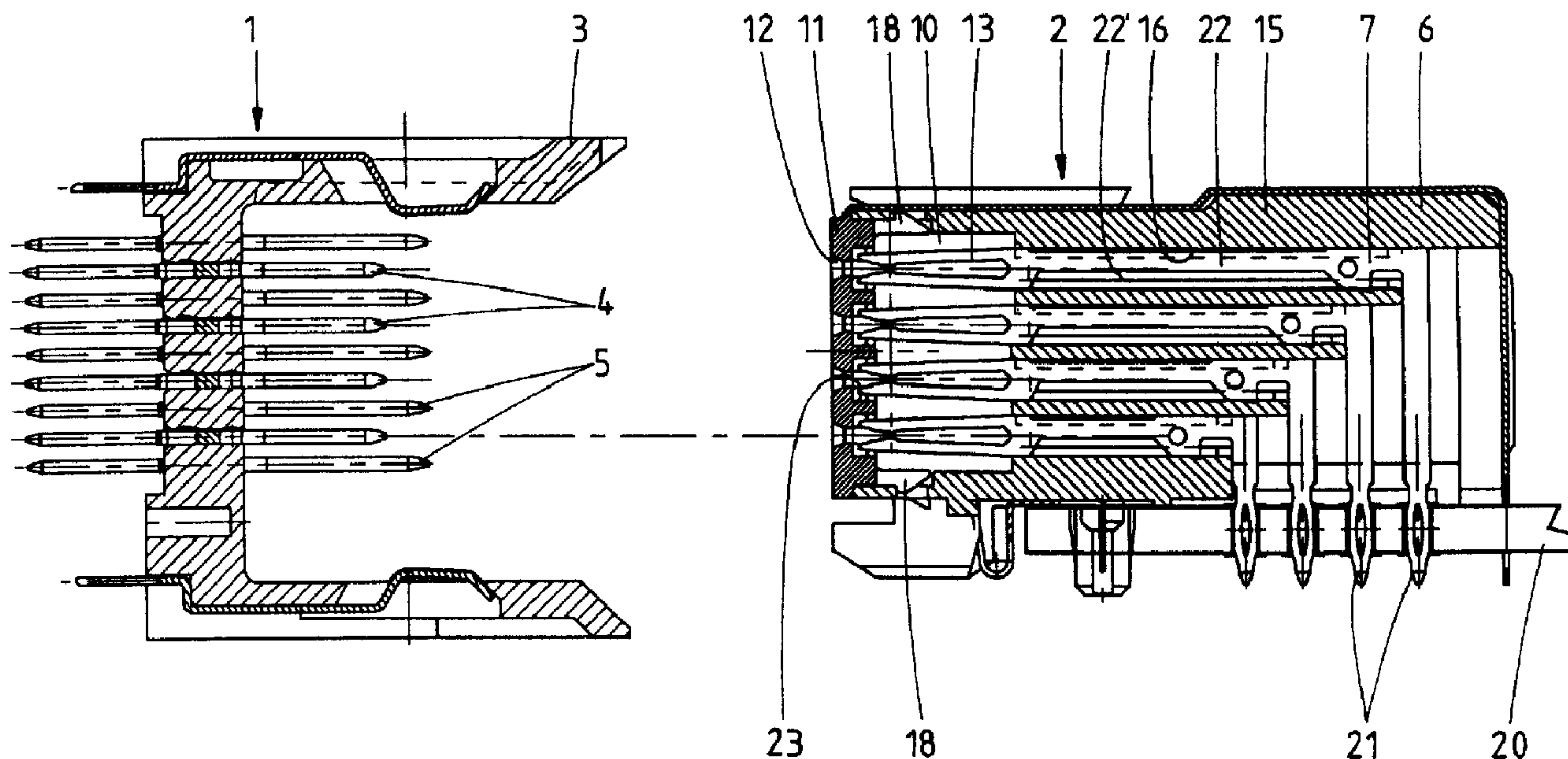




(22) Date de dépôt/Filing Date: 1998/07/06
 (41) Mise à la disp. pub./Open to Public Insp.: 1999/01/08
 (45) Date de délivrance/Issue Date: 2005/06/28
 (30) Priorité/Priority: 1997/07/08 (97/08837) FR

(51) Cl.Int.⁶/Int.Cl.⁶ H01R 23/00, H01R 23/68
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(54) Titre : CONNECTEUR
 (54) Title: CONNECTOR



(57) Abrégé/Abstract:

A connector comprises a housing of insulating material and a plurality of signal and ground contacts regularly arranged in rows and columns within the housing. All contacts have first and second ends and an intermediate section. The first ends each include a connection section. The housing is provided with a front wall having a grid of entrance openings leading to the connection sections. The housing is provided with an air chamber and all contacts extend along a part of their length through this air chamber.

