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MAGYARORSZÁG
Szellemi Tulajdon Nemzeti Hivatala

EURÓPAI SZABADALOM
SZÖVEGÉNEK FORDÍTÁSA

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(72) Feltaláló(k):
BEENKEN, Björn, 27777 Ganderkesee (DE)

(73) Jogosult(ak):
Tönnjes ISI Patent Holding GmbH, 27751 Delmenhorst (DE)

(74) Képviselő:
SBGK Szabadalmi Ügyvivői Iroda, Budapest

(54) **Rendszámtábla jármű számára**

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Description

The invention relates to an identification device for a vehicle pursuant to the respective preamble of claim 1.

The vehicle identification device according to the invention involves so-called license plates that are mounted on the front or rear of a vehicle body or on its front and rear bumpers, or adhesive identification labels that are stuck to a glass panel of the vehicle, in particular as supplementary identification.

Identification devices of the aforementioned types are frequently counterfeited or misused for a different vehicle. To prevent this, identification devices are known which feature a data carrier that can be read contactlessly. This data carrier contains vehicle-relevant data about the vehicle to which the data carrier belongs. These data are read by means of an external reading device. A comparison of the read data with the vehicle on which the identification device is used allows one to draw conclusions concerning misuse, in particular when the identification device has been assigned to a different vehicle.

Hitherto known identification devices with data carriers that can be read contactlessly feature a separate antenna. The antenna is connected to the data carrier with electric conductors for the transmission of the data. Such an identification device is costly and susceptible to malfunction.

Disclosed in the generic-establishing EP 1 903 531 A1 is a vehicle identification device having an identification device body and a RFID component which are electrically coupled to one another. The RFID component has its own antenna for transmitting purposes, while the identification device body serves as a reception antenna. The identification device body can form an antenna for transmitting as well as receiving signals.

Known from WO 2008/020771 A2 and DE 20 2005 018 589 U1 is an identification device having a slit-shaped antenna and a RFID chip.

Disclosed in WO 99/19170 and GB 2 429 828 is an identification device for vehicles having an electronic data carrier or RFID chip for identifying a vehicle.

The object of the invention is to create a simplified identification device with a data carrier and an antenna.

An identification device, in particular a vehicle license plate, that achieves this object is disclosed by the features of claim 1. This identification device has at least one data carrier, which generates a magnetic field, and an antenna, which is formed by the identification device body, which has at least one slit. The identification device body is made at least partially of an electrically conductive material, for example aluminium sheet. The result is an identification device with a transponder comprising a data carrier, which generates a magnetic field, and an antenna. The slit in the at least partially conductive identification device body results in an inductive coupling of the data of the data carrier in the identification device body serving as an antenna. The data carrier is inductively coupled to the slit. The data carrier has a chip, at least one coil connected electroconductively thereto, and a carrier made of an insulating or non-conducting material. The antenna, in particular the slit or the data carrier, serves simultaneously as an amplifier. The data of the data carrier can thus be read at a relatively large distance without any additional components and also without any connections of the data carrier.

According to a preferred development of the invention, it is provided that the data carrier is disposed within the slit in an electronically insulated manner, to be specific, preferably at a closed end of the slit. This makes it possible to accommodate or integrate the data carrier in the identification plate body without requiring additional installation space and that the data carrier cannot be seen from the outside of the identification device.

Preferably, it is provided that the data carrier, in particular its electrically conductive components, make no contact, and in particular specifically no electrically conductive contact, with the identification device body of the identification device. To this end, a circumferential gap or intermediate spacing is formed between the conductive components of the data carrier and the slit in the identification device body, thereby resulting in a particularly effective, contactless coupling of the data carrier to the electrically conductive identification device carrier of the identification device. This

coupling is made inductively by means of the magnetic field generated by the data carrier.

In a further preferred development of the identification device, the slit is provided with at least one opening, thus resulting in an enlargement in regions of the slit. Preferably, the opening is assigned to an end of the slit so that the slit end is enlarged by the opening. By arranging the data carrier in the region of the enlargement created by the opening at one end of the slit, sufficient space is also created for larger data carriers in the identification device body. Here the data carrier is situated within the contour of the identification device carrier, specifically without coming into physical or electrical contact with it. The data carrier cannot be perceived in the interior of the identification device, thus providing an invisible electrical or electronic protection of the identification device.

It is preferably provided that the data carrier is fixed in the identification device, namely in the identification device body. Any type of non-conducting means can be considered for fixing the data carrier in the identification device, whereas these means do not have to cover the entire surface of the identification device. In particular, fixation is carried out by means of at least one coating or adhesive layer which covers the identification device body at least partially. The readability of the data of the data carrier is not impaired by the electrically non-conducting coating or adhesive layer. Any attempt to tamper the data carrier would result in easily perceptible damage to the coating or adhesive layer. In an alternative development of the invention, the data carrier is fixed in the slit or opening by a reflective film applied to the visible front side of the identification device body. In this case, the reflective film is demetallized at least in the region of the data carrier, the slit and/or the opening, and thereby made nonconductive.

A development of the identification device is conceivable in which the data carrier is disposed in a receiving depression in the identification device body. The holding recess can be stamped into the identification device body. The data carrier is then attached in this holding recess in an insulating manner to prevent its conductive components from making any conductive connections with the identification device body made of conductive material. This thus results in a magnetic or inductive coupling of in particular a slit of the data carrier to the identification device body. In the

process, the identification device body serves not only as an antenna but preferably also as an amplifier at the same time, thus making it possible for the data of the data carrier to be read over a relatively large distance as well.

