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(54) **METHOD FOR PRODUCING MOTOR VEHICLE LOCKS WITH A TWISTED LOCKING PART EDGE**

(71) Applicant: **KIEKERT AKTIENGESELLSCHAFT**, Heiligenhaus (DE)

(72) Inventors: **Thorsten BENDEL**, Oberhausen, North Rhine-Westphalia (DE); **Werner POHLE**, Dortmund, North Rhine-Westphalia (DE); **Thomas WALDMANN**, Mulheim Ruhr, North Rhine-Westphalia (DE)

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(57) **ABSTRACT**

In order to minimize the sliding friction between the locking parts that is, between the pawl and the rotary latch of a motor vehicle lock, it is advantageous if, during the production process, the different latch surfaces of both locking parts are provided with a stamping contour having straight grooves and with a stamping contour characterized in that the provided grooves are oblique. Said oblique grooves of the latch surface on the pawl are placed in the position indicated in figure such that the entire pawl is twisted about the longitudinal axis thereof. Also, at least two overlapping points are provided between the straight grooves and the oblique grooves such that both of the locking parts come into mutual contact reducing the friction.

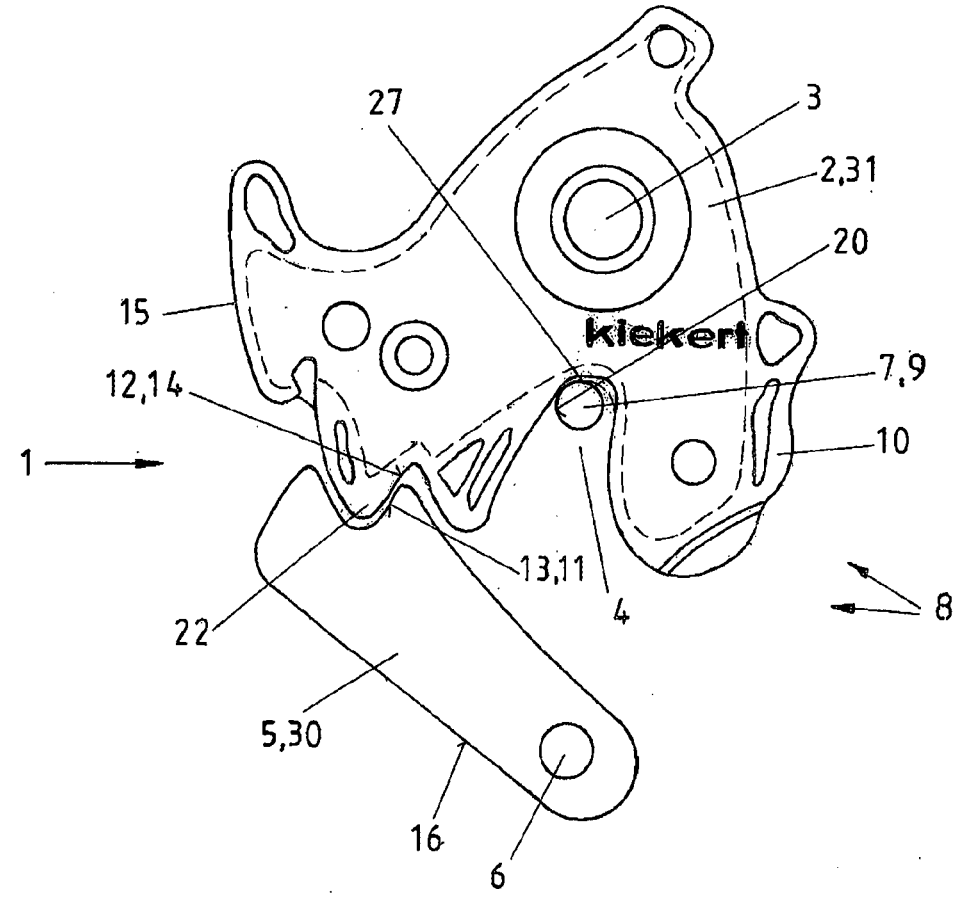


Fig.1

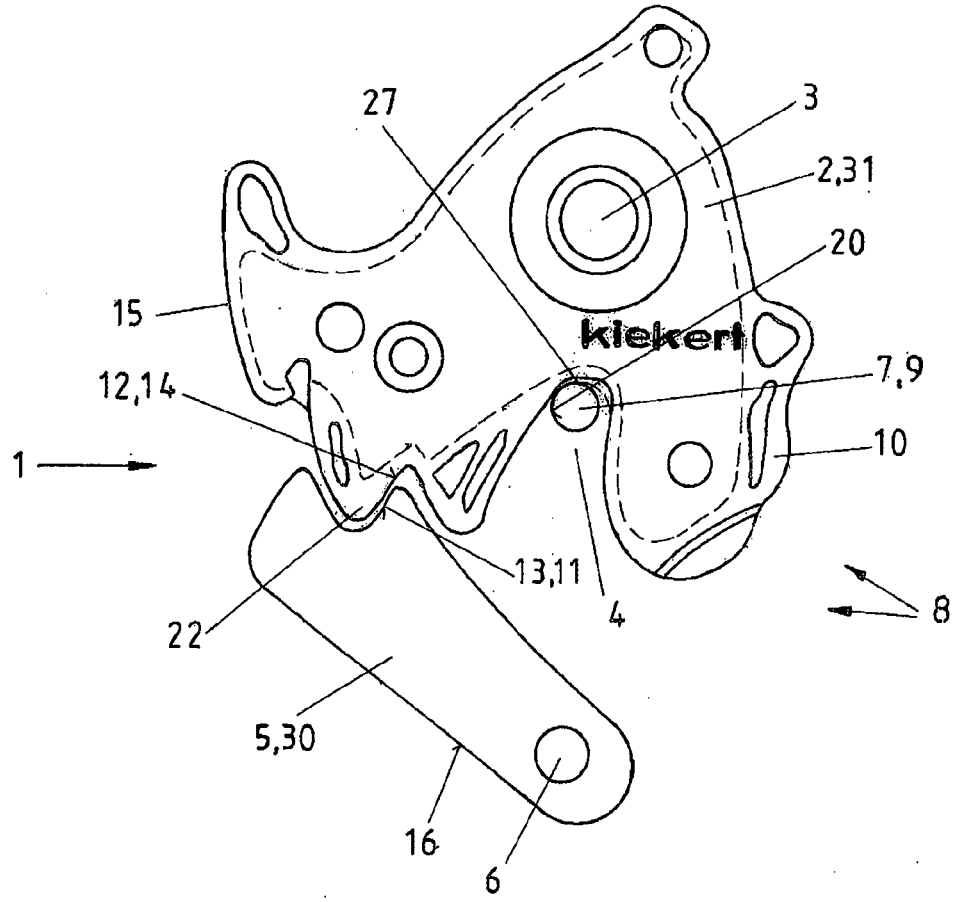


Fig.2

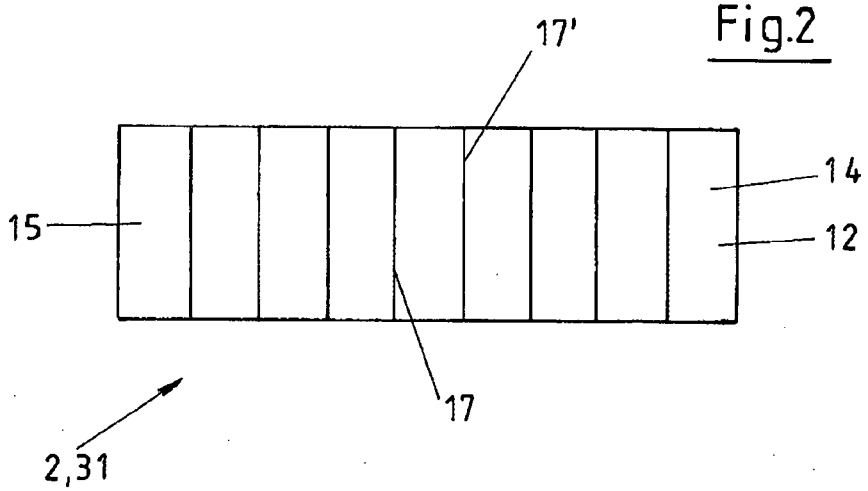
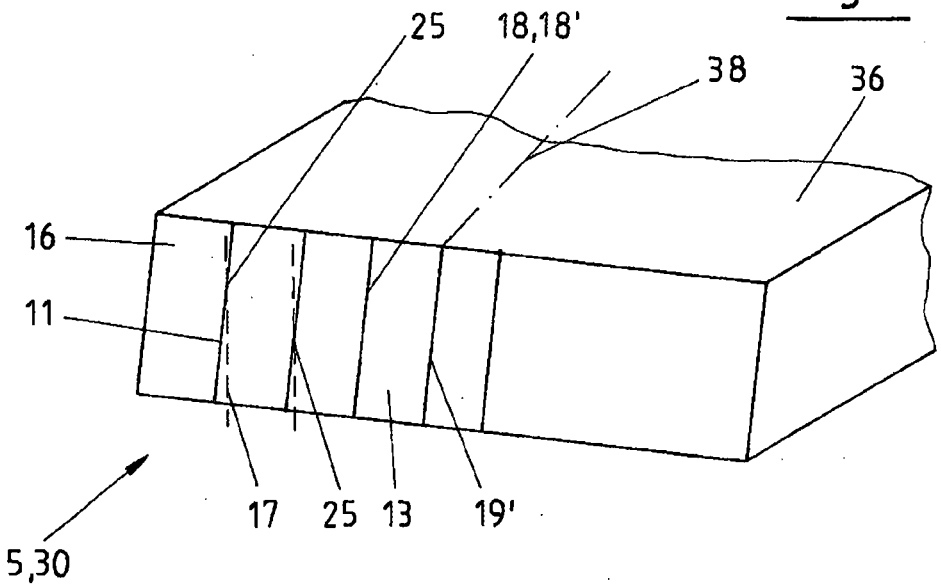