ABSTRACT

A connector comprises a housing of insulating material and a plurality of signal and ground contacts regularly arranged in rows and columns within the housing. All contacts have first and second ends and an intermediate section. The first ends each include a connection section. The housing is provided with a front wall having a grid of entrance openings leading to the connection sections. The housing is provided with an air chamber and all contacts extend along a part of their length through this air chamber.

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Connector

5 The invention relates to a high density connector,
comprising a housing of insulating material and a plurality of
signal and ground contacts regularly arranged in rows and
columns within said housing, each of said contacts having
first and second ends and an intermediate section, said first
10 ends each including a connection section, wherein said housing
is provided with a front wall having a grid of entrance
openings leading to said connection sections.

Document EP 0 446 980 A1 (Burndy Electra N.V.) published
on September 18, 1991, discloses a connector of this type. In
15 this known connector the signal contacts are mounted in a
dielectric insert surrounded by an outer conductor. Although
the impedance of the signal contacts can be determined in this
manner, manufacturing the connector is relatively complicated.
Further, increasing the density of the contacts would
20 significantly increase the complexity of the connector.

The invention aims to provide a connector of the above-
mentioned type wherein the impedance of the contacts can be
improved in a simple manner.

More specifically, according to the invention, there is
25 provided a receptacle connector with a high density of
contacts, comprising a housing of insulating material and a
plurality of signal and ground contacts regularly arranged in
rows and columns within the housing. Each of the contacts has
first and second ends and an intermediate section, the first
30 ends each including a receptacle contact connection section.
Also, the housing is provided with a front wall having a grid
of entrance openings leading to the connection sections. The
receptacle connector is characterized in that the housing is
provided with a common air chamber disposed adjacent the front
35 wall, a plurality of the receptacle contact connection
sections extending along a part of their length through this
common air chamber.

The foregoing and other objects, advantages and features
of the present invention will become more apparent upon
40 reading of the following non restrictive description of two
illustrative embodiments thereof, given by way of example only
with reference to the accompanying drawings in which:

1a

Fig. 1 shows a cross-section through a column of signal contacts of a connector assembly comprising a male connector and an illustrative embodiment of a female connector according to the invention, wherein the connectors are disconnected.

Fig. 2 shows a cross-section through a column of ground contacts of the female connector of Fig. 1.

