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"CLASP LOCK"

This invention relates to a clasp lock for releasably locking together at least two elongated members such as two lengths of chain or two gate elements.

Conventionally two lengths of chain or two gate portions are connected together by means of a padlock. Such a padlock has a body portion containing a releasably lockable bolt and a substantially C-shaped hasp hingedly connected at one end to the body portion for releasable engagement at the other end by the bolt provided in the body portion. Thus two lengths of chain or two gate elements can be secured together by closing the hasp round the chains or gate elements and engaging the free end of the hasp with the bolt in the body portion. Alternatively a continuous length of chain may be looped round the gate elements to be locked together and the free ends of the chain fitted on to the hasp over the free end thereof which is subsequently hinged back into locked engagement with the bolt in the body portion of the padlock to secure the chain ends together.

Such a conventional padlock, when used with a chain in this manner, is only as strong as the chain which may be broken or cut to free the locked gate elements even if the padlock itself has a relatively secure locking bolt. Attempts have been made to improve the security of such padlock and chain arrangements by replacing the chain by a slide bolt passing through apertures in the gate elements to be locked together and engaged at a free outer end by the padlock to prevent unauthorised withdrawal of the slide bolt. However such an arrangement is relatively cumbersome and unsuitable for many types of gates and in any event can be broken by cutting or breaking the slide bolt.

There is thus a need for a generally improved lock for

releasably locking together two lengths of chain or two gate elements, which does not require to be used with a length of fastening chain or with a slide bolt on the gate elements.

According to the present invention there is provided a
5 clasp lock for releasably locking together at least two elongated members such as two lengths of chain or two gate elements, including a body defining an opening therethrough in which the two members may be located for locking purposes, said body having two complementary body parts which are hingedly interconnected at one
10 end to pivot about a hinge axis extending substantially parallel to the longitudinal axis of the opening for the body parts to be clasped around, or unclasped from, the two members to be locked together, and which are lockably interconnectable at the other end by lockable bolt means carried on a first of said body parts for
15 releasable locking engagement with the second of said body parts, wherein the body parts are each substantially U or C-shaped in cross-section with the hinge interconnecting the end of one arm of one body part to the end of the adjacent arm of the other body part so that the opening is defined by the adjoining open mouths of the
20 facing end-to-end body parts between the arms and bases of the body parts, with the arms of the body parts providing the front and back of the clasp lock and the bases of the body parts providing the sides of the clasp lock, wherein the arm carrying the other end of the first body part has a male portion carrying the lockable bolt means
25 and wherein the arm carrying the other end of the second body part has a female portion into which the male portion is engageable.

Conveniently the female portion is in the form of two spaced fingers extending substantially perpendicularly from the second body part base transverse to the pivot axis and the male arm
30 portion projects

substantially perpendicularly from the first body part base into sliding co-planar engagement with and between the two female portion fingers, the bolt means being in the form of two spaced bolts extending in a direction substantially parallel to the pivot axis from the male arm portion for free ends of the bolts to releasably lockably engage in respective bolt holes provided each in one of the two female portion fingers.

Advantageously the bolts extend in line and are resiliently biased in a direction into the male arm portion and away from engagement with the bolt holes.

Preferably the lockable bolt means also include lock means housed in or on the male arm portion and operative by means of a key releasably to urge the bolts apart against the resilient bias into locked protrusion from the male arm portion and locked engagement in the bolt holes in the female portion fingers.

Conveniently the lock means is in the form of a cylindrical plug having a slot extending axially therein from one end for receiving a key, a cylindrical barrel fixedly located in the male arm portion, in which barrel the plug is rotatably housed, and a cam fixedly attached to the other end of the plug opposite to the slotted end, the arrangement being such that rotation of the plug in the barrel by the inserted key causes the cam to rotate and displace the bolts apart against the resilient bias into the projecting locking position in which they are held by lock faces provided on the cam.

Conveniently the barrel is provided with a plurality of radially extending bores opening from the inner cylindrical surface thereof for alignment with corresponding bores provided radially through the plug from the outer cylindrical surface thereof to the slot therein, there being slidably housed in the aligned barrel and plug bores a plurality of pins

resiliently bias towards the slot interior, with each pin being resiliently
biased via a spring housed in the respective barrel bore and exerting
biasing pressure on the associated pin via a slide member housed in the
respective barrel bore or at least partially in the associated plug bore
between the spring and pin, with each pin, slide member and plug and
barrel bores being dimensioned such that in the locked position at least
some of the pins project at least partially from the associated plug bore
into the aligned barrel bore and/or at least some of the slide members
project at least partially from the associated barrel bore into the aligned
plug bore to prevent rotation of the plug in the barrel.

