

A LOCK ASSEMBLY

TECHNICAL FIELD

This invention relates generally to a lock assembly.

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Background

A typically employed lock assembly employs a non-tumbler mechanism based lock incorporated with doors or lids to a cabinet or other containment structures. As the non-tumbler mechanism can be easily operated using improvised tools, an aperture formed in the door for access to the lock assembly is blocked using a tumbler-based grub lock. After latching of the lock assembly, the aperture in the door receives the grub lock which is secured in place using a key with a corresponding cut structure. Unlocking of the lock assembly will require unlocking and removing of the grub lock from the aperture before the lock assembly can be accessed through the aperture. This makes operating of the lock assembly cumbersome and un-efficacious. Further, such grub structures are also known to be easily tempered with. Therefore, there exists a need for a lock assembly.

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Summary

In accordance with a first aspect of the invention, there is disclosed a lock assembly comprising a first lock couplable to a case defining an opening and a second lock couplable to a door comprising a strike structure. The first lock comprises a latch, a first shell disposed adjacent the opening of the case and a first plug accommodated by the first shell and configured with the latch for displacing the latch between a lock position and an unlock position, the first plug defining a first joint portion. The door is movably coupled to the case for positioning between a closed position, for substantially covering the opening of the case and positioning the strike structure for engagement with the latch, and an open position for being displaced away from the opening of the case, the second lock comprising a second shell, a second joint portion and a second plug being operable by a key for displacing the second joint portion. Wherein when the door is positioned from the open to the closed position, the first lock and the second lock are inter-disposed for engaging the first joint

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portion with the second joint portion such that displacing the second joint portion will displace the first joint portion to thereby displace the latch from the unlock to the lock position to engage with the strike structure to consequently lock the door in the closed position.

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In accordance with a second aspect of the invention, there is disclosed a display case system comprising a case defining an opening and for receiving at least one article to be displayed, a door comprising a strike structure and being movably coupled to the case for positioning between an open position and a closed position, a first lock coupled to the case, and a
10 second lock couplable to the door. The first lock comprises a latch, a first shell disposed adjacent the opening of the case and a first plug accommodated by the first shell and configured with the latch for displacing the latch between a lock position and an unlock position, the first plug defining a first joint portion. The door is for substantially covering the opening of the case and positioning the strike structure for engagement with the latch in
15 the closed position, and for being displaced away from the opening of the case in the open position. The second lock comprises a second shell, a second joint portion and a second plug being operable by a key for displacing the second joint portion. Wherein when the door is positioned from the open to the closed position, the first lock and the second lock are inter-disposed for engaging the first joint portion with the second joint portion such that
20 displacing the second joint portion will displace the first joint portion to thereby displace the latch from the unlock to the lock position to engage with the strike structure to consequently lock the door in the closed position.

Brief Description of the Drawings

FIG. 1 shows a front partial perspective view of a lock assembly according to an aspect of the invention with a first lock being coupled to a second lock;

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FIG. 2 shows a front partial perspective view of the lock assembly of FIG. 1 with the first lock being decoupled from the second lock;

FIG. 3 shows a partial side sectional view of a display case system according to an aspect of the invention utilizing the lock assembly of FIG. 1; and

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FIG. 4 shows a displacement diagram according to an end view of the lock assembly of FIG. 1.

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Detailed Description

An exemplary embodiment of the present invention, a lock assembly 20, is described hereinafter with reference to FIG. 1 to FIG. 4. The lock assembly 20 comprises a first lock 22 couplable to a case 24 defining an opening 26. The first lock 22 comprises a pair of latches 28, a first shell 30 disposed adjacent the opening 26 of the case 24 and a first plug 32 accommodated by the first shell 30 and configured with the latch 28 for displacing the latch 28 between a lock position and an unlock position. The first plug 32 defines a first joint portion 34.

