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A gate lock for locking a gate bar

The present invention relates to a gate lock for locking a gate bar, comprising a generally U-shaped body including a bar and
5 having spaced-apart first and second legs provided with holes in which a bolt-like shackle is slideably engaged, the shackle having a locking end which is lockable by a key-operated lock mechanism which is arranged within the first one of the legs, the U-shaped body and the shackle defining a locking recess for
10 the gate bar to be locked, and the bar being divided into two bar members slideably connected via a splined connection.

Generally, a gate lock comprising two bar members is known, wherein one of the bar members includes a protrusion with a
15 rectangular cross-section, and the other of the bar members includes a rectangular recess to be engaged with the protrusion of the one bar member. Both bar members are connected to each other by means of screws in the section of the protrusion-recess-engagement, wherein the screws are covered by a special
20 cover which is removable with a special tool only. However, in spite of the presence of the special cover, a relatively easy access toward the screws for connecting the both bar members is possible. If the screws are released, the gate lock may be opened, although the shackle is locked with the key-operated
25 lock mechanism. Namely, in this case, the bar members can be disengaged by displacing along the end of the shackle opposite to its locking end so that the gate lock may be easily opened by an unauthorized person.

30 Another prior art gate lock comprises a divided bar member, wherein the one bar member has a protruded locking pin including a lateral locking recess, and the other bar member has a recess for receiving the locking pin of the one bar member, and a screw for engaging into the lateral locking
35 recess of the locking pin so that the both bar member are engaged. The access toward the screw is provided by a hole formed in the one bar member, and a hole formed in the shackle to be aligned with the hole in the bar member so that the

access toward the screw is more difficult. However, it is a problem that the both bar members have to be engaged by means of this mechanism, since otherwise the bar members can be disengaged even though the shackle is locked with the key-operated lock mechanism. Therefore, the correct locking of the gate lock is dependent on the operator's reliability so that no sufficient security by the technical construction is guaranteed.

10 An object of the present invention is to provide a gate lock for locking a gate bar, which may be easily closed and locked by an operator and which may not be easily opened by an unauthorized person so that a high security is achieved.

15 According to the present invention this is achieved by a gate lock for locking a gate bar, comprising a generally U-shaped body including a bar and having spaced-apart first and second legs provided with holes in which a bolt-like shackle is slideably engaged, the shackle having a locking end which is
20 lockable by a key-operated lock mechanism which is arranged within the first one of the legs, the U-shaped body and the shackle defining a locking recess for the gate bar to be locked, the bar being divided into two bar members slideably connected via a splined connection, wherein the splined
25 connection is a swallow-tail-shaped slide which has its longitudinal direction running transverse to the shackle.

By forming the swallow-tail-shaped slide which has its longitudinal direction running transverse to the shackle it is possible to easily engage the both bar members by slideably
30 displacing the bar members along the swallow-tail-shaped slide so that no screws are required to connect the bar members before locking the shackle with the key-operated lock mechanism. This allows the operator to comfortably engage and
35 lock the bar members of the gate lock by a simple movement of the bar members relative to each other and by a simple displacing of the shackle toward the key-operated lock mechanism into its locking position, respectively.

Both bar members must inevitably be engaged by the swallow-tail-shaped slide before locking the gate lock by means of the shackle into the key-operated lock mechanism. In the locked state of the gate lock, the swallow-tail-shaped slide may not
5 be released by any special tools, and defines a secure and reliable positive locking so that the bar members may not be disengaged by displacing the bar members along the end of the shackle opposite to its locking end even though the shackle is locked. Therefore, a high security against an unintended
10 releasing of the gate lock is ensured.

Otherwise, when releasing the gate lock, the operator need only actuate the key-operated lock mechanism to release the shackle and displace the same out of the key-operated lock mechanism,
15 and disengage the swallow-tail-shaped slide by displacing the bar members along this slide. Therefore, the gate lock can be easily and comfortably opened by the authorized operator.

According to a preferred embodiment of the present invention,
20 the swallow-tail-shaped slide has a trapeziodal cross-section. Such a slide allows a slight guiding of the bar members, since it has a minor number of guiding surfaces to secure a reduced friction. Additionally, the trapeziodal cross-section of the slide can be easily manufactured with low costs.

25 Further, the swallow-tail-shaped slide can have a T-shaped cross-section so that a precise and defined guiding for the bar members can be achieved by forming a higher number of guiding surfaces. The slide according to this embodiment allows a
30 secure and reliable positive locking between the bar members.

