of the periphery of the hole 30 and the peg 28 protrudes into the hole 30. The peg 28 has a detent lug 52 formed at
20 its free end, whereby the diameter of the peg 28 is smaller in the region of the detent lug 52 than the inner diameter of the hole 30. Also in the remaining section of the peg 28, which engages in the hole 30, the diameter of the peg 28 is designed to be smaller than the inner diameter of the
25 hole 30. In addition, the length of the peg 28 is selected such that with the component placed fully into the circuit board 32, the detent lug 52 is still situated within the hole 30, as is apparent in particular in Fig. 3. Additionally, the peg 28 is provided with cut-outs 54 in
30 the longitudinal direction, as shown in particular in Fig. 2. The smaller diameter of the peg 28 compared with the hole 30 and the cut-outs 54 are chosen such that between the outer periphery of the peg 28 and the inner periphery

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of the hole 30, an intermediate space with capillary properties is formed.

In a manufacturing process wherein firstly all components are placed by a component inserting machine into the circuit board 32 and subsequently a soldering procedure takes place in a hot air furnace, the solder 50 is heated and passes to the liquid phase. The liquid solder 50 then penetrates, by means of the capillary effect and additionally supported by an adhesion force, into the intermediate space between the outer periphery of the peg 28 and the inner periphery of the hole 30 and essentially fills it completely. Before the soldering procedure, the solder 50 is herein arranged on non-metallised regions round the hole 30, whereby corresponding adhesive forces are produced in the direction of the hole 30.

Figs. 4 and 5 show the condition following cooling and hardening of the solder 50. The intermediate space is filled with solder 50 and the solder 50 has become bound to the metallising 56 of the hole 30 in form-fitting manner. This alone produces a form-fitting connection between the circuit board 32 and the peg 28 in a plane of the circuit