

Lock

The invention relates to a lock.

Although already numerous different locks are commercially available, there is an undiminished need to develop new locks resistant to forcing. The invention
5 therefore aims to provide such a lock.

According to the present invention, a lock is provided, comprising a first lock member with a projecting lock pin, and a second lock member with a locking groove for receiving the lock pin, which locking groove, being rotatable
10 between a position in which the lock pin is retained and a position in which it is released, is connected to a lock cylinder which is locked up in the second lock member and which is operable with a key, said lock pin having a thickened head connected to a constricted neck, while the locking groove
15 consists of a cavity formed in a closing sleeve for receiving the head, which cavity communicates with the environment through an opening for letting through the head and a narrowed duct for receiving the neck of the lock pin, connected thereto in the direction of rotation of the closing sleeve.

20 In the releasing position of the closing sleeve, the thickened head of the lock pin can be moved in and out of the cavity of the closing sleeve, respectively through said opening. When the head has been moved into the cavity, it can subsequently be locked behind the narrowed duct by rotation of
25 the closing sleeve to the retaining position, the neck of the lock pin then being positioned in this narrowed duct. In this position, the lock pin cannot be removed from the closing sleeve. The lock cylinder connected to the closing sleeve affords the rotation thereof. In this way, the lock pin is
30 retained in the second lock member in such an effective and solid way, that it becomes extremely difficult to force the lock pin out of the second lock member.

In general, a transverse duct connected to the duct containing the closing sleeve will be formed in the second
35 lock member, in such a way that it communicates with the opening formed in the closing sleeve in the releasing position of the closing sleeve, and with the narrowed duct in the retaining position of the closing sleeve. This transverse duct



will preferably have a diameter which is just large enough to let the thickened head of the lock pin pass, so that a close fit is obtained and the lock members can hardly be moved in relation to each other in their joined position, which renders
5 it extremely difficult for unauthorized persons to break the connection between the lock members.

According to another aspect of the lock of the invention, the closing sleeve is closely fitted into a duct formed in the second lock member. This offers a number of
10 additional advantages. The most important advantage of the fact that the closing sleeve is closely fitted into the duct formed in the second lock member is that this prevents deformation of the closing sleeve when a great force is exerted thereon. Such a great force may, for example, be
15 exerted when someone tries to pull the lock pin out of the locking groove.

Another possible advantage is that the lock pin and the closing sleeve cooperating therewith, can be closed off completely from the environment in the joined position of the
20 lock members, by allowing the lock members to abut, so that, on the one hand, it is virtually impossible to destroy these elements, and, on the other hand, these elements are protected from weather influences.

It is further possible that the lock members comprise
25 rims overlapping their common interface in their joined position. When the lock members are joined together, and the lock pin is retained in the locking groove, these overlapping rims prevent that a breaking tool or the like is forced between the lock members in order to move these apart by
30 exerting a great force and to break the connection between them.

According to another aspect of the invention, the lock cylinder and the closing sleeve are inserted into the duct formed as a blind hole, while a passage of a smaller
35 diameter for introducing a key into the lock cylinder is formed in a wall of the second lock member, in line with the blind end of the hole, and the open end of the hole is closed with a plug.

As a result of this locking up of the locking
40 cylinder and the closing sleeve it becomes virtually

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impossible to remove the lock cylinder with breaking tools within a reasonable amount of time, so that the lock cannot be broken in this way either.

According to an alternative embodiment of the lock
5 according to the invention, the lock cylinder is screwed into the second lock member, the screwing direction for unscrewing the lock cylinder from the second lock member being opposite to the direction of rotation of the locking groove from the position in which the lock pin is retained to the position in
10 which it is released.

When the lock pin is retained in the locking groove, possible attempts to open the lock in an unauthorized way are, for example, aimed at unscrewing the lock cylinder from the second lock member. This means; however, that the locking
15 groove is then rotated to the position in which the lock pin is retained. Consequently, attempts to unscrew the lock cylinder from the lock member cause the lock pin to be more firmly locked in the locking groove. In this way, the lock according to the invention is protected against unauthorized
20 opening in an extremely effective way.