A second lock 36 couples to a door 38 comprising a pair of strike structures 40. The door 38 is movably coupled to the case 24 for positioning between an open position and a closed position. The door 38 is for substantially covering the opening 26 of the case 24 and positioning the pair of strike structures 40 for engagement with the pair of latches 28 in the closed position and for being displaced away from the opening 26 of the case 24 in the open position. The second lock 36 comprises a second shell 42, a second joint portion 44 and a second plug being operable by a key 48 for displacing the second joint portion 44.

The case 24 is for containing at least one article to be displayed therein with the door 28 for enabling and restricting access though the opening 26 when in the open position and the closed position respectively. Although a pair of the latches 28 is described, a single latch 28 or more than two latches 28 may be employed in the same manner as described hereinafter. Similarly, the quantity of the strike structures 40 employed will preferably correspond with the quantity of the latches 28 employed.

Hence, when the door 38 is positioned from the open position to the closed position, the first lock 22 and the second lock 36 are inter-disposed for engaging the first joint portion 34 with the second joint portion 44 such that displacing the second joint portion 44 will also displace the first joint portion 34 to thereby displace the pair of latches 28 from the unlock position to the lock position to engage with the strike structure 40 to consequently lock the door 38 in the closed position.

Preferably, each of the first joint portion 34 and the second joint portion 44 is shaped and dimensioned to enable structural nesting of the first joint portion 34 with the second joint portion 44. There are various ways to achieve this but it is preferred that the first joint portion 34 be shaped as a protrusion 48 with the second joint portion 44 being a receptacle 50 for receiving the protrusion 48 therethrough. Preferably, the protrusion 48 comprising a plurality of fingers and the receptacle 50 comprises a plurality of inwardly extending steps for nestling between the plurality of fingers when the plurality of fingers are received within the receptacle 50. Alternatively, each of the first joint portion 34 and the second joint portion 44 defines a fork or a ring of fingers with the ring of fingers of the first joint portion 34 nestling with the ring of fingers of the second joint portion 44 to form a joint akin to a universal joint.

Preferably, at least the case 24, the door 38, the first lock 22 and the second lock 36 constitute a display case system 56 for accommodating, substantially securing and make visible the abovementioned article to be displayed, for example, in an exhibition or museum. Hence, authorized access to the article requires the door 38 to be movable between the open position and the closed position. As such, the door 38 is movably coupled to the case 24 through the use of hinges, sliding tracks, linkages or the like mechanisms. In various implementations, the mechanisms employed may require the door 38 to travel along an arcuate path 58 when moving between the closed position and the open position.

It must be noted that the first shell 30 and the first joint portion 34 is rotatably displaced about a first axis 60 defined by the first lock 22, while the second shell 42 and the second joint portion 44 is rotatably displaced substantially about a second axis 62 defined by the second lock 36. Hence, in order for the first joint portion 34 to function with the second joint portion 44 to be rotatably displaced in tandem, the first axis 60 has to be aligned with the second axis 62 when inter-coupled. As the protrusion 48 is received and nested within the receptacle 50, it is naturally required that the first axis 60 be aligned with the second axis 62 before the protrusion 48 is received by the receptacle 50. This requirement becomes an

issue with the arcuate path 58 as the first axis 60 is angularly displaced from the second axis 62 when the door 38 is in the open position all the way till just before the door 38 is in the closed position.

5 As such, the arcuate path 58 may prevent the insertion, or proper insertion, of the protrusion 48 into the receptacle 50. Hence, it is preferred that at least one of the protrusion 48 and the receptacle 50 is tapered for enabling insertion of the protrusion 48 into the receptacle 50 and engagement therebetween when the door 38 moves along the arcuate path 58. Specifically,
 10 it is preferred that the protrusion 48, or at least part thereof, tapers away from the first shell 30 while the receptacle 50, or at least part thereof, tapers towards the second shell 42. Alternatively or in addition to the protrusion 48 and the receptacle 50 being tapered, the protrusion 48 may be tapered at a free end thereof to facilitate seating of the protrusion 48 into the receptacle 50.