It is particularly advantageous to provide a base of the depression of the holding recess with a continuous opening that is smaller than the data carrier so that the data carrier can be fixed despite this opening and the depression. The opening results in improved antenna function and, above all, in an improved amplification of the transmission power of the chip of the data carrier.

The data carrier has a passive Radio Frequency Identification Chip (RFID chip), to which the coil is connected electroconductively. The carrier facilitates the fixing of the data carrier in the identification device body. Above all, the carrier, being a non-conductor, ensures that the chip and the coil of the data carrier can be integrated in the identification device and insulated with respect to the identification device body, thus resulting in an inductive or magnetic coupling of the chip's signals to the identification device body of the identification device.

Preferred embodiments of the invention will be discussed in more detail below with reference to the drawings, which show:

Fig. 1 an identification device according to the invention with an identification device carrier made of aluminium sheet and an integrated data carrier,

Fig. 2 a cross-section through the identification device of Fig. 1,

Fig. 3 a top view of the data carrier,

Fig. 4 a second exemplary embodiment of an identification device in a view according to Fig. 1,

Fig. 5 a third exemplary embodiment of an identification device in a view according to Fig. 1,

Fig. 6 a fourth exemplary embodiment of an identification device in a view according to Fig. 2,

Fig. 7 a fifth exemplary embodiment of an identification device in a view according to Fig. 2.

The identification devices 10 shown in the figures have a panel-shaped identification device body 11 made of aluminium sheet. The identification device 10 has a rectangular configuration, with its dimensions conforming to those of a conventional motor vehicle license plate. The identification device body 11 is provided with a folded edge 13 running around its border 12. This folded edge 13 is pressed into the identification device body 11 by means of a forming operation, preferably by stamping.

Identification devices 10 of this type, commonly referred to as license plates or number plates, are usually attached to the front and back of a motor vehicle, specifically on the vehicle body and/or on the bumpers. For this purpose the identification device 10 has a number of mounting holes 15.

Within its front side 14 bounded by the folded edge 13 the identification device 11 is provided with an indicia area 22. Located in the indicia area 22 is indicia 23 of the identification device 10. Preferably, the indicia 23 is likewise applied to the indicia area 22 by stamping.

The indicia may consist of arbitrary characters, i.e. it is not limited to the example shown in Fig. 1, 4 and 5. In particular, any combination of letters, numbers and signs is possible in the composition of the indicia 23.

The identification device 10 is provided with a transponder. The transponder has an antenna 17 and a passive data carrier 20. The stored data of the data carrier 20 are readable via the antenna 17 in a contactless manner. The data carrier 20 contains selected data about the vehicle to which the identification device 10 belongs. The data carrier 20 is equipped with a passive chip 74, which here is configured as a passive Radio Frequency Identification Chip (RFID chip), a coil 75, which is connected to the chip 74 in an electrically conductive manner, and a carrier 76 made of nonconductive material, for example plastic, which can be configured as carrier film or a carrier body (Fig. 3). The passive RFID chip comprising the data carrier 20 operates in a frequency range of 800 MHz to 1,000 MHZ. The RFID chip generates a magnetic field that is inductively coupled via the antenna 17.

The antenna 17 has a slit 18 within the electrically conductive identification device body 11, namely in the aluminium sheet used to form the identification device body 11. The antenna 17 is thus formed by the identification device body 11 and the slit 18.

In the exemplary embodiment of Fig. 1, the slit 18 runs from a top edge 16 of the identification device body 11 approximately perpendicular to this top edge 16 into the identification device body 11. The slit 18 is thereby open at one end. However, the slit 18 can also proceed from any other edge of the identification device body 11. An opening 19 in the identification device body 11 is located at the end of the slit 18 opposite to the open end. This opening 19 enlarges the closed end of the slit 18 lying in the identification device body 11. Here the opening 19 corresponds to the shape or base area of the data carrier 20, thus making it possible for the data carrier 20 to be inserted in the opening 19, that is to say it is encompassed by the periphery surface 21 of the opening 19, with preferably a circumferential gap remaining between the opening 19 and the data carrier 20. The data carrier 20 is electrically insulated from the identification device body 11 by its nonconductive carrier 76. This arrangement leads to an inductive coupling of the data carrier 20 to the antenna 17.

In the identification device 10, the antenna 17, configured in the manner described above, acts at the same time as an amplifier for the signal of the chip 74, with the result that the relevant data of the chip 74 can be read at a relatively large distance from the identification device 10.

On its front side 14 provided with indicia 23, the identification device 10 has a coating executed as a self-adhesive and preferably reflective film 24. The film 24 covers the entire front side 14 of the identification device 10. The slit 18 with the opening 19 and the data carrier 20 are thereby also completely covered by the film 24. In the case of a reflective film 24 with metallic conducting components, it is provided that the reflective film 24 is supplied with a demetallized region 83 in the regions where the data carrier 20, the opening 19 and the slit 18 are located, or that its layer structure is altered such that the reflective film 24 is not conductive in the region of the data carrier 20, the opening 19 and the slit 18. Consequently, the reflective film 24 is completely nonconductive in the entire region of the slit 18 as well as that of the opening 19. Preferably, the reflective film 24 is also continuously nonconductive, in particular demetallized, in the marginal areas bordering the slit 18 and the opening 19 with the data carrier 20.