The lock according to the invention can be applied in various ways. We mention, for example, an embodiment in which the lock members comprise recesses in which the end links of chains can be placed and fastened, as well as lock pins
25 extending through the recesses and retaining the end links. Once placed, the end links which are retained in the recesses by means of the locking pins can hardly be removed from the lock members in an unauthorized way.

It is of course also possible to fit the lock members
30 to other elements, such as the ends of cables, bars, or other elements which can be connected to each other by means of a lock.

A very special embodiment of the lock according to the invention is the embodiment in which the lock is formed as
35 a disc brake lock for a vehicle fitted with a disc brake, in particular a motorcycle, in which the first lock member is formed as a disc-shaped boss at the end of the lock pin which is opposite to the head, and the second lock member is formed as a lock housing.

40 This lock allows to immobilize a vehicle fitted with



a disc brake by locking the lock on the disc of the disc brake. In most cases, this can be done by putting the lock pin through an existing hole in the disc of the disc brake and by locking the second lock member onto the lock pin, as a result of which the lock pin is closed off at both ends by the first and the second lock member, respectively. Because of the fact that the first and the second lock member are only connected via the lock pin and not externally of the disc as well, the hole through which the lock is put can be located anywhere on the disc, independent of the distance between the hole concerned and the rim of the disc.

In a very favourable embodiment of the lock according to the invention, the length of the lock pin between the disc-shaped boss and the second lock member only slightly exceeds the thickness of a disc, while the second lock member has a conically shaped surface on the side of the opening to the locking groove, of which the cone angle is preferably 5-20°.

In this embodiment, in which the first and the second lock member are positioned close to the disc in the closed configuration due to the short length of the locking pin, it is difficult to reach the lock pin with breaking tools, so that the lock pin is effectively secured. On the other hand, it is virtually impossible, due to the conical surface of the second lock member which is close to the disc, usually at its accessible side, to drive a wedge between the second lock member and the disc, as the conical surface causes the tool to slip away to the outside. Thus, surprisingly, an extremely effective protection against breaking of the lock is achieved by way of a relatively simple intervention.

The invention will now be further explained with reference to the drawings, in which exemplary embodiments of the lock according to the invention are represented.

Fig. 1 shows a side view of a first embodiment of the lock members constituting the lock according to the invention;

Fig. 2 is a section of one of the lock members according to the line II-II in Fig. 1, with at some distance of the lock member the elements to be received therein;

Fig. 3 is a longitudinal section according to a face parallel to the face of the drawing of the other lock housing of Fig. 1, with the elements received therein;

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Fig. 4 is a first view of a closing sleeve, and

Fig. 5 is a view of the closing sleeve according to V in Fig. 4.

Fig. 6 is a perspective view of a motorcycle with a second embodiment of the lock according to the invention in the form of a disc brake lock.

Fig. 7 is an enlarged longitudinal section of the lock of Fig. 6, in which the lock members are shown separate from a disc brake, on both sides thereof.

Fig. 8 is a small-scale front view of the disc brake with the lock locked thereto.

In the different embodiments, similar elements are indicated by the same reference numerals.

The lock according to the invention consists of a first lock member 1 with a projecting lock pin 2 and a second lock member 3 with a locking groove for receiving the lock pin 2, which will be discussed in more detail hereinafter. On comparison of Fig. 1 and 2, it becomes apparent that the first lock member 1 mainly consists of a massive square block made of hardened steel, in one side of which a recess 4 is formed for receiving the lock pin 2. The lock pin 2 and the recess 4 have cooperating grooves 5, 6 for receiving a securing ring 7. Once the lock pin 2 is secured in the recess 4 by means of the securing ring 7, it can no longer be removed from the recess 4 of the lock member 1. If, however, the recess 4, the lock pin and the securing ring 7 are cylindrically shaped, the lock pin 2 can still rotate within the recess 4.