Advantageously in the locked position each of the pins project
from the bores in the plug into the key slot therein for engagement by the
key, said projecting pin ends being frustoconical in shape for engagement
by corresponding shaped depressions in or protrusions on the key whereby
the pins and slide members are displaced sufficiently against the resilient
bias of the springs, or insertion of the key in the plug slot, to align all the
pins and slide member contact faces with the interface between the outer
cylindrical surface of the plug and the inner cylindrical surface of the
barrel and thereby free the plug for rotation in the barrel to advance or
retract the bolts, via the cam, into or out of the male arm portion and
into or out of engagement with the bolt holes in the female arm portion
fingers.

For a better understanding of the present invention and to
show how the same may be carried into effect, reference will now be
made, by way of example, to the accompanying drawings, in which.-

Figure 1 is a perspective view of two gate parts
interconnected by a clasp lock of the invention engaged around two
vertical elements of the gate,

Figure 2 is a diagrammatic perspective view of a closed clasp lock of Figure 1 to an enlarged scale shown in conjunction with a key,

Figure 3 is a partially exploded perspective view of the clasp lock of Figure 2 in an inverted position from that of Figures 1 and 2,

Figure 4 is a further exploded perspective view of the clasp lock of Figures 1 and 2, and

Figure 5 is a partially sectioned view, to an enlarged scale, of a detail of the clasp lock of Figures 1 to 4 showing the interrelationship of the lock and bolt means thereof.

As shown in the accompanying drawings a clasp lock of the invention generally indicated at 1 for releasably locking together at least two elongated members such as two lengths of chain or two gate elements 2 of gates 3 includes a body made of any convenient material such as hardened steel or solid stainless steel, made up of a first body part 4 and a complementary second body part 5. The body defines an opening 6 therethrough in which the two members or gate elements 2 may be located for locking purposes as shown in Figure 1.

The complementary body parts 4 and 5 are hingedly interconnected at one end by one or more pivot or hinge pins 7 as shown in Figures 3 and 4 to pivot about a hinge axis forming the longitudinal axis of the pins 7, extending substantially parallel to the longitudinal axis of the opening 6. This allows the body parts to be clasped around, or unclasped from, the two elements or members 2 to be locked together.

As shown particularly in Figure 3 the body parts 4 and 5 are each substantially U or C-shaped in cross-section with the hinge pins 7 interconnecting the end of arm 8 of the second body part 5 to the end of

the adjacent arm 9 of the first body part 4. At their other ends the body parts 4 and 5 are lockably interconnectable via lockable bolt means generally indicated at 10 in Figure 3 and more particularly in Figure 4, carried on the first body part 4 for releasably locking engagement with the second body part 5.

Thus the body part 4 has a base 4a from which one arm 9 projects perpendicularly at one side thereof and from which another arm carrying the bolt means 10 projects perpendicularly at the other side thereof as shown in Figure 3. Similarly the body part 5 has a base 5a from which projects perpendicularly at one end the arm 8 and at the other end an arm carrying the other end of the body part 5a which engages with the arm of the body part 4 carrying the bolt means 10 for locking purposes. In this way the opening 6 is defined by the adjoining open mouths of the facing end-to-end body parts 4 and 5 between the arms and bases thereof with the arms of the body parts 4 and 5 providing the front and back of the clasp lock and the bases 4a and 5a providing the sides of the clasp lock 1. Thus the arms 8 and 9 provide the back of the clasp lock 1.

As shown in Figures 4 and 5 the bolt means 10 is carried on arm 4b which, together with the bolts means 10 forms a male portion 11 engaging in a female portion provided by spaced fingers 12 forming the second body part arm opposite to that of arm 8. These fingers 12 extend substantially perpendicularly from the second body part base 5a transverse to the pivot axis through the pins 7 and the male arm portion 11 projects substantially perpendicularly from the first body part base 4a into sliding co-planar engagement with and between the two fingers 12 as can best be appreciated from Figure 3.

As also can be seen from Figures 3, 4 and 5, the bolt means 10 includes two spaced bolts 13 extending in a direction substantially parallel to the pivot axis of the pin 7 from the male arm portion 11 for free ends

13a of the bolts 13 to releasably lockably engage in respective bolt holes 14 provided one in each of the two female portion fingers 12. As can be seen more clearly from Figures 4 and 5 the bolts 13 extend in line and are resiliently biased by compression springs 15 in a direction into the male arm portion 11 and away from engagement with the bolt holes 14. The bolts 13 are made of any convenient material and preferably are made from steel case hardened to about 50 to 55 Rockwell Hardness to prevent easy breakage.