Arranged at the rear side 26 of the identification device body 11 is a nonconductive sticker 25. In the shown exemplary embodiment (Fig. 2) this sticker 25 covers at least

the region of the slit 18 with the opening 19 and the data carrier 20 located within. However, the sticker 25 can also cover a larger area, or can be configured as a self-adhesive film which covers the entire rear side 26 of the identification device 10.

The height of the data carrier 20, in particular of the carrier 76, is approximately the same as the thickness of identification device body 11. It is thereby possible to accommodate the data carrier 20 within the opening 19 and fix it there such that it is located between and flush with the film 24 attached to the front side 14 and the sticker 25 attached to the rear side 26 (Fig. 2).

The carrier 76 shown in Fig. 3 has a round base area, specifically, one shaped like the opening 19. However, it is possible for the base areas of the carrier 76 and the corresponding opening 19 to assume different geometrical forms. The surface of the opening 19 geometrically matches the base area of the data carrier 20, namely that of its carrier 76. In the shown exemplary embodiment, the opening 19 is larger than the carrier 76, whereby the carrier 76 is surrounded by a circumferential gap.

Fig. 4 shows an identification device 10 which differs from that of Fig. 1 and 2 only with respect to a modified slit 77. Both ends of this slit 77 are closed. The slit 77 extends at a slight distance from and parallel to the lower longitudinal border of the identification device body 11, specifically in the region of the indicia area 22. In the shown exemplary embodiment, the rectilinear slit 77 lies between the indicia 23 and the folded edge 13 at the lower longitudinal border of the identification device 10.

One end of the slit 77 is assigned the opening 19, whose configuration corresponds to the base area of the data carrier 20, namely of a carrier 76. The opening 20 is configured as in the exemplary embodiment of Fig. 1 and 2. The data carrier 20 corresponds to the data carrier 20 shown in Fig. 3.

The only difference between the identification device 10 of Fig. 5 and the identification device 10 of the previously described exemplary embodiments is that the slit 78 runs a different course. This slit 78 is also closed at both ends but bends at a right angle, specifically preferably at its middle point. Consequently, half of the slit 78 extends in the region of a longitudinal edge, while the other part of the slit 78 runs parallel to the shorter transverse edge of the identification device 10. Again a closed end of the slit 78 is assigned an opening 19, whose configuration corresponds to that of the data carrier 20. In the shown exemplary embodiment, the opening 19 with the data carrier

20 is located at that end of the angled slit 78 which is assigned to the longitudinal edge of the identification device body 11. However, the opening 19 with the data carrier 20 can also be located at that end of the slit 78 which is assigned to the shorter transverse edge of the identification device body 11. The opening 19 corresponds to that of the exemplary embodiment of Fig. 1. The data carrier 20 is also configured in the manner shown in Fig. 3. Reference is made here to the description of Fig. 1 to 3.

The identification device 10 of Fig. 6 differs from the previously described identification devices in that the data carrier 20, which is basically of the same configuration as shown and described in Fig. 3, is arranged in a receiving depression 79. Like the folded edge 13, the receiving depression 79 is stamped into the identification device body 11 made of sheet metal, specifically being stamped from the front side 14 of the identification device body 11, with the receiving depression 79 thus being open on the front side 14 of the identification device 10. This allows the data carrier 20 to be inserted into the receiving depression 79 from the front side 14. The depth of the receiving depression 79 is selected so that the top side of the data carrier 20 pointing toward the front side 14 of the identification device 10 fits approximately flush with the front side 14 of the identification device 10.

The receiving depression 79 is assigned to an end of the slit in the identification device body 11. This end of the slit does not need to have any opening 19 since the opening 19 in this exemplary embodiment is replaced by the receiving depression 79. The receiving depression 79 can be located at one end of the slit 18, 77 or 78. The receiving depression 79 is stamped into the identification device body 11 at the end of the respective slit 18, 77 or 78, with a base wall 80 of the receiving depression 79 thereby having a continuous opening 81 formed by the end of the respective slit 18, 77 or 78. This opening 81, at least in its width, is smaller than the outer dimensions of the carrier 76 of the data carrier 20, whereby the data carrier 20 does not fit through the continuous opening 81 in the base wall 80 of the receiving depression 79.

In the shown exemplary embodiment, the receiving depression 79 is stamped into the identification device body 11 after its front side 14 has already been provided with the film 24. The film 24, which can be reflective film, thus extends across the base wall 80 of the receiving depression 79. In this case the data carrier 20 is mounted by means of a nonconductive compound, such as an adhesive 82, in the receiving depression

79, which is open at the top. In the shown exemplary embodiment, the adhesive 82 also fills out an interspace running around and encompassing the data carrier 20 between the outer walls of the carrier 76 and the comparatively larger receiving depression 79 so that the receiving depression 79 is completely filled out by the data carrier 20 and the adhesive 82 (Fig. 6). In the exemplary embodiment shown here, the film 24 in the region of the receiving depression 79 and data carrier 20 does not have to be demetallized. A label can be attached to the receiving depression 79 from the front side 14 of the identification device 10.

Fig. 7 shows a further exemplary embodiment of the identification device 10 which, like the identification device of Fig. 6, has a receiving depression 79. The receiving depression 79 has a configuration which is exactly the same as that in the identification device 10 of Fig. 6, which is why it is provided with the same reference numbers. In particular, here too the base wall 80 of the receiving depression 79 has an opening 81, which is formed by one end of a slit 18, 77 or 78.