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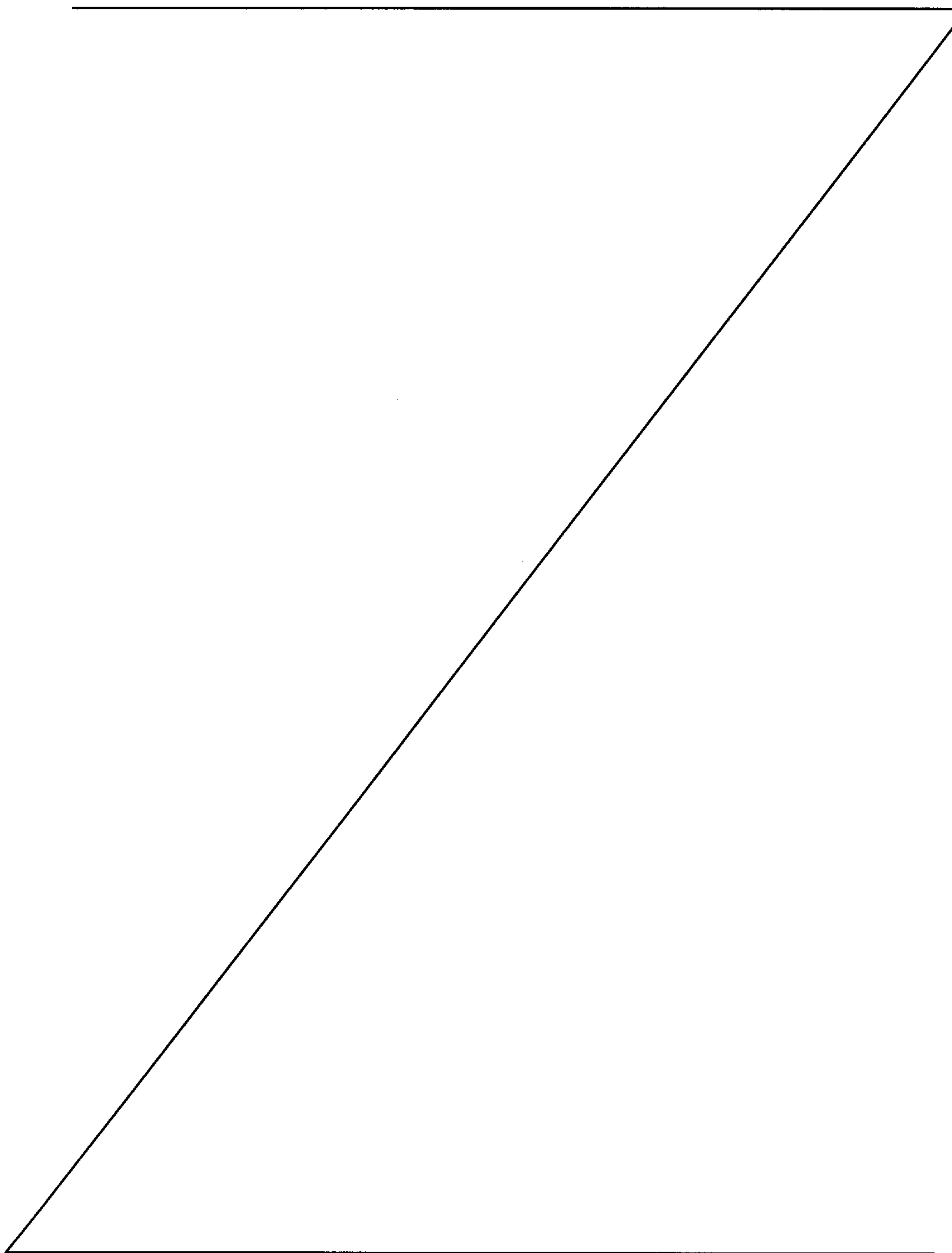


Fig. 3 shows a front view of the female connector of Fig. 1.

Fig. 4 shows a cross-section through a column of signal contacts of a connector assembly comprising a second embodiment of the female connector according to the invention.

Fig. 5 shows a front view of the female connector of Fig. 4.

Referring to Figs. 1-3 there is shown a connector assembly for printed circuit boards, comprising a male connector 1 and a female connector 2. The male connector 1 comprises a first housing 3 of insulating material and a plurality of male signal contacts 4 and a plurality of male ground contacts 5. In the embodiment shown the length of the ground contacts 5 is greater than the length of the signal contacts 4. However, the signal and ground contacts may have equal lengths.

The female connector 2 comprises a second housing 6 of insulating material and a plurality of female signal contacts 7 and a plurality of female ground contacts 8, wherein the ground contacts of one column are part of a ground contact element 9 as shown in Fig. 2.

In order to increase the density of contacts, the signal and ground contacts 4, 5 and 8, 9 are arranged in a special manner as can be seen in the front view of the female connector 2 in Fig. 3. All contacts are regularly arranged in rows and columns, wherein in each row and column all contacts 4, 5 and 8, 9 are arranged at an equal pitch p in row and column direction. Further, each row and each column of signal contacts 4 or 8 contains signal contacts only and each row and each column of ground contacts 5 or 9 contains ground contacts only. As can be seen in Fig. 3, successive rows of contacts 8, 9 are staggered in row direction by half the pitch p of the contacts, wherein the rows and columns of contacts have a pitch equal to half the pitch p of the contacts. In this manner a pitch half p of the contacts in adjacent rows and columns can be obtained.

5 At a pitch of for example 2 mm, the pitch between adjacent
contacts 4, 5 and 8, 9 will be 1 mm.

10 In the female connector 2, the impedance of the signal
contacts 7 is improved by providing the housing 6 with an air
chamber 10 at the front side of the connector 2. As shown in
Figs. 1 and 2, the housing 6 comprises a front wall 11 having
a grid of entrance openings 12 leading to fork-shaped
connection sections 13 of the signal and ground contacts 7, 8.
15 The housing 6 further comprises a contact supporting part 15
provided with passages 16 and 17 for the female signal
contacts 7 and ground contacts 8, respectively. As
schematically shown in Fig. 1, the front wall 11 is detachably
attached to the contact supporting part 15 by means of hooks
20 18.