On its opposite side, the lock member 1 has a recess 8 for receiving the end link 9 of a chain or the like (represented by a dotted line in fig. 2), which, once placed in the recess 4, can be secured therein by means of a securing pin 10 which can pass through the recess 8 and the end link 9 placed therein via a transverse duct 11. This securing pin 10 can be locked irremovably in the lock member 1 by means of a securing ring 12.

The lock member 1 may of course also be attached to other elements than a chain comprising links. For example, cables, bars or other constructive parts are conceivable.

On comparison of Fig. 1 and Fig. 3, it becomes clear that the second lock member 3 comprises a main duct 13 with a

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shoulder 14 formed therein.

The wall of the part of the main duct 13 which is situated above the shoulder 14 is threaded, allowing a lock cylinder 15, represented in Fig. 3, to be screwed thereinto.

5 Once placed, this lock cylinder 15 can be fixed by means of glue or mechanical locking means.

The part of the main duct 13 which is situated below the shoulder 14, contains a closing sleeve 16, preferably made of a strong and ductile type of aluminium, which, as Fig. 4
10 shows most clearly, comprises a connecting groove 17 in the upper side thereof. An operating pin 18 of the lock cylinder 15 engages into this connecting groove 17. When the lock cylinder is operated with a key (not represented), the operating pin 18 is rotated on the longitudinal axis of the
15 lock cylinder 15, as a result of which the closing sleeve 16 can also be rotated in the respective part of the main duct 13.

The closing sleeve 16 is retained in the respective part of the main duct 13 by a retaining plate 19, which is
20 locked irremovably by means of a securing ring 20 in the same way as described hereinbefore. This means that, once placed, the closing sleeve 16 cannot be removed from the main duct 13.

The closing sleeve 16 is accessible from the front side of the second lock member 3 via a transverse duct 21.
25 This transverse duct 21 has a diameter which substantially corresponds to the diameter of the lock pin 2.

As Fig. 2 clearly shows, the lock pin 2 has a constricted neck 22 and a thickened head 23 connected thereto. The thus formed lock pin 2 has to cooperate through its head
30 23 and neck 22 with a locking groove formed in the closing sleeve 16. As Fig. 4 and 5 show, this locking groove mainly consists of a cavity 24 formed in the closing sleeve 16 for receiving the thickened head 23. The cavity communicates with the environment via an opening 25 situated at a certain
35 circumferential position of the closing sleeve 16. This opening 25 is just large enough to place the head 23 of the lock pin 2 in the cavity 24 or to remove it therefrom. A narrowed duct 26 is connected to the opening 25 in the direction of rotation of the closing sleeve 16, the diameter
40 of which is large enough to let the constricted neck 22 of the



lock pin 2 pass.

Fig. 3 further shows that the lock member 3 has a recess 27 on its back side, in which a securing pin 28 is placed. The design and the operation of this recess 27 and
5 securing pin 28 correspond to those of the recess 8 and the securing pin 10 in the first lock member 1.

When the lock pin 2 is locked in the first lock member 1 in the way described hereinbefore and all the elements mentioned have been placed in the lock member 3, the
10 lock members 1 and 3 can be attached to each other in order to close the lock. To this end, the closing sleeve 16 is rotated by means of the lock cylinder 15 to a position, in which the opening 25 communicates with the transverse duct 21. Subsequently, the head 23 of the lock pin 2 is placed in the
15 internal cavity 24 of the closing sleeve 16 via the transverse duct 21 and the opening 25. By subsequently rotating the closing sleeve 16, by means of the lock cylinder 15, to a position, in which the narrowed duct 26 communicates with the transverse duct 21, the head 23 of the lock pin 2 is retained
20 in the cavity 24, thus locking both lock members 1 and 3 to each other. Due to the close fit of the closing sleeve 16 in the main duct 13 in the second lock member 3, it is not possible to force the lock pin 2 from the closing sleeve 16.