The exemplary embodiment of Fig. 7 deviates from the exemplary embodiment of Fig. 6 in that in Fig. 7 the receiving depression 79 is stamped in the identification device body 11 before the film 24 is applied to the front side 14 of the identification device body 11. Consequently, the inner side of the receiving depression 79 is not coated with the film 24. Instead, the data carrier 20 is inserted into the uncoated receiving depression 79. In this case, an electrically nonconductive insulation between the conductive sheet metal of the identification device body and the data carrier 20 is provided by the carrier 76, which is made of a nonconductive material. The data carrier 20 is also not firmly glued in the receiving depression 79. Instead, the data carrier 20 lies with its bottom side on the part of the base wall 80 which partially surrounds the opening 81, while the data carrier 20 is retained on its top side by the film 24, which in the case of the identification device 10 shown in Fig. 7 extends across the receiving depression 79, specifically in a planar manner. In the shown exemplary embodiment, the film 24 is a reflective film with conductive properties. For that reason the reflective film 24 in the region of the data carrier 20 and receiving depression 79 is electrically nonconductive by virtue of a demetallized region 83. The data carrier 20 arranged in the receiving depression 79 can therefore send amplified signals which can be received by a reader or similar apparatus at a relatively large distance from the identification device 10.

The slits 18, 77 and 78 have a width that is 1.5 to 2 times greater than the thickness of the sheet metal used to form the identification device body 11. Depending on the sheet metal thickness, it is therefore possible for the slit to have a width ranging from 1.5 mm to 2.5 mm, preferably approximately 2 mm. The length of the slit ranges from 100 mm to 200 mm, preferably approximately 160 mm. The diameter of the data carrier 20 lies in the range between 6 mm and 10 mm, preferably being approximately 8 mm. In the case of the identification device 10, the thickness of the data carrier 20, in particular that of the carrier 76, can correspond approximately to the thickness of the sheet metal of the identification device body 11.

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SZABADALMI IGÉNYPONTOK

RENDSZÁMTÁBLA EGY JÁRMŰ SZÁMÁRA

1. Rendszámtábla egy jármű számára, egy lapos, legalább részben elektromosan vezető rendszámtesttel (11), amelynek legalább egy feliratmezőt (22) tartalmaz, és a rendszámtest (11) feliratmezőjén (22) legalább egy felirat (23) van elrendezve, ahol a rendszámtesthez (11) egy érintés mentesen kiolvasható adathordozó (20), és legalább egy hasítékon keresztül (18, 77, 78) egy rendszámtestbe (11) épített antenna (17) van hozzárendelve, és az adathordozó (20) egy mágneses teret kibocsátó adathordozó (20), azzal jellemezve, hogy az adathordozó (20) ahasítékhoz (18, 77, 78) induktívan van csatlakoztatva, ahol az adathordozó (20) egy chip (74), legalább egy elektromosan vezető módon összekapcsolt tekercsel (75) és egy szigetelő, illetve elektromosan nem vezető anyagból kialakított tartóval van ellátva, és a hasíték (18, 77, 78) illetve az adathordozó (20) egyidejűleg erősítőként is szolgál.

2. Az 1. igénypont szerinti rendszámtábla, azzal jellemezve, hogy az adathordozó (20) a hasítékhoz (18, 77, 78), különösképp a hasíték (18, 77, 78) egy végének területhez elektromosan szigetelt módon van elrendezve.

3. Az 1. vagy a 2. igénypont szerinti rendszámtábla, azzal jellemezve, hogy az adathordozó (20) a hasítékon (18, 77, 78) belül szigetelve, vagy a hasíték (18, 77, 78) fölött van elrendezve, előnyösen az adathordozó (20) elektromosan vezető alkatrészei a hasíték (18, 77, 78) határoló felületeitől (21) térközzel vannak elválasztva.

4. Az előző igénypontok egyike szerinti rendszámtábla, azzal jellemezve, hogy a hasíték (18, 77, 78) egy áttörést (19) tartalmaz, ahol az áttörés (19) előnyösen a hasíték (18, 77, 78) a zárt vég területén helyezkedik el.

5. A 4. igénypont szerinti rendszámtábla, azzal jellemezve, hogy az adathordozó (20) a lemeztestben (11), a hasítékban (18, 77, 78) az áttörés (19) területén található.

6. Az előző igénypontok egyike szerinti rendszámtábla, azzal jellemezve, hogy az adathordozó (20) a rendszámtestbe (11) be van ágyazva, különösképp a hasítékban (18, 77, 78) illetve az áttörésben (19) van rögzítve, előnyösen legalább egy, a rendszámtesten (11) lévő bevonat (24) által.

7. A 6. igénypont szerinti rendszámtábla, azzal jellemezve, hogy legalább egy látható bevonat (24) különösképp egy öntapadós visszaverő fóliaként van kialakítva, amely előnyösen az adathordozó (20) illetve az áttörés (19) és/vagy a hasíték (18, 77, 78) területén úgy van kialakítva, hogy nem tartalmaz vezető alkatrészeket.

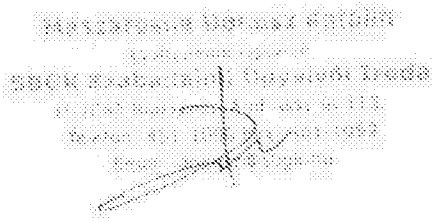
8. Az előző igénypontok egyike szerinti rendszámtábla, azzal jellemezve, hogy az adathordozó a rendszámtestben (11) egy befogadó vályúban (79) van elrendezve, ahol a befogadó vályú (79) a hasíték (18, 77, 78) egyik végén van elrendezve.