15 Preferably, the pair of latches 28 is a pair of elongated rods extending from the first shell 30 away from each other. The pair of elongated rods extends from and retract into the first shell 30 when displaced between the lock position and the unlock position respectively. Further, each of the pair of strike structure 40 defines an aperture wherethrough the corresponding one of the pair of latches 28 passages when the door 38 is in the closed
 20 position and the pair of latches 28 are in the locked position. The aperture may be formed, for example, by defining a hole or a slot in a plate or bracket structure that attaches to the case 24 proximal the opening thereof. Alternatively, each of the pair of strike structure 40 is a loop-shaped structure formed, for example, by bending a short rod segment into a U-shape.

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Preferably, at least a portion of the first lock 22 is disc tumbler lock or the like Abloy-type lock. Preferably, the first plug 32 drives the pair of latches 28 directly for displacing them between the lock and unlock positions. However, if the angular rotational range of the first lock 22 does not meet the angular rotational range of the second lock 36, this may lead to
 30 the under rotation or over rotation of the first plug 32 when driven by the second plug via

the first joint portion 34 and the second joint portion 44. In such instances, it is preferred that the pair of latches 28 be coupled to and driven by a crank 64 contained in and structurally supported by the first shell 30 and rotatable about the first axis 60 for displacing the pair of latches 28 between the lock and unlock positions. The first plug 32 then forms a cam coupling with the crank 64 to provide an angular free play therebetween between a first angular position 66 and a second angular position 68 relative the crank 64. Given that the crank 64 is angularly displaceable by a first displacement angle 70 while the second plug, and consequently the first joint portion 34, is displaceable by a second displacement angle 72 which is larger than the first displacement angle 70, the angular free play will function to buffer the difference in displaceable angles.

When in use, the door 38 is in the closed position with the pair of latches 28 are in the locked position with the first plug 32 being in the first angular position 66. When the second plug is displaced by the key by the second displacement angle 72, motion is translated to the first plug 32 by the first joint portion 34 and the second joint portion 44. This displaces the first plug 32 from the first angular position 66 to the second angular position 68 before it engages with the crank 64 to displace with the crank 64 by the first displacement angle 70 to displace the pair of latches 28 from the locked position to the unlock position. Similar, when the second plug is displaced by the key by the second displacement angle 72 in a reverse angular direction, motion is translated to the first plug 32 by the first joint portion 34 and the second joint portion 44. This displaces the first plug 32 from the second angular position 68 to the first angular position 66 before it engages with the crank 64 to displace with the crank 64 by the first displacement angle 70 to displace the pair of latches 28 from the unlock position to the locked position.

Aspects of particular embodiments of the present disclosure address at least one aspect, problem, limitation, and/or disadvantage associated with lock assemblies. While features, aspects, and/or advantages associated with certain embodiments have been described in the disclosure, other embodiments may also exhibit such features, aspects, and/or advantages, and not all embodiments need necessarily exhibit such features, aspects, and/or advantages

to fall within the scope of the disclosure. It will be appreciated by a visitor of ordinary skill in the art that several of the above-disclosed structures, components, or alternatives thereof, can be desirably combined into alternative structures, components, and/or applications. In addition, various modifications, alterations, and/or improvements may be made to various
5 embodiments that are disclosed by a visitor of ordinary skill in the art within the scope of the present disclosure, which is limited only by the following claims.