Fig.3



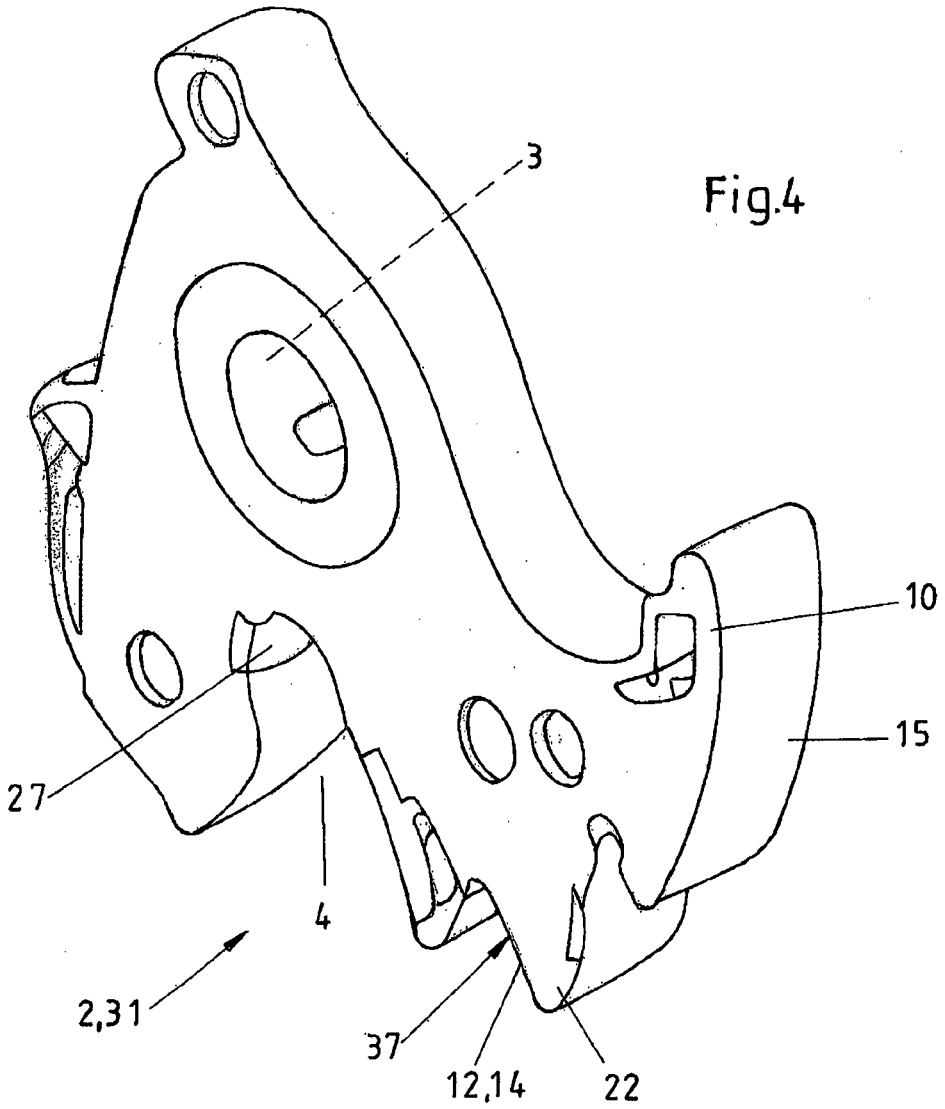


Fig.4

METHOD FOR PRODUCING MOTOR VEHICLE LOCKS WITH A TWISTED LOCKING PART EDGE

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is the U.S. national stage application of International Patent Application No. PCT/DE2013/000769, filed Dec. 11, 2013, which claims priority of German Application No. 10 2012 024 379.0, filed Dec. 12, 2012, which are both hereby incorporated by reference.

BACKGROUND

[0002] The invention relates to a method for producing the locking parts catch and pawl of a motor vehicle door lock, in which the catch and pawl have been stamped resulting in vertical or near vertical edges with corresponding ratchet surfaces on the pawl and catch and which have then been covered by a coating except for the ratchet surface. The invention also refers to a motor vehicle door latch with a catch and a pawl locking the catch when the motor vehicle door latch is closed, with both locking parts containing corresponding ratchet surfaces on the vertical edges created during stamping and a coating not covering the ratchet surfaces.

[0003] In general, so-called creaking noises than can be generated during driving of a vehicle between the hanger arms and the catch, are reduced by either applying a surface structure reducing the sliding friction to the hanger arms or also the catch in the area in which these come into contact with each other. In the prior art disclosed in DE 10 2010 009 141 A1 grooves or respective webs are applied to the hanger arms in the contact area that run obliquely to the longitudinal axis of the hanger arm. These aim to reduce said creaking. These solutions do, however, not take into consideration that during the actual production of the hanger arms and, in particular, of the locking parts, catch and pawl, a surface favoring creaking exists on the corresponding ratchet surface. During stamping channels and grooves are created on the edge surfaces which can engage with each other in particular when the pawl is pivoted away.