As shown in FIG. 2, the female ground contacts 8 of one
column are part of a ground contact element 9 having a
25 plurality of press-fit terminations 19 connected to the plated
through-holes of a printed circuit board 20. The female signal
contacts 7 are also provided with press-fit terminations 21
connected to plated through-holes of the printed circuit board
20. The female signal contacts 7 having the connection section
30 13 as first end and the press-fit termination 21 as second
end, include an intermediate section 22 extending through the
corresponding passage 16 of the contact supporting part 15 of
the house 6.

35

As can be seen in Figs. 1 and 2 the connection sections
13 of the contacts 7, 8 extend through the air chamber 10 into
corresponding recesses 23 provided at the inner side of the
front wall 11 at the location of each entrance opening 12. In
40 this manner the recesses 23 receive and align the connection
sections 13 of the contacts with the corresponding entrance
openings 12.

The impedance of the signal contacts 7 is significantly improved because the connection sections 13 extend through air as dielectric. The impedance can be further improved by a special design of the intermediate sections 22 of the signal contacts 7 as shown in Fig. 1. A part of the intermediate section 22 is removed so that air is present as dielectric along this removed length of the intermediate sections as indicated by 22'. This means that the height of the intermediate section 22 is less than the height of the corresponding passage 16.

Fig. 4 shows a cross-section of a further connector assembly comprising a male connector 24 and a female connector 25, wherein the female connector 25 is mainly in the same manner as the female connector 2 of Figs. 1-3. However, in this case the pitch of adjacent contacts is 2 mm and the rows of contacts are not staggered as can be seen in the front view of the female connector 25 shown in Fig. 5. The housing 6 of the connector 25 is made in the same manner with a front wall 11 and a contact supporting part 15, wherein the connection sections 13 extend through an air chamber 10 into recesses 23 at the inner side of the front wall 11. Further the intermediate sections 22 of the female signal contacts 7 are made in the same manner as in the connector 7. In this manner again the impedance of the signal contacts is improved.

Although the invention has been explained with reference to a female connector for a printed circuit board, it will be understood that the invention can also be used in other types of connectors, for example connectors with male contacts and connectors for cables.

The invention is not restricted to the above-described embodiments which can be varied in a number of ways within the scope of the claims.

The embodiments of the invention in which an exclusive property of privilege is claimed are defined as follow:

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1. A receptacle connector with a high density of contacts, comprising a housing of insulating material and a plurality of signal and ground contacts regularly arranged in rows and columns within said housing, each of said contacts having first and second ends and an intermediate section, said first ends each including a receptacle contact connection section, wherein said housing is provided with a front wall having a grid of entrance openings leading to said connection sections, characterized in that said housing is provided with a common air chamber disposed adjacent the front wall, a plurality of the receptacle contact connection sections extending along a part of their length through said common air chamber.

20

2. Connector according to claim 1, wherein the intermediate sections of the signal contacts each are accommodated in a corresponding passage in the housing, wherein the height of at least a plurality the intermediate sections is smaller than the height of the corresponding passage.

25

3. Connector according to claim 1 or 2, wherein the ground contacts of each row of ground contacts are part of a ground contact element.

30

4. Connector according to anyone of claims 1 to 3, wherein in each row and each column all contacts are arranged at an equal pitch in row and column direction, wherein successive rows of contacts are staggered in row direction by half the pitch of the contacts, wherein each row and each column of contacts contains only signal or only ground contacts, respectively, and wherein the rows and columns of contacts have a pitch equal to half the pitch of the contacts.

35

5. Connector according to anyone of claims 1 to 4, wherein the housing comprises at least the front wall and a contact supporting part, wherein the front wall is detachably attached to the contact supporting part.

40

6. Connector according to claim 5, wherein the front
5 wall is provided with a recess at its inner side at the
location of each entrance opening for at least the signal
contacts, said recesses receiving and aligning the connection
section of each contact with the corresponding entrance
opening.