The screwing direction for unscrewing the lock
25 cylinder 15 from the main duct 13 is opposite to the direction of rotation of the closing sleeve 16 from the position in which the lock pin is retained (in which the narrowed duct 26 communicates with the transverse duct 21) to the position in which the lock pin 2 is released (in which the opening 25
30 communicates with the transverse duct 21). Therefore, when attempts are made to unscrew the lock cylinder 15 in an unauthorized way from the lock member 3, the closing sleeve 16 will be held in the locking position. The unauthorized opening of the lock is thus prevented.

35 In the embodiment shown, the lock pin is rotationally symmetrical on its longitudinal axis, so that, in the locked position, both lock members 1 and 3 can rotate on this axis in relation to each other. This allows a great freedom of movement when the lock is applied to the ends of chains. This
40 also prevents one possibility of forcing the lock. This Sheet Has Been Replaced



In the locked position, all operative elements of the lock are situated within the lock members 1 and 3, so that these are protected against unintended opening. In addition, these elements are hardly affected by weather influences.

- 5 It is possible that, at the site of the faces 29 and 30 of the lock members 1 and 3, respectively, which are to be placed against each other, cooperating rims (grooves and projections) are provided to overlap the joint. This prevents breaking tools from being forced between both lock members.
- 10 These cooperating rims may, of course, also be symmetrical in rotation, whereby the relative freedom of rotation of the lock members can be maintained.

- When the lock members are attached to the ends of chains, they do not constitute separate elements, as opposed
- 15 to the known locks. The lock may be supplied as an assembly, consisting of chains and lock members attached thereto, but it is also possible to supply the lock members separately and to attach these to a chain later. Another possibility is to attach the lock members to other constructive elements.

- 20 The drawings do not show that it is possible to provide the cavity 24 in the closing sleeve 16 with a cup oriented towards the narrowed duct 26, whereby a tensile force exerted on the lock pin 2 leads to the centring of the head 23 in the cup, so that any unintended rotation of the closing
- 25 sleeve 16 in the direction of the releasing position of the lock pin 2 is prevented.

- Fig. 6 and 7 show a second embodiment of the lock according to the invention in the form of a so-called disc brake lock for securing motors, motorcycles or other vehicles
- 30 equipped with one or more disc brakes. As Fig. 6 shows, the lock consisting of the lock members 1 and 3 is irremovably mounted on the disc brake, so that it is impossible to drive off in the vehicle, as the lock strikes against the brake claw, a front leg or other adjacent elements. As Fig. 6 and,
- 35 in particular, Fig. 7 show, the short straight lock pin 2 of the first lock member 1 is put through an existing hole B in or internally of the disc A of the disc brake and is subsequently locked by the second lock member 3, as a result of which the lock can no longer be removed from the disc A.

- 4 ~~Fig. 7 shows that, in this case, the lock member 1~~

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comprises a disc-shaped boss which is formed at the end of the projecting lock pin 2 opposite of the head 23, and which is integrally associated with the lock pin 2. The disc-shaped boss may be formed eccentrically or may be cut off on one side
5 in order to allow the lock to be placed very close to the hub of the wheel.

The second lock member 3 comprises a main duct 13, which, in this case, is formed as a blind hole, which is defined at the blind end by a wall 31 of the second lock
10 member 3. The lock cylinder 15 is placed adjacent to the wall 31 and the closing sleeve 16 is placed in line therewith. The lock cylinder 15 and the closing sleeve 16 are introduced from the open end of the main duct 13. A passage 32 with a smaller diameter than that of the main duct is provided in the wall 31
15 for allowing the introduction of a key 41 for operating the lock cylinder 15. The lock cylinder 15 is locked in the main duct 13 by means of a securing pin 33 which extends with a tight fit through a hole 34 perpendicular to the main duct 13 into a transverse bore 35 in the lock cylinder 15.