SUMMARY

[0004] The invention thus has the task of suggesting a motor vehicle door latch largely avoiding any noise generated during opening and closing of the motor vehicle door latch on the ratchet surface of the catch and pawl when moved.

[0005] The invention solves this task in the way that after stamping of the locking parts, one of the parts is twisted by a specified angle, which otherwise would engage with the stamped contour of the other locking part by means of the grooves arranged parallel to each other.

[0006] In a not corresponding production process, the stamping contours created by stamping and containing grooves would come into contact with the stamping contour of the facing locking part in such a way that they would engage with each other and would adversely affect movement of the pawl on the catch or would cause a jerky movement resulting in the described undesirable noises. The invention remedies this by preventing the stamping contours containing said grooves from engaging with each other as the stamped contour of the twisted locking part only matches on some points with the twisted locking part where it thus makes contact. The sliding friction that has to be overcome is thus considerably reduced and, in particular, any engaging of the stamped grooves is reliably prevented. The invention thus not only minimizes the sliding friction but also prevents both locking parts getting caught in each other, making the operation of such a motor vehicle door latch considerably safer.

[0007] In an appropriate embodiment of the invention, the pawl and its stamping contour containing straight grooves is twisted at a predefined angle, so that in contrast to the straight grooves of the other locking part the grooves of the stamped pawl contour are oblique. The pawl is a component which, due to its shape is easily twisted so that in contrast to the other locking part, a stamping contour containing oblique grooves is then created.