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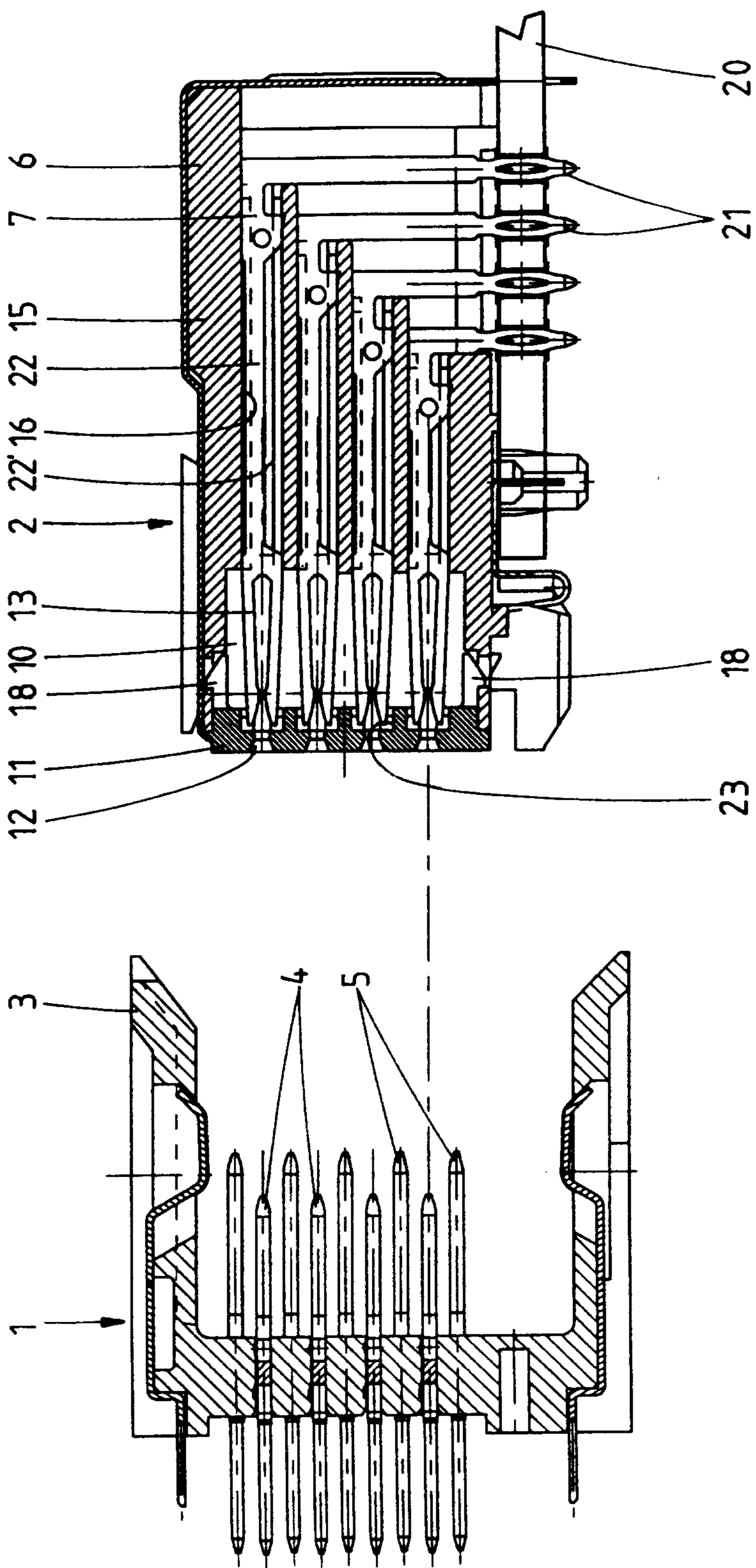