The open end of the main duct 13 is closed with a plug 36 which, in this case, is also secured with a securing pin 37 which extends with a tight fit through a hole 38 and a transverse bore 39 in the plug 36, the hole 38 and thus the securing pin 37 extending as far as the other side of the plug
25 36. Both holes 34 and 38 for the securing pins 33 and 37 open onto the face 30 on the end face of the lock member 3, onto which the transverse duct 21 for the lock pin 2 opens as well. This surface 30 is oriented towards the disc brake A when the lock is placed thereon, so that unauthorized persons cannot
30 reach the securing pins 33 and 37.

The lock pin 2 and the closing sleeve 16 of this embodiment are comparable to those of the first embodiment according to Fig. 1-5, so that it is not necessary to discuss these again here, as it suffices to refer to the foregoing.

An important advantage of the lock according to the invention is that the length of the lock pin 2 between the lock members 1 and 3 is not much greater than the thickness of the disc A of the disc brake, so that it is virtually impossible to reach the lock pin with a tool, as a result of
40 which this lock pin 2 is very well protected against attacks

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from outside. Of course, not all discs have the same thickness, so that with some discs A there will be a greater clearance than with others. Another special feature is that the transverse duct 21 for the lock pin 2 is provided
5 eccentrically in the second lock member 3, that is, diametrically opposed to the passage 32, as a result of which the lock will hang with the passage 32 oriented downwards after its application to the disc A, so that rainwater cannot enter the lock cylinder.

10 A special feature of the second lock member 3 is that the surface 30 on the end face of the cylindric lock member 3 has a conical shape of which the central axis 40 is parallel to the transverse duct 21, and thus perpendicular to the disc brake A in the mounted position. The cone angle of the conical
15 surface can be small and will be 5-20° in practice, 10° in the case represented. This conical shape causes a tool, such as a wedge or a chisel, when it is placed between the surface of the disc A and the surface 30 of the second lock member 2, in order to wedge the lock apart, to slip away sideways, which
20 makes it impossible to exert a great wedge force on the lock. The slot between the surface 30 and the disc A is also wedge-shaped, which also reduces the magnitude of the wedge force that can be exerted.

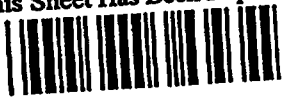
It will be understood from the foregoing that this
25 disc brake lock does not only fit the discs of disc brakes provided with holes, but also offers a very high resistance to forcing, since it is virtually impossible to attack the lock.

The invention is not limited to the embodiments described in the foregoing, which can be varied in many ways
30 within the scope of the invention as defined by the claims.

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CLAIMS

1. Lock, comprising a first lock member with a projecting lock pin, and a second lock member with a locking groove for receiving the lock pin, which locking groove, being rotatable between a position in which the lock pin is retained and a position in which it is released, is connected to a lock cylinder which is locked in the second lock member and which is operable with a key, the lock pin having a thickened head connected to a constricted neck, while the locking groove consists of a cavity formed in a closing sleeve for receiving the head, which cavity communicates with the environment through an opening for letting through the head and a narrowed duct for receiving the neck of the lock pin, connected thereto in the direction of rotation of the closing sleeve.

2. Lock according to claim 1, in which the locking groove is formed in a closing sleeve, which is connected to the lock cylinder and closely fitted into a duct formed in the second lock member.

3. Lock according to any of the preceding claims, in which the lock members comprise rims overlapping their common interface in their joined position.

4. Lock according to any of the preceding claims, in which the lock cylinder is screwed into the second lock member and the screwing direction for unscrewing the lock cylinder from the second lock member is opposite to the direction of rotation of the locking groove from the position in which the lock pin is retained to the position in which it is released.

5. Lock according to any of the claims 1-3, in which the lock cylinder and the closing sleeve are inserted into the duct formed as a blind hole, while a passage of a smaller diameter for introducing a key into the lock cylinder is formed in a wall of the second lock member, in line with the blind end of the hole, and the open end of the hole is closed with a plug.

