

The invention relates to a rotary lock cylinder according to the preamble to Claim 1.

A rotary lock cylinder of this type is known for example from US-A-1 434 947.

Well, a method of breaking in has become known in which a self-tapping and toughened steel screw of a diameter of about 4 mm and having a hexagonal head is screwed into the cylinder core of such a rotary lock cylinder. With an extraction device, for example according to DE-A-3 711 938, the screwed-in screw is withdrawn from the cylinder housing together with the cylinder core and the now exposed driver is turned with a screwdriver so that the lock is opened. In order to prevent this method of break-in, it is possible to dispose dogs at the inner end of the cylinder core and to couple the cylinder core with the driver. However, it has been found that due to the extraordinarily high tractive force of the extraction device, even such a cylinder core can easily be pulled out of the cylinder housing. It is substantially more effective in the case of a rotary lock cylinder of composed cylinder parts to provide the cylinder core with a radially projecting portion at one end and to insert this into the back of the housing aperture. In the case of a double lock cylinder with a one-piece cylinder housing, however, this is not possible since the cylinder core can only be inserted from the front.

The generic US-A-1 434 947 discloses a rotary lock cylinder in which there are in the cylinder core four steel pins which extend in the longitudinal direction of the core. According to column 1, lines 21 to 24, it is intended that these pins should prevent the screwing in of a drilling tool. It is possible thus to prevent the tumbler pins being destroyed or rendered ineffectual, as

mentioned in the last part of column 2. The break-in method mentioned in the preamble to the description of the present application cannot however be prevented by these pins. The pins would only guide the hardened steel screw of an extraction device but could not prevent the steel screw from finding a grip in the cylinder core. Since according to Fig. 3 of the citation where this rotary lock cylinder is concerned, the cylinder core has at the rear end an outer flange, it must in this case nevertheless be difficult to extract the cylinder core by the method mentioned. However, as mentioned above, it is not possible with all rotary lock cylinders to insert the cylinder core as shown in Fig. 3.

Thus, the invention can be based on the problem of providing a rotary lock cylinder of the said generic type in which the aforementioned break-in method is ineffectual but which is nevertheless capable of functioning and can be produced at a favourable cost. Also in the case of a double lock cylinder, it is intended to prevent the break-in method, the cylinder core being inserted from the front.

The problem is resolved in accordance with the invention by the characterising feature of Claim 1.

In the case of the rotary lock cylinder according to the invention, it is still possible to screw a toughened steel screw into the cylinder core but the threaded part of the screw which is inserted is sheared off by the pins and/or the core pins. When pull is exerted on the screw by means of the extraction device, it has no grip in the cylinder core and is withdrawn, the cylinder core remaining in the housing. If a screw is screwed in so that it is too close to the core pins in the cylinder core, the tumbler pins are pushed radially outwardly in their bores by the screw. However, this

results in the rotary lock cylinder becoming completely jammed, since the outwardly emergent core pins anchor the cylinder core in the cylinder housing. What is essential therefore is that the pins are so disposed that when a screw is screwed in, it is guided at these pins and therefore the core and housing pins are forced tightly into the cylinder housing. Further rotation of the screw causes the screw thread to be trimmed off against the toughened tumbler pins. As a result of this measure, the screw has no grip in the cylinder and therefore cannot tear the cylinder nor pull on the core.

If the rotary lock cylinder comprises a plurality of rows of tumblers, as is mostly the case with rotary lock cylinders for flat keys, then the pins extend in the longitudinal direction of the cylinder core and according to the disposition of the rows of tumblers, so there may be two or four pins. In the case of a rotary lock cylinder for a so-called toothed key, the pins are preferably so inserted into the cylinder core that they extend at right-angles to the longitudinal axis of the cylinder core and parallel with the tumbler pins. In this case, it is preferable for a plurality of pairs of pins to be disposed at intervals from one another. If the intervals between the pairs of pins are varied, this increases the certainty that when a screw is screwed in, its threaded part will be sheared off by the pins. With only two pins, there is the risk that they will not damage the screw-threaded part of the screw but will on the contrary provide additional grip for the screw. It goes without saying that an attempted break-in will also fail if the screw is partly screwed into the housing so that contact with the pins is avoided.

The further development according to Claims 5 to 7 reinforces the lock cylinder in the region of the web and at the same time prevents the web being weakened by a

drilling tool and the double cylinder from being torn apart by the aforementioned break-in method. If it is possible to separate the double cylinder in the region of the cuffed screw, the pins anchored in the cylinder housing prevent the web of the cylinder part being sheared off against the long plate and the cylinder part from being pulled out of the door.

Examples of embodiment of the invention are described in greater detail hereinafter with reference to the accompanying drawings in which:

Fig. 1 shows a cross-section through a rotary lock cylinder according to the invention,

Fig. 2 is a view of an alternative cylinder core,

Fig. 3 is a section through the cylinder core taken on the line III-III in Fig. 2,

Fig. 4 is a partial section through a double cylinder and

Fig. 5 is a partial section taken on the line V-V in Fig. 4.