fig.1

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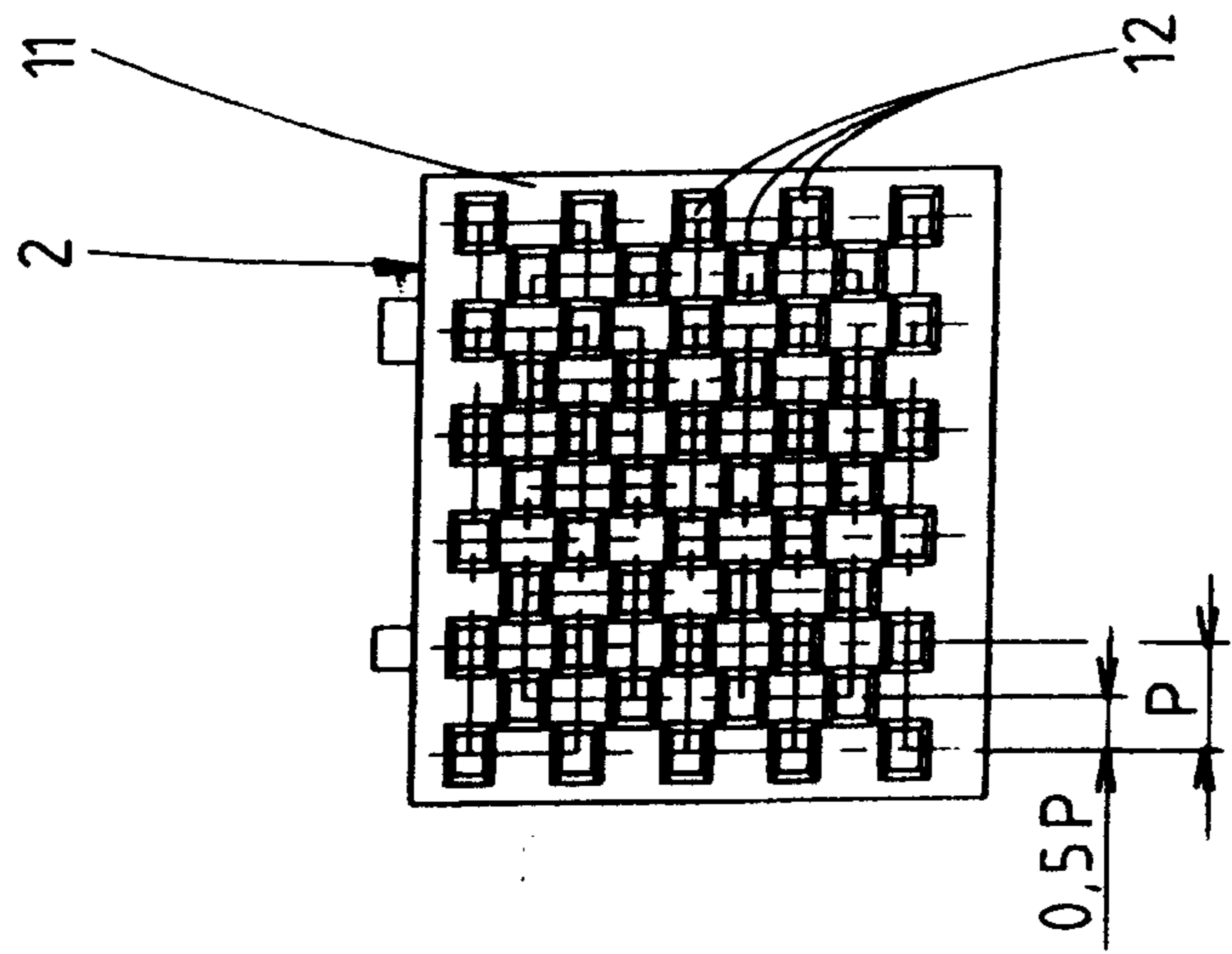