6. Lock according to claim 5, in which a casing of the lock cylinder and/or the plug is secured with a securing pin introduced substantially at right angles thereto.

7. Lock according to claim 6, in which the securing



pin for the plug is fitted into a blind hole that extends into the second lock member on both sides of the plug.

8. Lock according to claim 7, in which the blind hole for the securing pins opens onto the same side as a transverse
5 duct for the lock pin.

9. Lock according to any of the preceding claims, in which the lock is formed as a disc brake lock for a vehicle fitted with a disc brake, in particular a motorcycle, in which the first lock member is formed as a disc-shaped boss at the
10 end of the lock pin which is opposite to the head, and the second lock member is formed as a lock housing.

10. Lock according to claim 9, in which the second lock member has a conically shaped surface at the side of the transverse duct for the lock pin, of which the cone angle is
15 preferably 5-20°.

11. Lock according to any of the preceding claims, of which the lock members comprise recesses in which the end links of chains can be placed and fastened, and lock pins extending through the recesses and retaining the end links.

12. Assembly, consisting of a chain and a lock
20 according to any of the preceding claims.

13. Disc brake lock for a vehicle fitted with a disc brake, in particular a motorcycle, comprising a first lock member with a projecting lock pin which can be led through an
25 existing hole in the disc of the disc brake, which lock pin can be retained by means of a second lock member fitted with a locking part, in such a way that this is closed off at both ends, the lock pin being substantially straight and provided at one end with a fixed disc-shaped boss as a first lock
30 member and at the other end with a head for cooperation with the locking part of the second lock member.

14. Lock according to claim 13, in which, in the closed configuration of the lock, the length of the lock pin between the disc-shaped boss and the second lock member only
35 slightly exceeds the thickness of a disc.

15. Lock according to claim 14, in which the second lock is provided with a locking groove for receiving the head of a lock pin, the locking groove opening onto an end face of the second lock member.

40 16. Lock according to claim 15, in which the end face





of the preferably cylindrical second lock member has a conically shaped surface, of which the cone angle is preferably 5-20°.

17. Lock comprising a first lock member with a projecting lock pin and a second lock member with a lock cylinder which is operable with a key, and a closing sleeve connected thereto for cooperation with the lock pin which is introduced through an opening extending substantially at right angles thereto, while the lock cylinder and the closing sleeve are locked one behind the other in a main duct in the second lock member, the main duct in the second lock member being a blind hole, while a passage of a smaller diameter for introducing a key into the lock cylinder is formed in a wall of the second lock member, in line with the hole at the blind side, and the open end of the hole is closed with a plug.

18. Lock according to claim 17, in which a casing of the lock cylinder and/or the plug is secured with a securing pin, which is introduced substantially at right angles thereto.

19. Lock according to claim 18, in which the securing pin for the plug is fitted into a blind hole which extends into the second lock member on both sides of the plug .

20. Lock according to claim 19, in which the blind hole for the securing pins opens onto the same side as a transverse duct for the lock pin.

21. Lock, comprising a first lock member with a projecting lock pin, and a second lock member with a locking groove for receiving the lock pin, which locking groove, being rotatable between a position in which it is retained and a position in which the lock pin is released, is connected to a lock cylinder which is locked in the second lock member and which is operable with a key, the locking groove being formed in a closing sleeve, which is connected to the lock cylinder and closely fitted into a duct formed in the second lock member.

22. Lock, consisting of a first lock housing with a projecting lock pin, and a second lock housing with a locking groove for receiving a lock pin, which locking groove, being rotatable between a position in which the lock pin is retained and a position in which it is released, is connected to a lock



cylinder which is screwed into the second lock housing and which is operable with a key, the screwing direction for unscrewing the lock cylinder from the second lock housing being opposite to the direction of rotation of the locking
5 groove from the position in which the lock pin is retained to the position in which it is released.