9. A 8. igénypont szerinti rendszámtábla, azzal jellemezve, hogy a befogadó vályú (79) egy belső falazatot (80) tartalmaz, amelybe a hasíték (18, 77, 78) egyik vége benyúlik, vagy a belső falazat (80) egy nyílást (81) tartalmaz, amely kisebb, mint az adathordozó (20).

10. Az 1. igénypont szerinti rendszámtábla, azzal jellemezve, hogy az adathordozó (20) chipje (74) egy passzív rádiófrekvenciás azonosító chipként (RFID-chip) van kialakítva.

11. Az 1. igénypont szerinti rendszámtábla, azzal jellemezve, hogy a rendszámtest (11) egy elektromosan vezető fémes anyagból, előnyösen alumíniumból, vagy egy alumíniumötvözetből van kialakítva.

A meghatalmazott:



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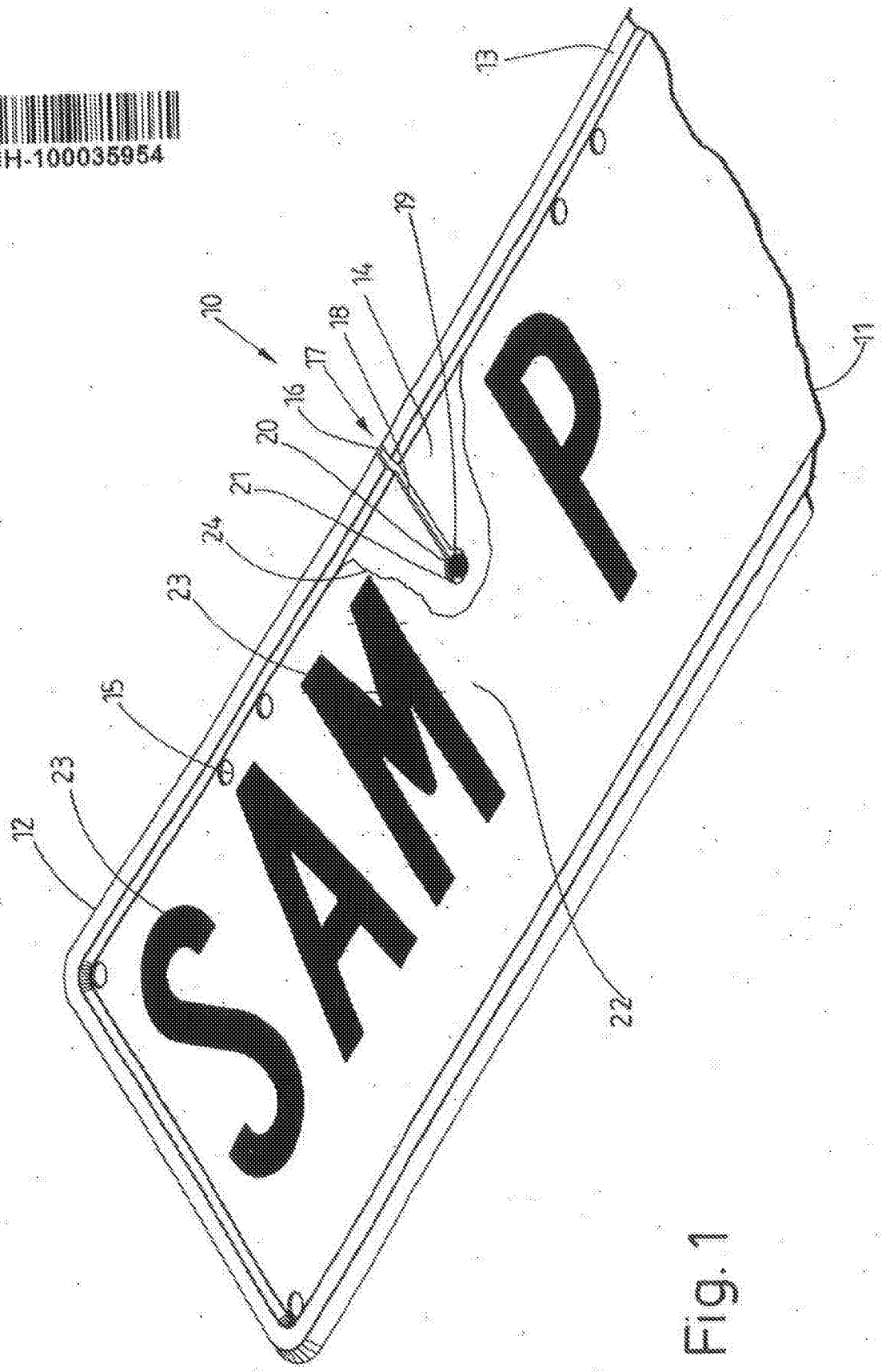