Claims

1. A lock assembly comprising:

5 a first lock couplable to a case defining an opening, the first lock comprising a latch, a first shell disposed adjacent the opening of the case and a first plug accommodated by the first shell and configured with the latch for displacing the latch between a lock position and an unlock position, the first plug defining a first joint portion; and

10 a second lock couplable to a door comprising a strike structure, the door being movably coupled to the case for positioning between a closed position, for substantially covering the opening of the case and positioning the strike structure for engagement with the latch, and an open position for being displaced away from the opening of the case, the second lock comprising a second shell, a second joint portion and a second plug being operable by a key for displacing the second joint portion,

15 wherein when the door is positioned from the open to the closed position, the first lock and the second lock are inter-disposed for engaging the first joint portion with the second joint portion such that displacing the second joint portion will displace the first joint portion to thereby displace the latch from the unlock to the lock position to engage with the strike structure to consequently lock the door in the closed position.

2. The lock assembly as in claim 1, each of the first joint portion and the second joint portion being shaped and dimensioned to enable structural nesting of the first joint portion with the second joint portion.

3. The lock assembly as in claim 1, the first joint portion being a protrusion and the second joint portion being a receptacle for receiving the protrusion therethrough.

4. The lock assembly as in claim 3, the protrusion comprising a plurality of fingers and the receptacle comprising a plurality of inwardly extending steps for nestling between the plurality of fingers when the plurality of fingers are received within the receptacle.
5. The lock assembly as in claim 3, the door being coupled to the case to travel along an arcuate path when moving between the closed position and the open position.
6. The lock assembly as in claim 5, the at least one of the protrusion and the receptacle being tapered for enabling engagement therebetween when the door moves along the arcuate path.
7. The lock assembly as in claim 1, the latch being an elongated rod extendable from and retractable into the first shell when displaced between the lock position and unlock position respectively.
8. The lock assembly as in claim 7, the strike structure defining an aperture wherethrough the latch passages when in the lock position for securing the door to the case.
9. The lock assembly as in claim 8, the strike structure being a loop-shaped structure.
10. The lock assembly as in claim 1, the first lock being a disc tumbler lock.
11. A display case system comprising:
 - a case defining an opening and for receiving at least one article to be displayed;
 - a door comprising a strike structure and being movably coupled to the case for positioning between an open position and a closed position;

a first lock coupled to the case, the first lock comprising a latch, a first shell disposed adjacent the opening of the case and a first plug accommodated by the first shell and configured with the latch for displacing the latch between a lock position and an unlock position, the first plug defining a first joint portion; and

5 a second lock couplable to the door, the door for substantially covering the opening of the case and positioning the strike structure for engagement with the latch in a closed position, and for being displaced away from the opening of the case in an open position, the second lock comprising a second shell, a second joint portion and a second plug being operable by a key for displacing the second joint portion,

10 wherein when the door is positioned from the open to the closed position, the first lock and the second lock are inter-disposed for engaging the first joint portion with the second joint portion such that displacing the second joint portion will displace the first joint portion to thereby displace the latch from the unlock to the lock position to engage with the strike structure to consequently lock the door in the closed position.

12. The display case system as in claim 1, each of the first joint portion and the second joint portion being shaped and dimensioned to enable structural nesting of the first joint portion with the second joint portion.

13. The display case system as in claim 1, the first joint portion being a protrusion and the second joint portion being a receptacle for receiving the protrusion therethrough.

14. The display case system as in claim 3, the protrusion comprising a plurality of fingers and the receptacle comprising a plurality of inwardly extending steps for nesting between the plurality of fingers when the plurality of fingers are received within the receptacle.

15. The display case system as in claim 3, the door being coupled to the case to travel along an arcuate path when moving between the closed position and the open position.
- 5 16. The display case system as in claim 5, the at least one of the protrusion and the receptacle being tapered for enabling engagement therebetween when the door moves along the arcuate path.
- 10 17. The display case system as in claim 1, the latch being an elongated rod extendable from and retractable into the first shell when displaced between the lock position and unlock position respectively.
- 15 18. The display case system as in claim 7, the strike structure defining an aperture wherethrough the latch passages when in the lock position for securing the door to the case.
19. The display case system as in claim 8, the strike structure being a loop-shaped structure.
- 20 20. The display case system as in claim 1, the first lock being a disc tumbler lock.