[0008] In order to optimize the operation of the motor vehicle door lock, the invention provides for the locking part to be twisted at an angle resulting in at least two overlapping points of straight and oblique grooves. In two of such overlapping points, or contact points of the two locking parts in contact with each other, an unwanted engaging of the stamped grooves is thus effectively prevented and it is ensured that both locking parts, exerting equal friction on each other, can be pivoted apart.

[0009] In order to achieve the at least two overlapping points, it is advantageous for the twisting angle to be set to 5-15° taking into consideration the thickness of the locking parts and the distance of the grooves. Such twisting can be easily implemented even when considering that the pawl is made, for instance, of a type of metal. Such an only slightly twisted component or locking part can then be used in the motor vehicle door latch without the need for further modifications and changes.

[0010] In another appropriate embodiment of the invention, both locking parts, i.e. catch and pawl are twisted in such a way that the grooves of the facing ratchet surfaces of the locking parts contain respective overlapping points or contact points, preventing any adverse engaging of the stamped grooves. If both locking parts are twisted accordingly, the amount of twisting in both parts is less than if, for instance only the pawl would be twisted. Twisting of the pawl is still significantly easier than twisting of the catch, even if the catch only has to be twisted in a small area, i.e. not the entire catch has to be twisted.

[0011] For implementation of the method it is advantageous for a locking part to contain a ratchet surface with a stamping contour, whose normally straight grooves are arranged diagonally by twisting of the locking part in contrast to the straight grooves of the other locking part or that act as oblique grooves. Using such a designed locking part, it is possible to prevent said engagement of the stamped grooves when the pawl is pivoted along the catch for opening of the motor vehicle door latch or initiating the opening process. One locking part remains unchanged, whilst the second locking part, and preferably the pawl, is stamped into a format in which the ratchet surface contains oblique grooves, able to advantageously cooperate with the straight grooves of the other locking parts.

[0012] Particularly advantageously, the oblique grooves are formed in the twisted part of the pawl. The pawl is essentially a rectangular piece of sheet metal that can be twisted as a whole or also in parts thereof in order to produce the oblique grooves. It is therefore suggested to provide the pawl with the oblique grooves whilst the catch as such remains unchanged, i.e. retains its straight grooves. Together with the ratchet surface of the pawl also the front part of the pawl is twisted

which is, however, of no relevance for guiding and supporting the pawl on the catch due to the thickness of the pawl.

[0013] It has already been pointed out that the pawl only has to be twisted by a slight amount or angle in order to achieve the desired or extremely advantageous oblique grooves. It is, however, also possible to twist both locking parts, i.e. the pawl and the catch, in opposing directions by a respectively smaller angle. This also achieves that the stamped grooves of both locking parts do not impede each other but allow unimpeded gliding of the pawl on the catch.

[0014] Apart from the option of twisting both locking parts, another option is for the catch to be twisted in the area facing the pawl to provide respective overlapping points on the ratchet surfaces. Even if the catch as such cannot or can only be twisted with respective effort, the option of restricting this twisting to a certain partial section of the catch exists.

[0015] Even in the event that, for instance, the pawl can only be twisted in a partial section, it is particularly expedient for one of the locking parts, preferably the pawl to be twisted around its longitudinal axis. This means that the entire pawl as such is twisted by the intended amount even if only the section of the pawl containing the ratchet surface does actually have to be twisted to produce oblique grooves.

[0016] The particular advantage of the invention is that with very little additional manufacturing effort a motor vehicle door latch can be produced in which the pawl and catch in the latching area, i.e. in the area in which they both rest against each other, are designed in such a way that previously generated noises are significantly reduced. This is achieved by reducing the sliding friction, i.e. by the created overlapping points in form of the straight grooves and oblique grooves. The overlapping points also advantageously prevent any engagement of the originally straight grooves. As it is a near square component or sheet metal part, the pawl is particularly suitable for twisting as a locking part. Also, only slight twisting is required to achieve the oblique grooves. All in all, this makes the operation of such a motor vehicle door latch easier and more reliable and significantly reduces the generated noise.