fig.3

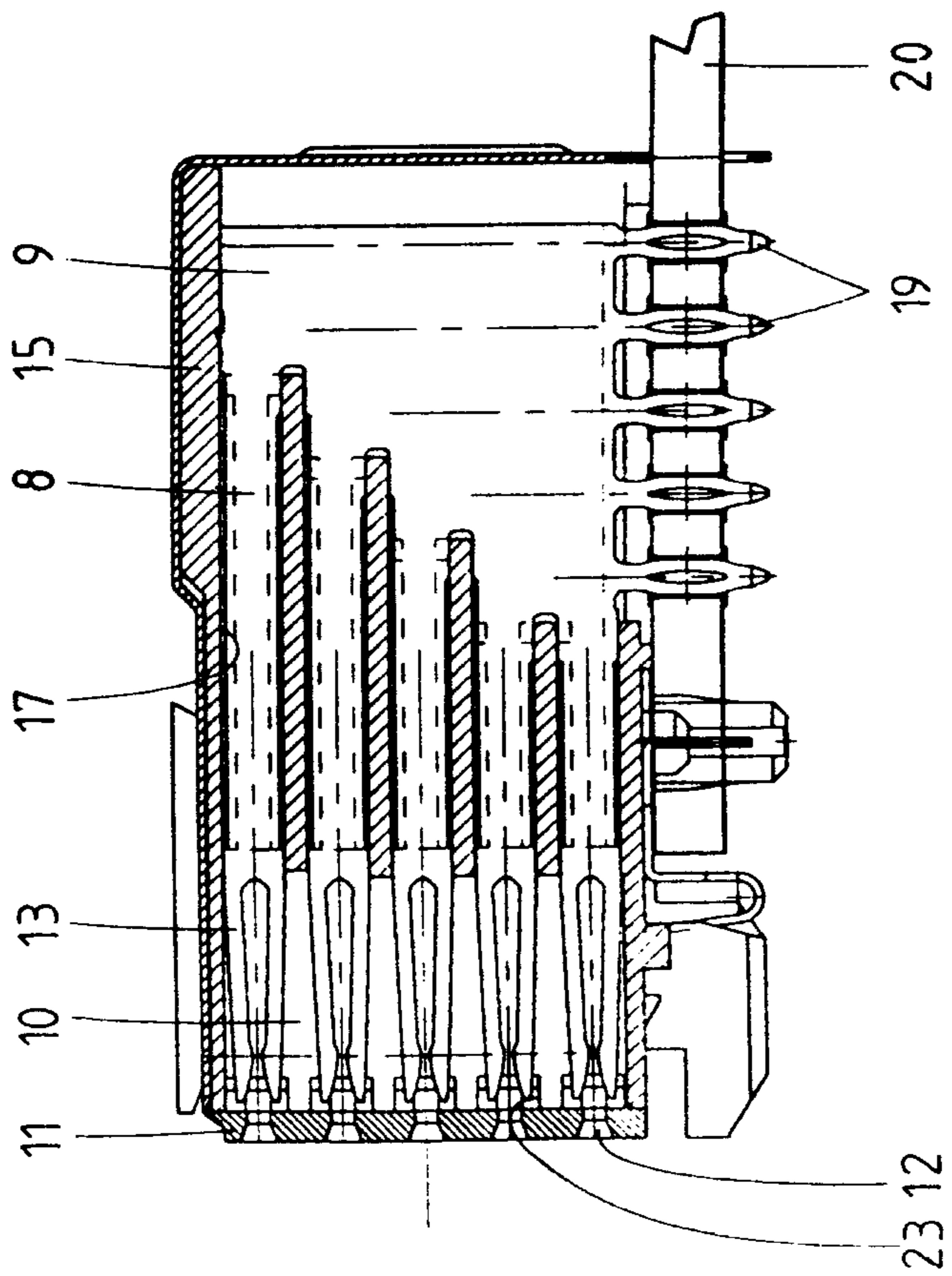


fig.2

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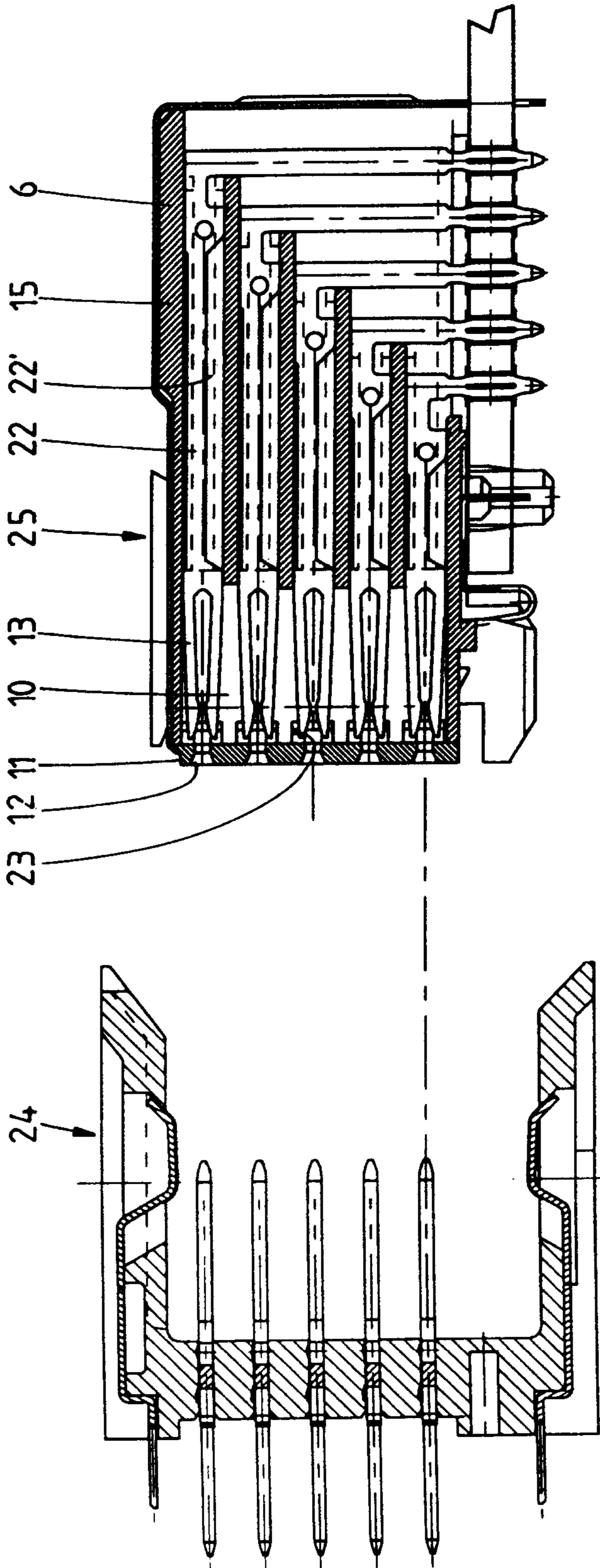