Fig. 1

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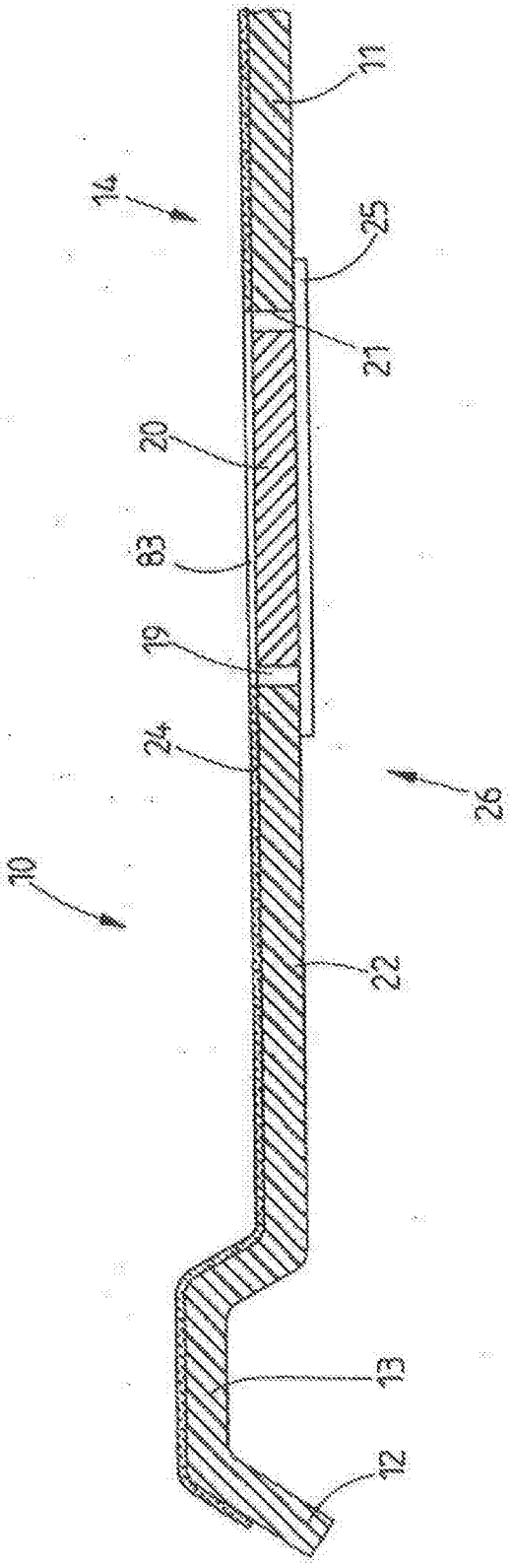

Fig. 2

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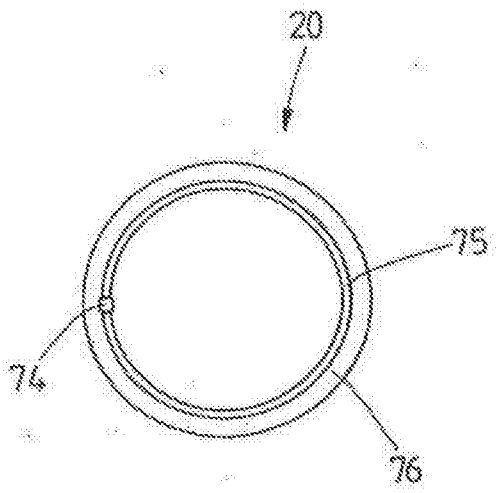

Fig. 3

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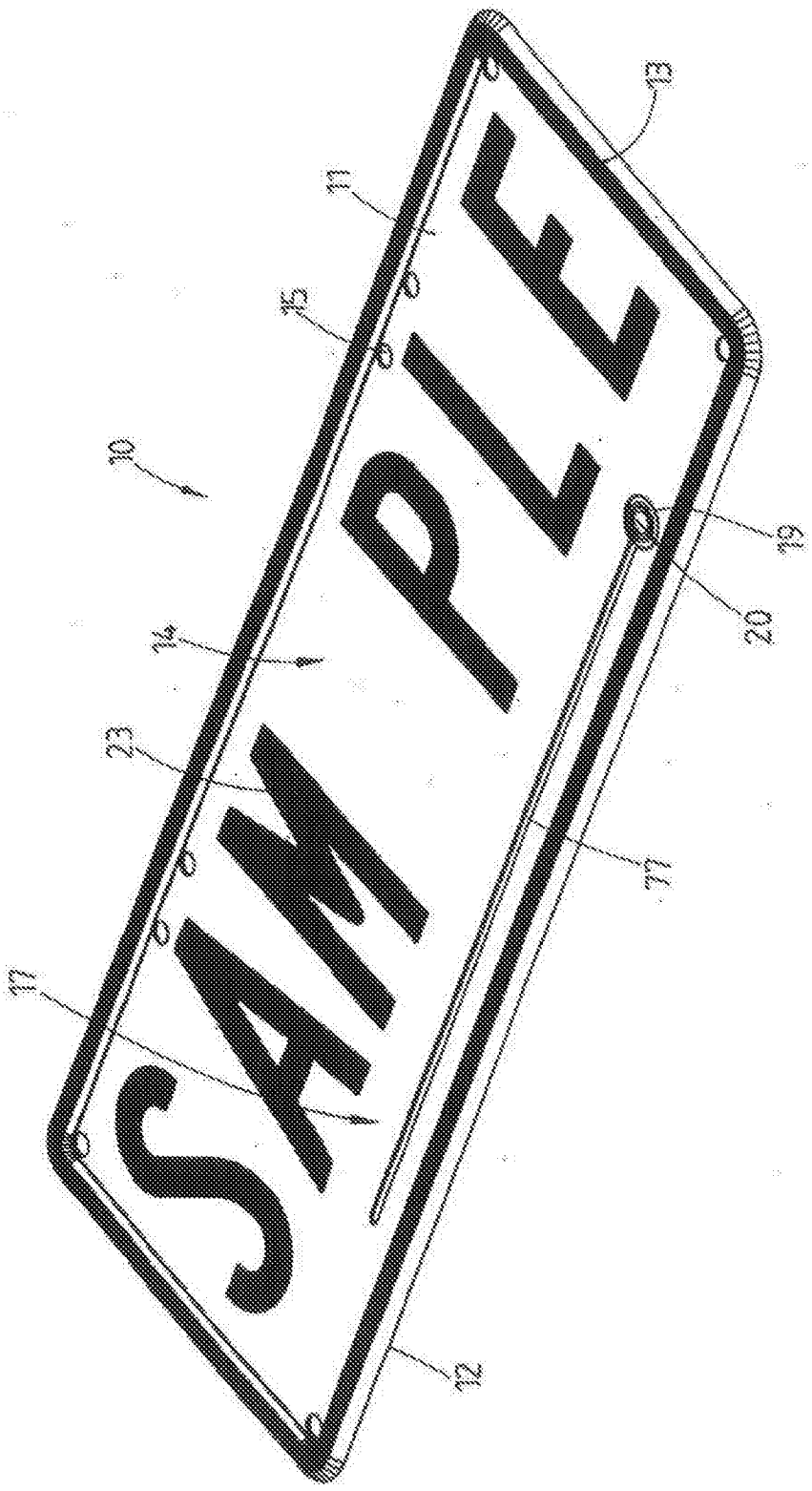