The lockable bolt means 10 also includes lock means housed in or on the male arm portion and operative by means of a key 16 releasably to urge the bolts 13 apart against the resilient bias of springs 15 into locked protrusion from the male arm portion 11 and locked engagement in the bolt holes 14 in the female portion fingers 12. This lock means is in the form of a cylindrical plug 17 having a slot 18 extending axially therein from one end for receiving the key 16. The lock also includes a cylindrical barrel 19 fixedly located in the male arm portion 11 such as by being secured thereto or to an enclosing housing part 20 in any convenient manner such as by a screw or screws (not shown). The plug 17 is rotatably housed in the barrel 19 and a cam 21 is fixedly attached, such as by screws 22 to the other end of the plug 17 opposite to the slotted end thereof.

Thus the barrel 19, plug 17 rotatably housed therein and cam 21 fixedly attached to the inner end of the plug 17 are secured to the male arm portion 11 provided by the arm 4b, by the enclosing housing part 20 which is substantially C-shaped in cross-section so that its arms 20a fit over the arm 4b forming the male portion 11 of the body part 5 and are secured thereto in any convenient manner such as by screws 23. Thus the bolts 13 and springs 15 are housed inside the enclosure provided by the housing part 20 and arm 4b to project through the housing part arms 20a as shown in Figure 4. As can also be seen from the drawings the housing

part 20 is tapered in shape outwardly from the arms 20a to the slotted end of the plug 17 in order to reduce the weight of the part and also to provide a glancing surface off which any blows will be deflected without causing damage to the clasp lock 1. In this way the force of the blows applied to the lock by persons attempting to break it will be deflected away from the housing part 20 with consequent lessening of the effect on the lock. In use, of course, the screws 23 of which only two have been shown for convenience, will be hidden inside the lock 1 by the overlying fingers 12 for greater security. The outer ends of the pivot pin 7 will also be rendered inaccessible for security reasons. Rotation of the plug 17 in the barrel 19 by the inserted key 16 causes the cam 21 to rotate and displace the bolts 13 apart against the resilient bias of the springs 15 into the projecting locking position in which they are held by lock faces 21a provided on the cam 21. Thus the cam 21 has three pairs of faces namely a pair of inner unlocked faces 21b, the pair of intermediate lock faces 21a and a pair of outermost stop faces 21c. Thus depending on the rotary position of the cam 21 the bolts 13 which engage the cam faces via their ends 13b are moved between unlocked retracted positions in engagement with the unlocked cam faces 21b and protruding locked positions engaging the cam lock faces 21a. The stop faces 21c prevent further movement of the bolts 13 beyond the locked protruding position and thus assist security.

Actual locking between the rotary plug 17 and rotationally fixed barrel 19 can be effected in any convenient manner such as by the cooperating resiliently biased pin and bore system shown in Figures 4 and 5. In this system the barrel 19 is provided with a plurality of radially extending bores 24 opening from the inner cylindrical surface thereof for alignment with corresponding bores 25 provided radially through the plug from the outer cylindrical surface thereof to the slot 18 therein. Conveniently six such bores 24 and six such bores 25 are provided. A plurality of pins 26 are provided one in each aligned pair of bores 24 and 25 and slidably resiliently biased towards the interior of the slot 18 by a

spring 27 housed in the respective barrel bore 24 and exerting biasing pressure on the associated pin 26 via a slide member 28 housed in the respective barrel bore 24 or at least partially in the associated plug bore 25 between the spring and pin. Each pin 26, slide member 28 and plug and barrel 25 and 24 are dimensioned such that in the locked position at least some of the pins 26 project at least partially from the associated plug bore 25 into the aligned barrel bore 24 and/or at least some of the slide members 28 project at least partially from the associated barrel bore 24 into the aligned plug bore 25 to prevent rotation of the plug 17 in the barrel 19, as shown particularly in Figure 5.

Thus in the locked position ends of the pins 26 project from the bores 25 into the key slot 18 in the plug 17 for engagement by the key 16. The projecting pin ends 26a are frustoconical in shape for engagement by correspondingly shaped depressions 16a provided in the key. These depressions 16a are of differing depths depending upon the axial dimensions of the respective cooperating pins 26 but do not pass right through the key 16. Alternatively or additionally protrusions can be provided on the key for engagement by the projecting pin ends 26a of the cooperating pins 26. Thus engagement of the key 16 in the slot 18 brings the projecting pin ends 26a into engagement with the respective depressions 16a or protrusions in or on the key 16 to displace the pins 26 and slide members 28 sufficiently against the resilient bias of the springs 27 to align all the pin and slide member contact faces with the interface 29 between the outer cylindrical surface of the plug 17 and inner cylindrical surface of the barrel 19 thus freeing the plug 17 for rotation in the barrel 19 to advance or retract the bolts 13, via the cam 21, into or out of the male arm portion 11 and into and out of engagement with the bolt holes 14 in the female arm portion fingers 12 of the body part 5.