board 32. Additionally, by means of the detent lug 52, a form-fit in the direction of the longitudinal axis of the hole 30 is produced, that is, in a direction perpendicular to the circuit board 32. Overall, therefore, the peg 28 is firmly connected or locked to the circuit board 32 in all three spatial directions. This connection is also able to absorb turning moments without the peg 32 becoming loosened from the hole 30. As is immediately apparent, however, no insertion force or latching force has to be applied to achieve this. Locking has been automatically achieved during the soldering procedure. It is also apparent that

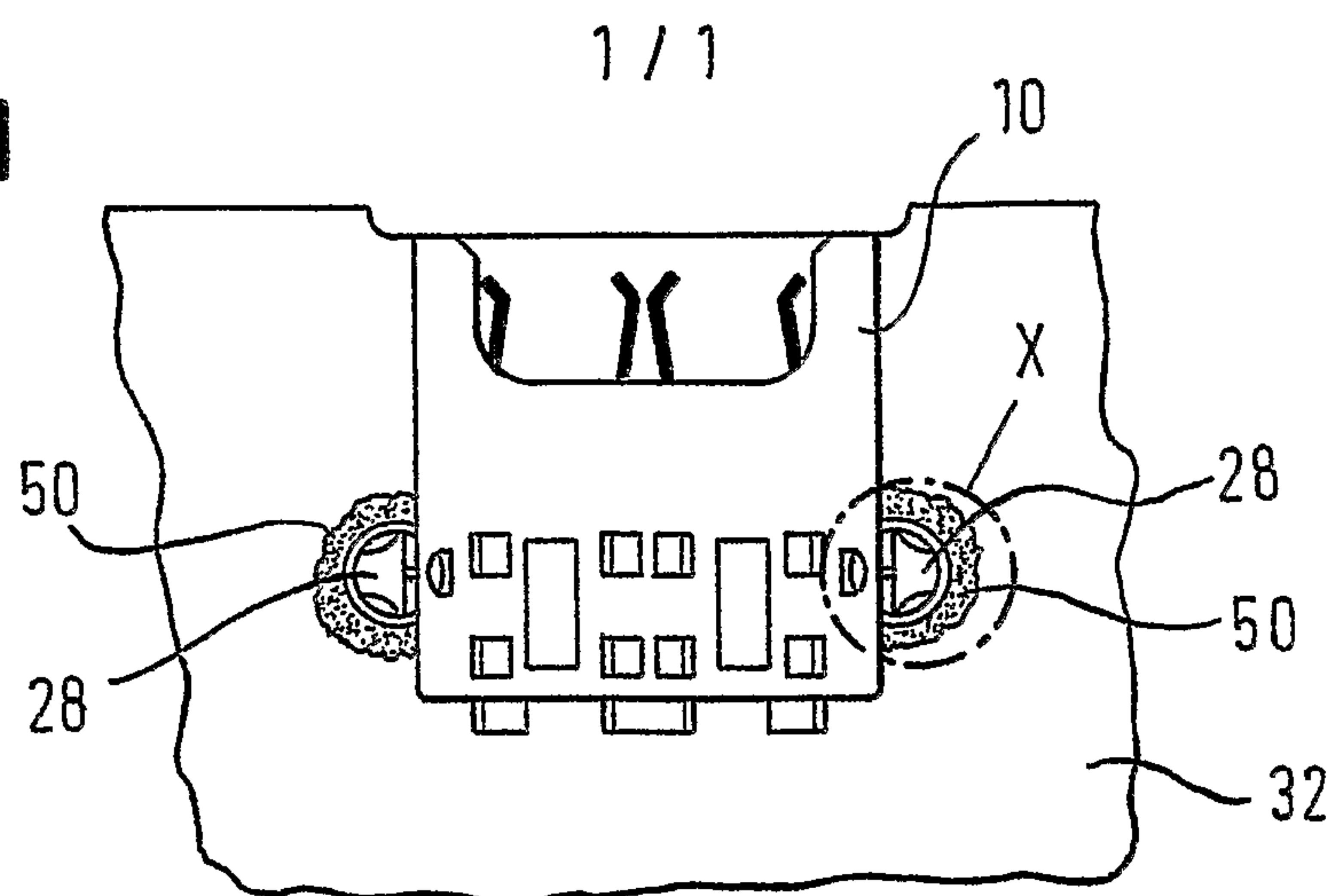
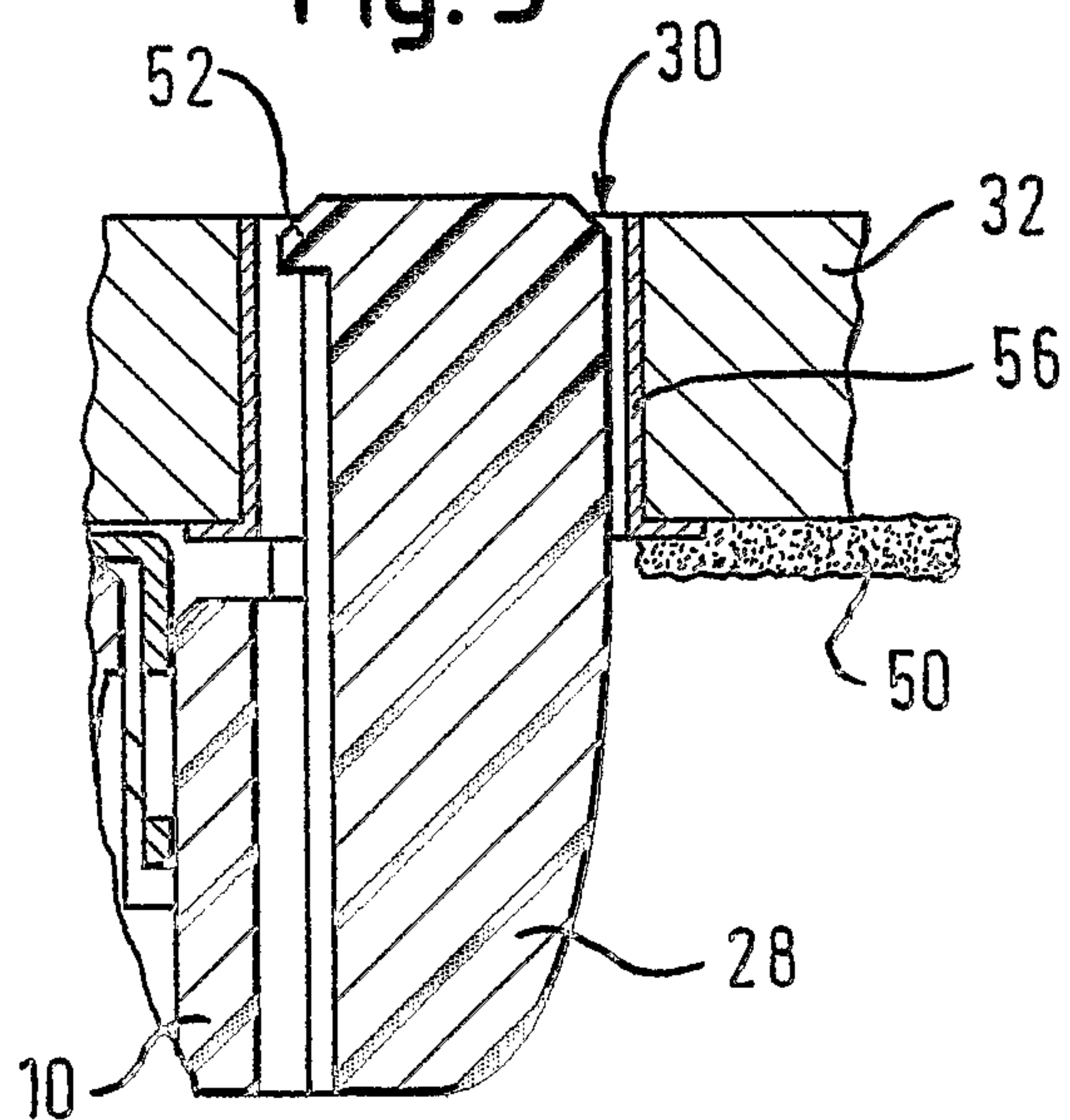
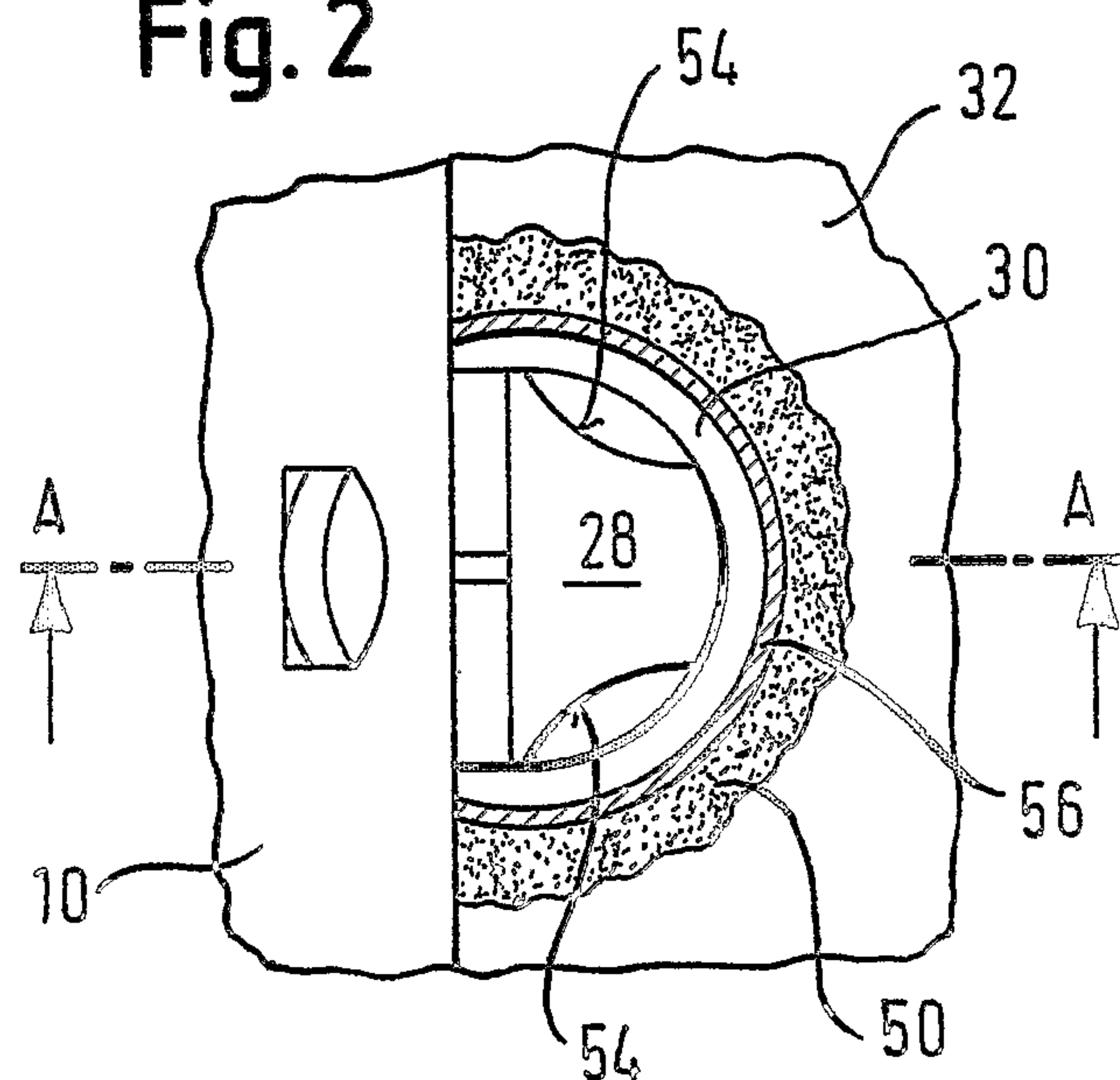
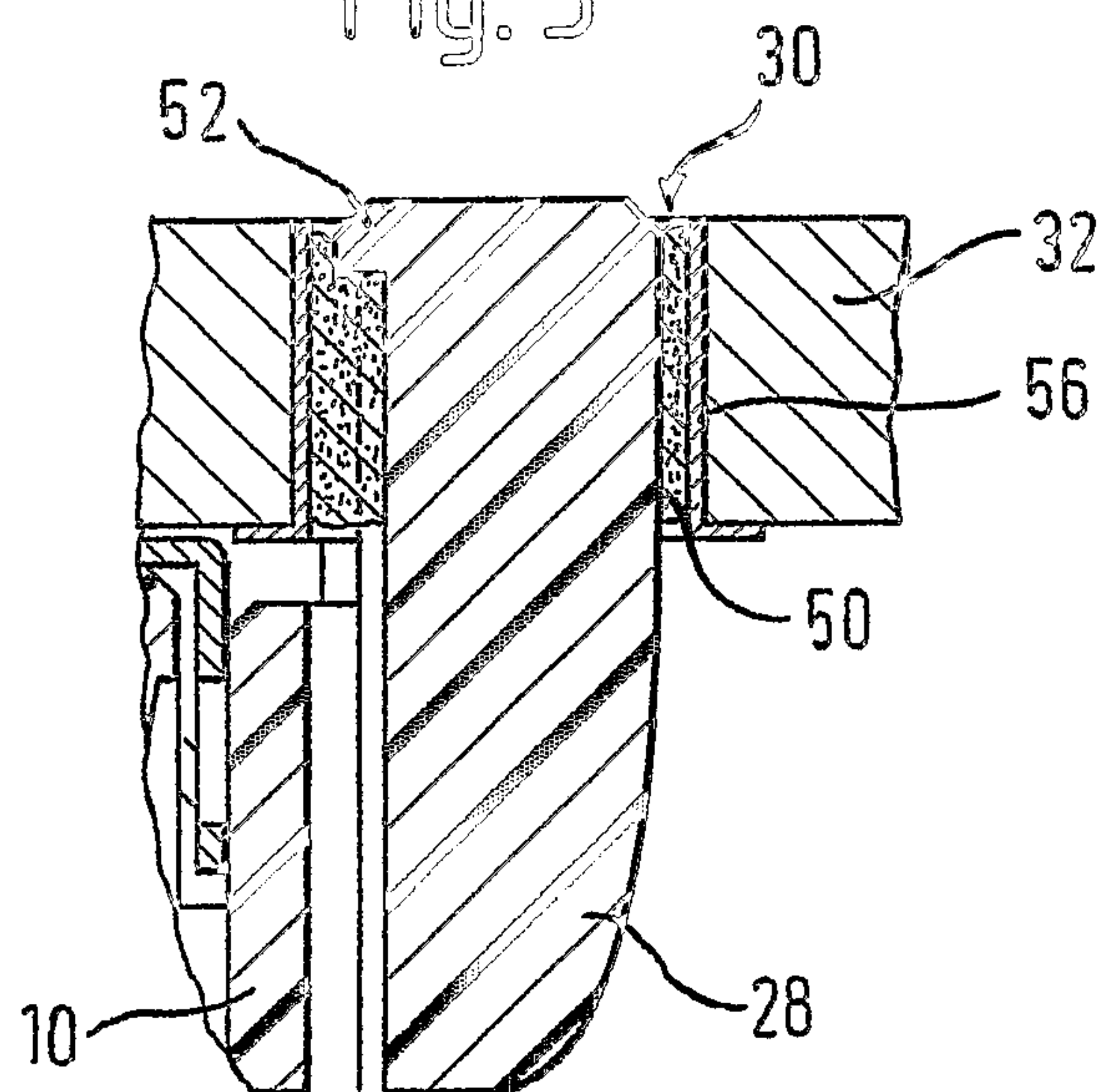
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the connection between the peg 28 and the circuit board 32
is tolerance-free.

WE CLAIM:

1. Component for a circuit board, having a housing on which at least one peg is designed for engaging in a hole in the circuit board, whereby the peg has at least one detent lug which projects in the radial direction relative to the peg beyond its outer periphery, characterised in that the detent lug is designed and arranged on the peg such that the outer periphery of the peg is smaller in the region of the detent lug than the diameter of the hole in the circuit board, whereby the outer periphery of a section of the peg protruding into the hole in the circuit board is designed such that between the outer periphery of this section and the inner wall of the hole in the circuit board, over at least a portion of the outer periphery there is an intermediate space with capillarity for solder, such that solder situated on the surface of the circuit board during a soldering procedure penetrates by capillary action into the intermediate space, filling it.
2. Component according to claim 1, characterised in that the detent lug is designed and arranged on the peg such that with the component placed fully on the circuit board, the detent lug is arranged within the hole in the circuit board.
3. Component according to claim 1 or 2, characterised in that the periphery of the peg in the longitudinal direction over a whole section situated in the hole in the circuit board is designed with at least one cut-out.
4. Component according to any one of claims 1 to 3, characterised in that the hole in the circuit board is metallised.
5. Component according to any one of claims 1 to 4, characterised in that the peg is made of plastics.
6. Method for inserting a component into a circuit board designed according to any one of claims 1 to 5, characterised by application of soldering paste on the circuit board round at least a portion of the periphery of the hole, placement of the component into said circuit board with the peg in the hole in said circuit board, heating of the solder arranged round the hole such that the solder penetrates by capillary action into the intermediate space with capillarity, and cooling of the solder which has penetrated into the hole, such that it hardens.

Fig. 1**Fig. 3****Fig. 2****Fig. 5****Fig. 4**