Fig. 4

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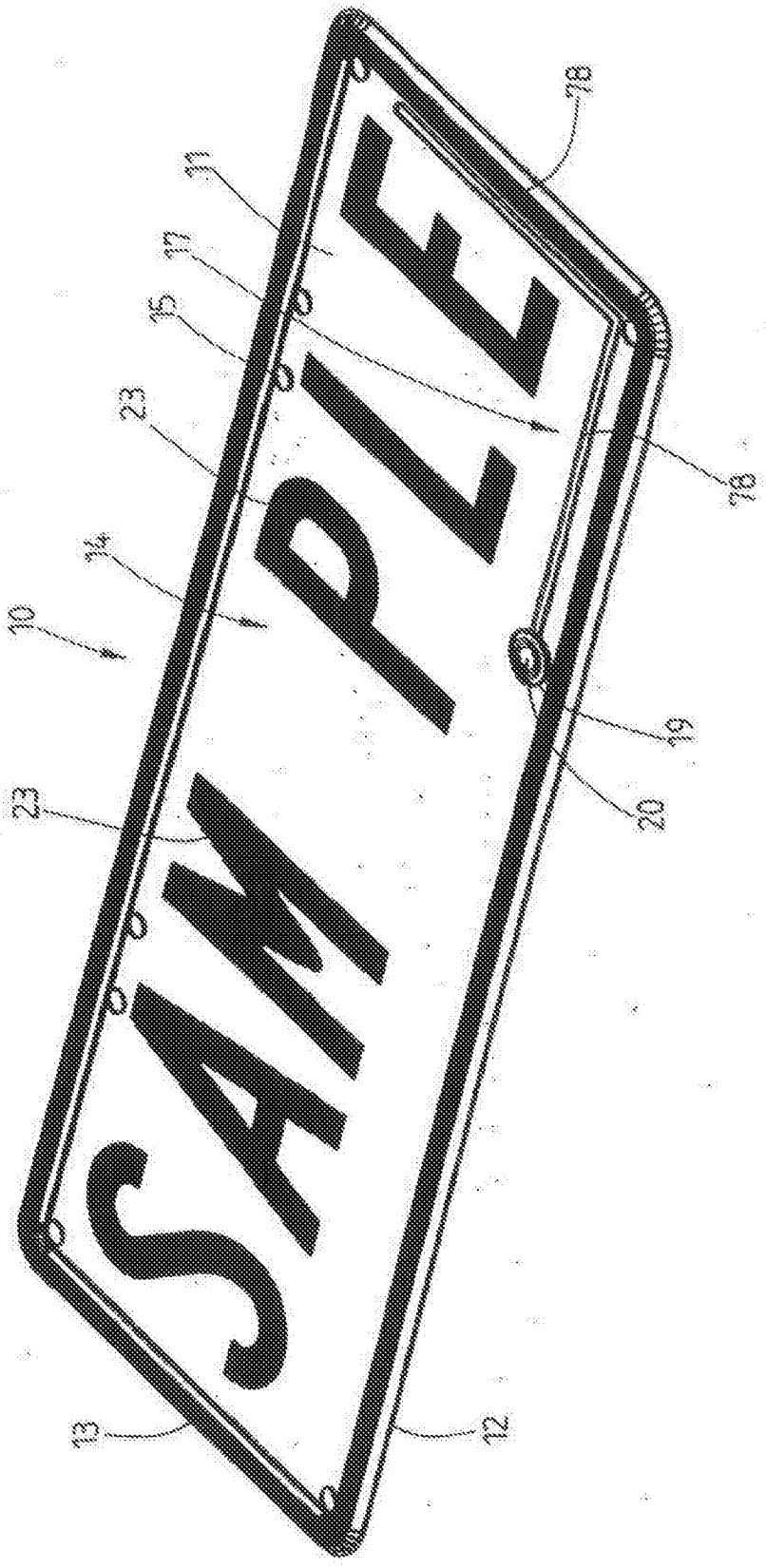