[0017] Further details and advantages of the object of the invention are provided in the below description of the associated drawing, showing a preferred embodiment with all required details and individual components. In which:

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] FIG. **1** shows a top view of a motor vehicle door latch in a closed state,

[0019] FIG. **2** shows an enlargement of the edge profile of a catch in the area of its ratchet surface,

[0020] FIG. **3** shows an enlargement of the ratchet surface of the pawl in the twisted state and

[0021] FIG. **4** a perspective view of the catch with the particular edge formation.

DETAILED DESCRIPTION OF THE DRAWINGS

[0022] FIG. **1** shows a top view of a motor vehicle door latch **1**, in which the catch **2** moving around axis **3** contains the hanger arm **9** of the latch bracket **7**. This shows the closing state of a respective motor vehicle door latch **1**; the catch **2** is secured by pawl **5** pivotable around pawl axis **6**, i.e. the motor vehicle door latch **1** can only be opened again once the pawl **5** has been pivoted away, which can be achieved by actuation of the handle of the motor vehicle door—not shown in the drawing. By means of the seat **4**, the hanger arm **9** is moved into the lowest point **27** on the catch **2** thus ensuring the closed condition of also the vehicle door—not shown, with the locking parts **30**, **31**, i.e. the pawl **5** and the catch **2** being part of the motor vehicle door, whilst the latch bracket **7** with the hanger arms **9** is secured to the car body of the motor vehicle.

[0023] The locking parts **30**, **31** of the locking mechanism **8** are produced from sheet metal in preferably multiple stamping operations and at the ratchet surfaces **12**, **13** not covered by the coating **10**, the surface of both locking parts **30**, **31** is initially characterized by a stamping contour **14**. In the area of the ratchet surface **13** this surface structure has, however been changed as the grooves **18**, **19** forming the stamping contour **11** are oblique as a result of the twisting of the component and, in particular pawl **5**, and are shown as oblique grooves **18'**, **19'** in FIG. **3**. This stamping contour **11** produces a considerably better sliding friction between the locking parts **30**, **31**, i.e. the pawl **5** on the catch **2**, so that the unwanted noises can no longer be generated.

[0024] It is not particularly highlighted in the figure that the edges **15**, **16** of the catch **2** and pawl **5** contain a plastic coating **10**. The edges **15**, **16** are thus covered by such a coating, whilst only in the area of the ratchet surfaces **12**, **13** and also on the contact surface **20** this coating is not applied, allowing the special surface structure, as shown in the below figures, to become effective. The surface structure ensures that the noise and sliding friction are reduced to a minimum, with both cooperating.

[0025] FIG. **2** shows the area of the ratchet surface **12** on the catch **2** that has to correspond with the ratchet surface **13** on the pawl **5** during opening and closing of the motor vehicle door latch **1**. This means that during opening and closing of the motor vehicle door latch **1**, the two locking parts **30**, **31** rub against each other in the area of the ratchet surfaces **12**, **13** or even on top of each other at the edges **15**, **16**, which can, in particular in case of the straight grooves **17**, shown in FIG. **2**, cause problems, when the ratchet surface **13** on the pawl **5** is the same, i.e. contains straight grooves. As apparent from a comparison between FIGS. **2** and **3** this has, however, been avoided by the latching contour of the ratchet surface **13** being oblique, as a result of the entire component, i.e. the pawl **5** being twisted by a certain angle.

[0026] FIG. **3** shows that the end state has not been reached as yet, i.e. the pawl **5** has to be twisted further in order to ensure that at least two overlapping points **25** have to be provided. The, in this case, oblique grooves **18'**, **19'**, in particular in the area of the main ratchet position **22**, reduce the sliding friction and the produced friction noise, as the oblique grooves **18'**,**19'**, as apparent from FIG. **3**, only contain a few overlapping points **25**. Here, too, it can be assumed that the oblique arrangement caused by the twisting of the pawl **5** around its longitudinal axis **38** is around 5-15°, in order to achieve the desired two overlapping points in each case. It is important that said overlapping points **25** are provided in order not to adversely affect the movement of the pawl **5** on the catch **2**, so that the movement is even, thus reducing the sliding friction and the noise to such an extent that they are no longer causing a problem. Numeral **36** refers to the twisted part of the pawl **5**, although generally, due to the overall design of the pawl **5**, it has been found to be advantageous for the entire component to be twisted in such a way that the ratchet surface **13** contains the oblique grooves **18'**, **19'**.