Preferably, a bolt having a head and a shaft is inserted into a hole of one of the bar members to engage with a corresponding hole of the other of the bar members in parallel to the shackle
35 for locking the slide. Therefore, an additional securing of the slide is achieved, when the bar members are engaged to each other by displacing along the slide. The bolt can have an easy access from the outside of the gate lock or can be covered by a

corresponding cover. Moreover, the shaft of the bolt can be engaged with the hole of the other of the bar members before or after locking the shackle with the key-operated lock mechanism, since the bar members are already in positive locking by the
5 swallow-tail-shaped slide.

The bolt can be biased by a spring which is wound around the shaft and supported against the head in a direction for disengaging the bolt out of the hole, and can be pressed into
10 engagement with the hole by a pressing member which is releasably arranged in the U-shaped body. Therefore, the bolt is easily actuable by the pressing member, since the bolt is biased by the spring. This allows a securely and slightly reverse movement of the bolt when releasing from the hole of
15 the other of the bar members by the spring force.

According to another embodiment of the present invention, the head of the bolt is conically formed, and the pressing member is a screw in a screw hole formed in the second one of the legs
20 of the body to extend in a direction transverse to the bolt. By such a forming and arrangement of the head of the bolt and of the pressing member it is possible to arrange the screw in a section which is not used for other important functions of the gate lock and which is difficultly accessible for an
25 unauthorized person, for example in a section such as the longitudinal extension of the second leg of the U-shaped body of the gate lock. Moreover, the conical form of the head of the bolt allows a reduced running way for the screw to move the bolt between its engaging and disengaging position relative to
30 the bar members.

If the screw is an Allen screw actuated by an Allen key through the screw hole, such an Allen screw can be arranged within the bar member in which the bolt is received so that the screw does
35 not protrude from the bar member. The Allen screw can be arranged such that it is not visible from the outside and it is difficultly accessible for an unauthorized person.

For more difficult access to the pressing element such as a screw by an unauthorized person, a through hole can be formed in the locking end of the shackle in a direction transverse to the shackle to be aligned with the screw hole when the shackle is disengaged from the first one of the legs into a predetermined position. In this embodiment, if the shackle is locked with the key-operated lock mechanism, no access toward the screw is possible. To access the screw, the shackle has to be disengaged from the key-operated lock mechanism into a predetermined position and aligned with the screw hole so that the key can be inserted into the screw hole through the through hole of the shackle, and the screw can be actuated to engage and release the bolt with and from the hole of the bar member to be engaged and disengaged, respectively.

According to a further embodiment of the present invention, one of the legs includes a projection extending toward the other leg to be aligned with the shackle. This allows the gate bar to be more tightly abut on the limiting surfaces of locking recess defined by the U-shaped body and the shackle, wherein a more precisely guiding of the gate lock relative to the gate bar during the locking operation is achieved. Since the projection is aligned with the shackle, a more precise guiding of the shackle into the hole of the leg of the one bar member is achieved during the locking operation.

It is noted that the projection extending toward the other leg to be aligned with the shackle can be extend up to the other leg so that the projection contacts the surface of the other leg when the gate lock is completely locked.

The invention is further described by way of preferred embodiments as disclosed in the drawings.

Fig. 1 is a perspective explosive view of a gate lock according to a preferred embodiment of the present invention;

Fig. 2 is a cross-sectional view of the gate lock of fig. 1, in

which the slide is engaged only;

Fig. 3 is a cross-sectional view of the gate lock of fig. 1, in which the gate lock is completely locked;

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Fig. 4 is a side view of the gate lock of fig. 3; and

Fig. 5 is a perspective explosive view of a gate lock according to another embodiment of the present invention.

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With reference to fig. 1, according to a preferred embodiment of the present invention, the gate lock comprises a U-shaped body divided into two bar members 1 and 2 having first and second legs 3 and 4 which are provided with holes 5 and 6 in which a bolt-like shackle 7 is slideably engaged. The shackle 7 has a locking end 8 which is lockable by a key-operated lock mechanism 9 in form of a cylinder lock which is arranged within the first leg 3 and which is not described in further detail.

20 The U-shaped body and the shackle 7 define a locking recess 10 for receiving a gate bar (not shown) to be locked by means of the gate lock. The bar members 1 and 2 are slideably connected via a swallow-tail slide 11 having a trapezoidal cross-section and having its longitudinal direction running transverse to the shackle 7.

The bar member 2 is provided with a hole 12 in parallel to the shackle 7 and in the center of the swallow-tail slide 11. A bolt 13 having a conically formed head 14 and a shaft 15 is inserted into the hole 12 of the one bar member 2 to engage with a corresponding hole 16 of the other bar member 3 for locking the swallow-tail slide 11, wherein the bolt 13 is biased by a coil spring 17 which is wound around the shaft 15 of the bolt 13 and supported against the head 14 of the bolt 13 in a direction for disengaging the bolt 13 out of the hole 16.