Fig. 5

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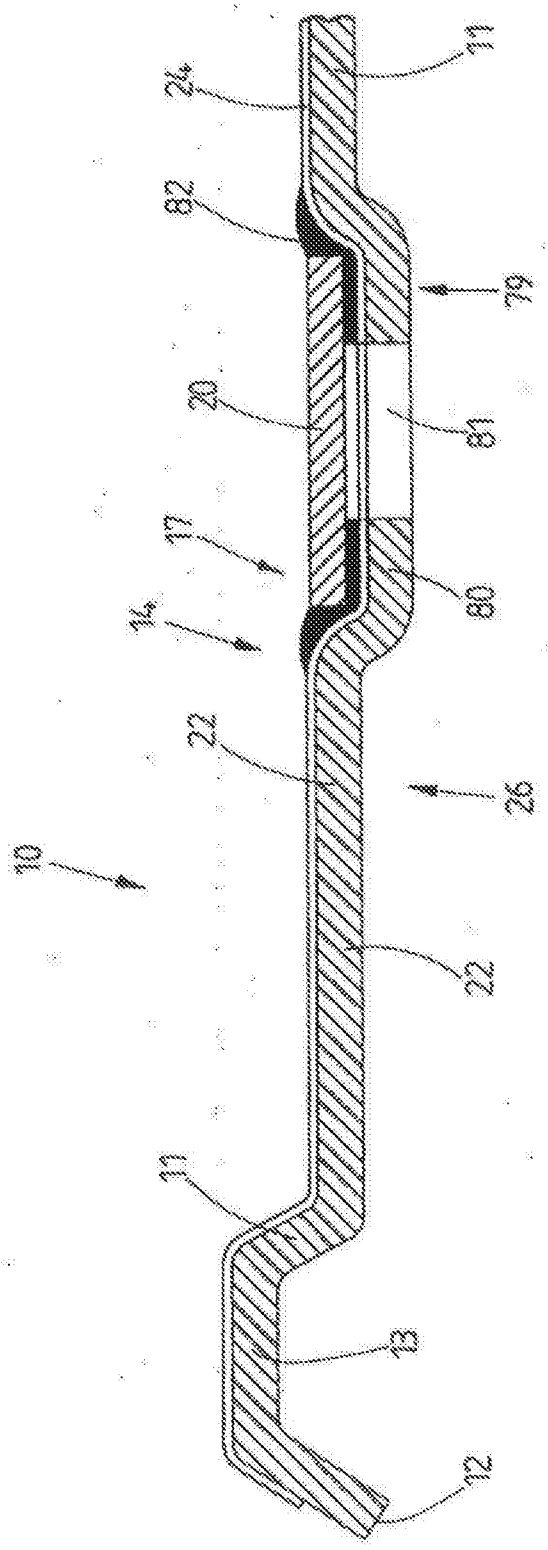

Fig. 6

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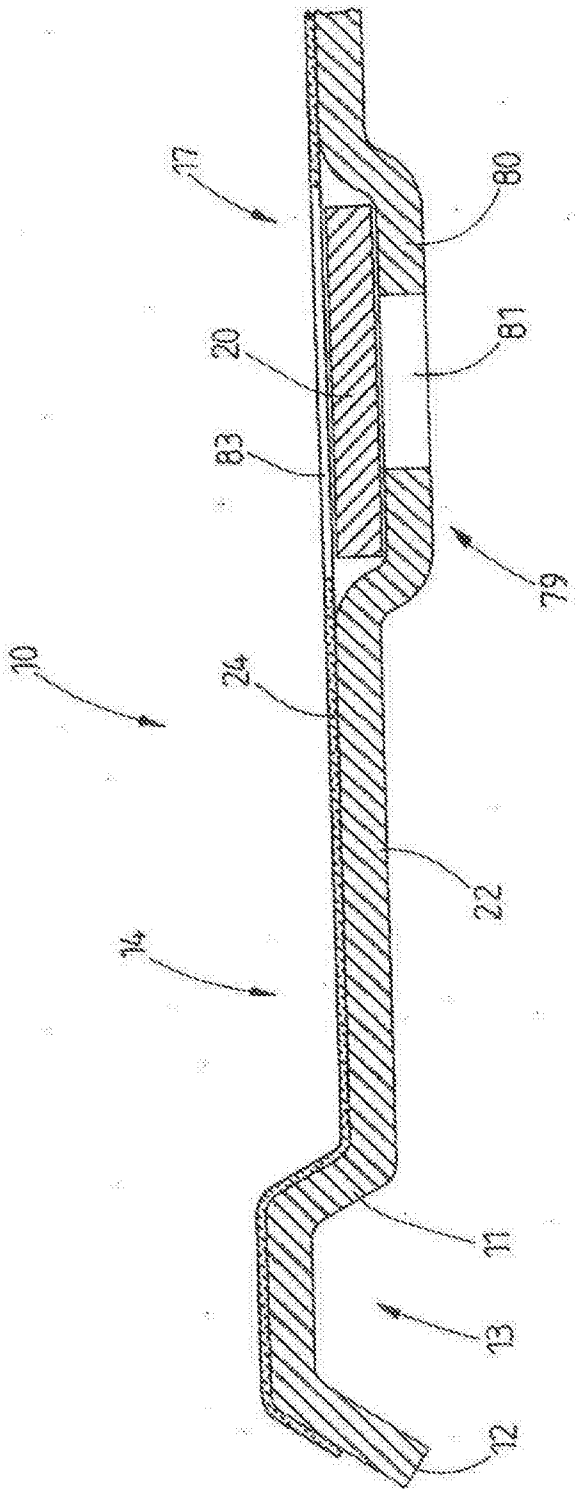

Fig. 7