Conveniently the clasp lock plug 17 and barrel 19 are in the locked position in the protruding locked position of the bolt 13 and in the

unlocked position in the retracted unlocked position of the bolts 13. To improve security the pins can be provided in a three dimensional configuration with at least 6 different axial lengths of pins. As the pins are completely housed in the interfitting plug and cylinder assembly which is machined to close tolerances the lock provided in this way is extremely difficult to pick. If desired the key can be manufactured so as to be insertable into the lock either way up and yet still be operative.

The clasp lock of the invention therefore having basically only three main portions mechanically secured together such as the two body parts and the lockable bolt means, is very robust and provides a relatively simple, but secure lock.



CLAIMS

1. A clasp lock for releasably locking together at least two elongated members such as two lengths of chain or two gate elements, including a body defining an opening therethrough in which the two members may be located for locking purposes, said body having two
5 complementary body parts which are hingedly interconnected at one end to pivot about a hinge axis extending substantially parallel to the longitudinal axis of the opening for the body parts to be clasped around, or unclasped from, the two members to be locked together, and which are lockably interconnectable at the other end
10 by lockable bolt means carried on a first of said body parts for releasable locking engagement with the second of said body parts, wherein the body parts are each substantially U or C-shaped in cross-section with the hinge interconnecting the end of one arm of one body part to the end of the adjacent arm of the other body part so
15 that the opening is defined by the adjoining open mouths of the facing end-to-end body parts between the arms and bases of the body parts, with the arms of the body parts providing the front and back of the clasp lock and the bases of the body parts providing the sides of the clasp lock, wherein the arm carrying the other end of the
20 first body part has a male portion carrying the lockable bolt means and wherein the arm carrying the other end of the second body part has a female portion into which the male portion is engageable.

2. A clasp lock according to claim 1, wherein the female portion



is in the form of two spaced fingers extending substantially perpendicularly from the second body part base transverse to the pivot axis and wherein the male arm portion projects substantially perpendicularly from the first body part base into sliding co-planar engagement with and between the two female portion fingers, the bolt means being in the form of two spaced bolts extending in a direction substantially parallel to the pivot axis of the male arm portion for free ends of the bolts to releasably lockably engage in respective bolt holes provided one in each of the two female portion fingers.

3. A clasp lock according to claim 2, wherein the bolts extend in line and are resiliently biased in a direction into the male arm portion and away from engagement with the bolt holes.

4. A clasp lock according to claim 3, wherein the lockable bolt means also includes lock means housed in or on the male arm portion and operative by means of a key releasably to urge the bolts apart against the resilient bias into locked protrusion from the male arm portion and locked engagement in the bolt holes in the female portion fingers.

5. A clasp lock according to claim 4, wherein the lock means is in the form of a cylindrical plug having a slot extending axially therein from one end for receiving a key, a cylindrical barrel fixedly located in the male arm portion, in which barrel the plug is rotatably housed and a cam fixedly attached to the other end of the plug opposite to the slotted end, the arrangement being such that rotation of the plug in the barrel by the inserted key causes the cam to rotate and displace the bolts apart against the resilient bias into the projecting locking position in which they are held by lock faces provided on the cam.

6. A clasp lock according to claim 5, wherein the barrel is provided with a plurality of radially extending bores opening from the



inner cylindrical surface thereof for alignment with corresponding bores provided radially through the plug from the outer cylindrical surface thereof to the slot therein, there being slidably housed in the aligned barrel and plug bores a plurality of pins resiliently biased towards the slot interior, with each pin being resiliently biased via a spring housed in the respective barrel bore and exerting biasing pressure on the associated pin via a slide member housed in the respective barrel bore or at least partially in the associated plug bore between the spring and pin, and with each pin, slide member and plug and barrel bores being dimensioned such that in the locked position at least some of the pins project at least partially from the associated plug bore into the aligned barrel bore and/or at least some of the slide members project at least partially from the associated barrel bore into the aligned plug bore to prevent rotation of the plug in the barrel.

7. A clasp lock according to claim 6, wherein in the locked position each of the pins project from the bores in the plug into the key slot therein for engagement by the key, said projecting pin ends being frustoconical in shape for engagement by correspondingly shaped depressions in or protrusions on the key whereby the pins and slide members are displaced sufficiently against the resilient bias of the springs, on insertion of the key in the plug slot, to align all the pins and slide member contact faces with the interface between the outer cylindrical surface of the plug and the inner cylindrical surface of the barrel and thereby free the plug for rotation in the barrel to advance or retract the bolts via the cam, into or out of the male arm portion and into or out of engagement with the bolt holes in the female arm portion fingers.

8. A clasp lock for releasably locking together at least two elongated members, substantially as hereinbefore described with reference to the accompanying drawings.