The second leg 4 of the bar member 2 is provided with a longitudinal screw hole 18 extending in a direction transverse

to the bolt 13 and being provided with an Allen screw 19 which is able to press the bolt 13 by contacting the conical surface of the head 14 of the bolt 13 into engagement with the hole 16 of the bar member 1. The Allen screw 19 is actuated by an Allen
5 key 20 which is inserted through the screw hole 18 and a through hole 21 formed in the locking end 8 of the shackle 7 in a direction transverse to the shackle 7 and being aligned with the screw hole 18 when the shackle 7 is disengaged from the first leg 3 of the bar member 1 into a predetermined position.

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Further, the first leg 3 of the bar member 1 includes a projection 22 extending toward the second leg 4 of the bar member 2 to be aligned with the shackle 7. The projection 22 allows the gate bar to more tightly abut on the limiting
15 surfaces of locking recess 10 defined by the U-shaped body and the shackle 7, wherein a more precisely guiding of the gate lock relative to the gate bar during the locking operation is achieved.

20 Next, the operation of the gate lock according to the invention is explained.

As shown in fig. 2, the bolt 13 is disengaged from the hole 16 of the bar member 1 by releasing the Allen screw 19, and the
25 shackle 7 is disengaged from the lock mechanism 9 by actuating a key 23 thereof. In this state, the swallow-tail slide 11 of the bar members 1 and 2 is engaged, and the gate bar (not shown) is received within the locking recess 10. The shackle 7 is in its predetermined position in which the through hole 21
30 is aligned with the screw hole 18 so that the Allen key 20 can be inserted into the screw hole 18 through the through hole 21 of the shackle 7 to actuate the Allen screw 19 for sliding along the conical surface of the head 14 of the bolt 13.

35 As shown in figs. 3 and 4, the gate lock is completely locked, i.e. the swallow-tail slide 11 of the bar members 1 and 2 is engaged, the bolt 13 is engaged with the hole 16 of the bar member 1 by advancing the Allen screw 19 along the conical

surface of the head 14 of the bolt 13 in direction of its top by means of the Allen key 20 (fig. 2), and the shackle 7 is engaged with the lock mechanism 9 by actuating the key 23 (fig. 2) thereof. In this state, the screw hole 18 of the second leg
5 4 of the bar member 2 is blocked by the shackle 7 so that no engagement with the Allen screw 19 is possible. Since no access toward the Allen screw 19 from the outside is provided, the gate lock is secured against a manipulation by unauthorized persons.

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Fig. 5 shows a gate lock according to another embodiment of the present invention. In this embodiment, the bar-members 1 and 2 are connected via a swallow-tail slide 11' having a T-shaped cross-section. The slide 11' according to this embodiment
15 allows a securely and reliably positive locking between the bar members 1 and 2.

Claims:

1. A gate lock for locking a gate bar, comprising a generally U-shaped body including a bar and having spaced-apart
5 first and second legs provided with holes in which a bolt-like shackle is slideably engaged, the shackle having a locking end which is lockable by a key-operated lock mechanism which is arranged within the first one of the legs, the U-shaped body and the shackle defining a locking recess for the gate bar to
10 be locked, the bar being divided into two bar members slideably connected via a splined connection, wherein the splined connection is a swallow-tail-shaped slide which has its longitudinal direction running transverse to the shackle.
- 15 2. The gate lock according to claim 1, wherein the swallow-tail-shaped slide has a trapeziodal cross-section.
3. The gate lock according to claim 1, wherein the swallow-tail-shaped slide has a T-shaped cross-section.
- 20 4. The gate lock according to any of claims 1 to 3, wherein a bolt having a head and a shaft is inserted into a hole of one of the bar members to engage with a corresponding hole of the other of the bar members in parallel to the shackle
25 for locking the slide.
5. The gate lock according to claim 4, wherein the bolt is biased by a spring which is wound around the shaft and supported against the head in a direction for disengaging the
30 bolt out of the hole, and is pressed into engagement with the hole by a pressing member which is releasably arranged in the U-shaped body.
6. The gate lock according to claim 5, wherein the head of
35 the bolt is conically formed, and the pressing member is a screw in a screw hole formed in the second one of the legs of the body to extend in a direction transverse to the bolt.



7. The gate lock according to claim 6, wherein the screw is an Allen screw actuated by an Allen key through the screw hole.

5 8. The gate lock according to claim 7, wherein a through hole is formed in the locking end of the shackle in a direction transverse to the shackle to be aligned with the screw hole when the shackle is disengaged from the first one of the legs into a predetermined position.

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9. The gate lock according to any of claims 1 to 8, wherein one of the legs includes a projection extending toward the other leg to be aligned with the shackle.