[0027] A comparison of FIG. **2** and FIG. **3** shows that when the ratchet surface **12** meets the ratchet surface **13**, i.e. the facing area **37**, the grooves **17**, **18** and **19** can no longer engage.

[0028] FIG. **4** shows a perspective view of the catch **2** that can be pivoted around axis **3**—not shown in the drawing. When pivoting the catch **2**, the hanger arm **9**, not shown in FIG. **4**, is inserted in the seat **4** or released therefrom, so that the motor vehicle door can then be opened or evenly closed and is then locked in the closed position by the pawl **5**. FIG. **4** shows that the stamping of the catch **2** produces a clearly visible edge **15** whose surface, as explained above, is characterized by the stamping contour **14** on the ratchet surface **12**. This stamping contour **14** is only indicated in FIG. **4**. The ratchet surface **12** indicates the main ratchet position **22**, i.e. the position in which the pawl **5** prevents the catch **2** for pivoting back in the closed position. In this case, the ratchet surface **13** of the pawl **5** rests, as already explained, on the latching surface **12** of the catch **2** and both parts can move on top of each other with less friction, without unwanted noises being generated, as the straight grooves **17** of the catch **2** and the oblique grooves **18'**, **19'** of the pawl **5** cannot engage or latch with each other.

[0029] It is apparent that at the lowest point **27** of the seat **4** it contains a surface deviating from the other surface of the edge **15**, which is, in particular, achieved by the fact that this area is not covered by a coating **10** and that a separate part has been inserted at this point to positively affect the sliding effect of the catch **2** at the hanger arm **9**.

[0030] All aforementioned characteristics, including those only shown in the drawings, are separately or in combination essential parts of the invention.

1. Method for producing the locking parts catch and pawl of a motor vehicle door lock, in which the catch and pawl are stamped, resulting in vertical or near vertical edges with corresponding ratchet surfaces on the pawl and catch, which are then covered by a coating except for latching surfaces, characterized in that after stamping of the locking parts one part is twisted by a specified angle in an area which would otherwise be engaged with a stamping contour of the other locking part by means of grooves arranged parallel to each other.

2. Method according to claim **1**, characterized in that the pawl with its stamped contour containing straight grooves is twisted by a specified first angle, so that in comparison to the straight grooves of the other locking part, the grooves of the pawl stamping contour are oblique.

3. Method according to claim **1**, characterized in that the locking part is twisted by a second angle, resulting in at least two overlapping points of straight and oblique grooves.

4. Method according to claim **2**, characterized in that the angle of twisting is set to 5-15° depending on the thickness of the locking part and the distance of the grooves.

5. Method according to claim **1**, characterized in that the two locking parts, i.e. catch and pawl are twisted to such an extent that the groves of the other facing latching surface of the locking parts contain respective overlapping points or contact points.

6. Motor vehicle door latch with a catch and a pawl locking the catch when the motor vehicle door is closed, in which both locking parts contain corresponding ratchet surfaces on the vertical edges created during stamping and a coating except for on the ratchet surfaces, characterized in that the locking part contains a ratchet surface with a stamping contour whose straight grooves are obliquely arranged in relation to the straight grooves of the other locking part as a result of the twisting of the locking part or act as oblique grooves.

7. Motor vehicle door latch according to claim **6**, characterized in that the oblique grooves are formed on the twisted part of the pawl.

8. Motor vehicle door latch according to claim **6**, characterized in that both locking parts are twisted in opposite directions by a respective small angle.

9. Motor vehicle door latch according to claim **6**, characterized in that the catch is twisted creating overlapping points on the ratchet surfaces in the area opposite to the pawl.

10. Motor vehicle door latch according to claim **6**, characterized in that one of the locking parts, preferably the pawl is twisted around its longitudinal axis.

11. Method according to claim **3**, characterized in that the angle of twisting is set to 5-15° depending on the thickness of the locking part and the distance of the grooves.

12. Method according to claim **2**, characterized in that the two locking parts, i.e. catch and pawl are twisted to such an extent that the groves of the other facing latching surface of the locking parts contain respective overlapping points or contact points.

* * * * *