fig. 4

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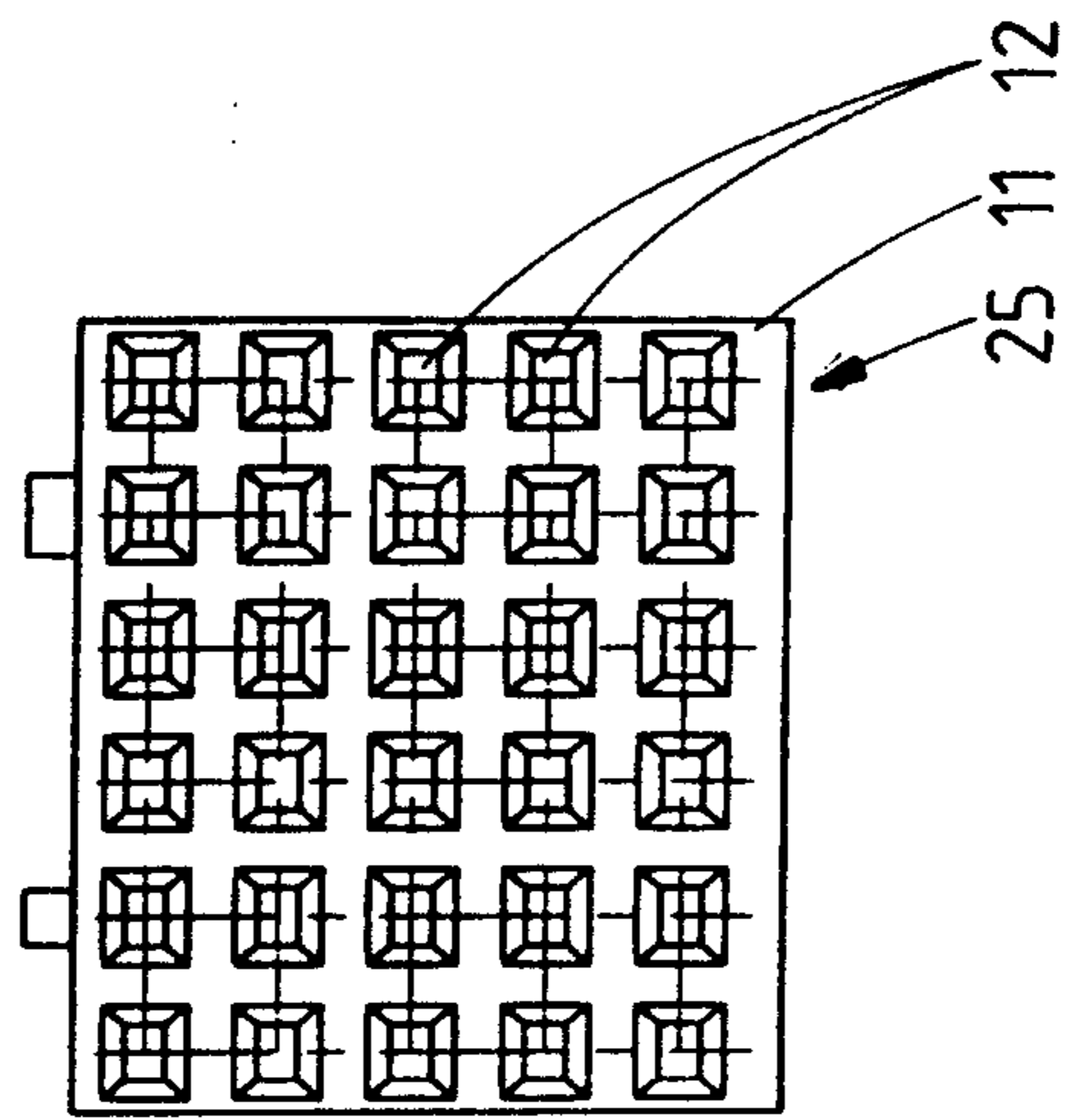


fig.5