The rotary lock cylinder shown in Fig. 1 is a double cylinder with two cylinder housings 1 which are connected to each other by a web 2 of toughened steel. However, the rotary lock cylinder can also be a single cylinder. In known manner, there is rotatably mounted in the cylinder housing 1 a cylinder core 3 which comprises a key channel 8 into which a key not shown here can be inserted in order to actuate the lock. The rows of tumblers comprising core pins, housing pins 4, springs 6 and chamber walls 7 are aligned by means of the key. The core pins 5 consist of toughened steel, while the housing pins 4 may consist of brass. The rotary lock cylinder

shown has a so-called Europrofile but other profiles are possible.

The cylinder core 3 has four blind bores 10 open to the rear which extend parallel with the axis of rotation of the cylinder core and into which toughened steel pins 11 are inserted with a tight fit. The pins 11 have a diameter of about 2 mm and extend substantially over the entire length of the cylinder core 3. What is essential is that in the case of the arrangement shown in Fig. 1, the two bottom pins 11 are spaced apart by a distance which is less than 3.2 mm and preferably less than 3.0 mm. The gap B between the said pins 11 and the nearest core pins 5 is preferably smaller than about 0.6 mm. With this arrangement, when a screw is screwed into the cylinder core 3 the screw-threaded part thereon is sheared off by the pins 11 which guide the screw and/or by the radially outwardly pushed core pins 5 so that even if the screw is securely seated, the cylinder core 3 cannot be withdrawn from the cylinder housing 1.

According to the number and disposition of the rows of tumblers, so two pins 11 may be sufficient but as a rule no more than four pins 11 are needed.

If, as shown in Figs. 2 and 3, the rotor has only one row of tumblers in a cylinder core 12 with a profiled key channel 13, then as shown in Fig. 2, it is also possible to insert a plurality of pins 20 - 24 which extend at right-angles to the axis of rotation of the cylinder core 12. The pins 20 - 24 are inserted with a secure fit into bores 15 - 19 which are disposed in pairs and which, as Fig. 2 shows, are disposed between two bores 14 for the tumbler pins. Here, too, what is important is that the distances between any two associated pins 20 - 24 are smaller than about 3.2 mm. The gaps may be the same or, as shown in Fig. 2, the gaps D and E may be different.

In the case of the double cylinder 40 shown in Figs. 4 and 5, toughened steel pins 32 are additionally inserted into bores 31 in a web 30 and prevent the brass web 30 from being sheared off. The pins 32 extend inwardly into the cylinder housing and, at the end, to a position close to the outer surface of the cylinder core. At least one steel pin 32 is disposed on both sides of a threaded bore 34 or entraining means 33.

The above details show that there are rotary lock cylinders which, in spite of the considerably greater degree of lock security, are only insignificantly more expensive than conventional rotary lock cylinders so that according to the invention rotary lock cylinders have been made available which not only satisfy security demands in an outstanding way but which, by reason of their simple design, are favourably costed and reliable.

As is readily understandable, details can be variously modified by way of adaptation to other types of cylinder. For example, the diameter of the pins 11 and 20 to 24 may also be greater than 2 mm, according to the size of the rotary lock cylinder.



Patent Claims

1. A rotary lock cylinder for a safety lock in which spring-loaded pin tumblers (4, 5, 6) are mounted in bores extending radially in relation to a cylinder core (3, 12) and the cylinder housing (1) and can be adjusted by a key introduced into the key channel (8) in order to release the cylinder core (3) for rotation, at least two hardened steel pins (11) extending in the longitudinal direction being disposed in the cylinder core, characterised in that the steel pins (11) are so introduced into the cylinder core (3) that they guide a steel screw with a diameter of at least about 3 mm and which has to be screwed into the cylinder core for its withdrawal, so that the steel screw is on its periphery abraded by pin tumblers (4, 5, 6) which press on the block radially from the outside.
2. A rotary lock cylinder according to Claim 1, characterised in that the steel pins (11) are spaced apart by a distance (A) which is no greater than about 3 mm.
3. A rotary lock cylinder according to Claim 2, characterised in that the pins (11) are disposed to the right and left of and are alongside the key channel (8) and in that the distance (B) between these pins (11) and the nearest core pins (5) is so chosen that a screw screwed into the key channel (8) between the pins (11) and having a diameter of about 4 mm pushes the pin tumblers (4, 5, 6) radially outwardly en bloc.
4. A rotary lock cylinder according to Claim 2 or 3, characterised in that the distance (B) between the pins (11) and the nearest core pins (5) is no greater than about 0.6 mm.



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5. A rotary lock cylinder according to one of Claims 1 to 4, in which this is a double cylinder with a web (30) joining the two cylinder halves, characterised in that inserted into bores (31) in the web (30) are hardened steel pins (32) which extend into the cylinder housing (1).
6. A rotary lock cylinder according to Claim 5, characterised in that the steel pins (32) extend in the web (30) at right-angles to the longitudinal direction of the rotary lock cylinder.
7. A rotary lock cylinder according to Claim 6, characterised in that on both sides of the screw-threaded bore (34) for the screw there is at least one steel pin (32).

Two sheets of drawings