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CYLINDER LOCK MECHANISM

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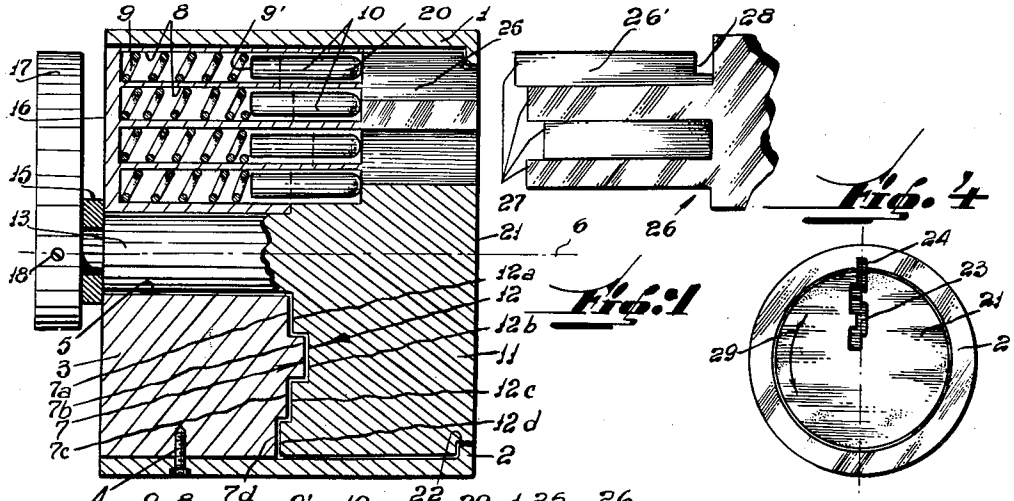


Fig. 1

Fig. 4

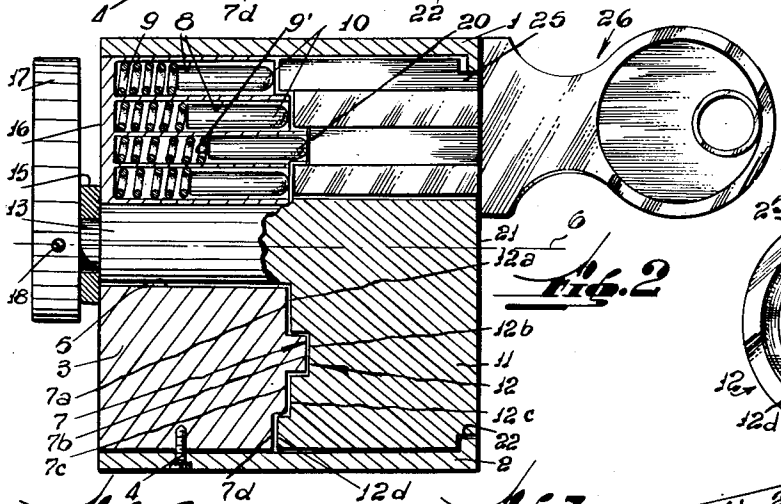


Fig. 2

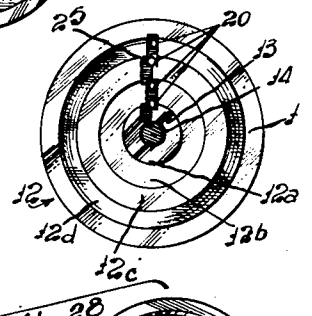
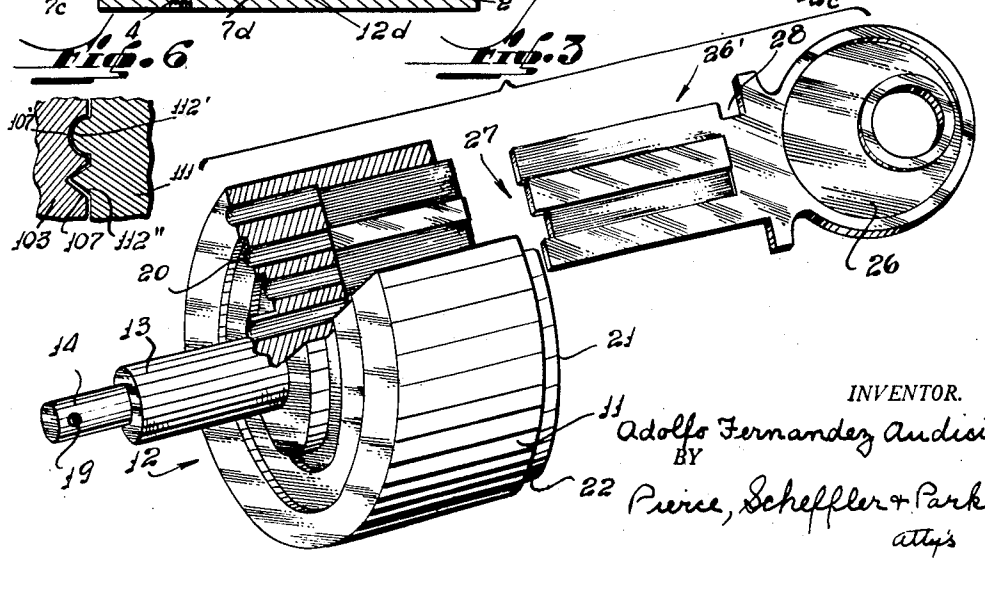


Fig. 5

Fig. 6

Fig. 3



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CYLINDER LOCK MECHANISM

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4 Claims. (Cl. 70—363)

This invention relates to a lock mechanism of the kind usually known as "cylinder lock" for which the "flat shank key" is used.

The so-called "Yale" type of known cylinder lock comprises an inner drum and an outer drum of substantially equal length and a plurality of spring urged double pins which enter laterally, that is to say through the cylindrical periphery of the inner drum. Consequently access to the springs for destroying them is relatively easy and thereby the lock may be violated. Furthermore it may be stated that the assembling of the above mentioned known type of cylinder lock is rather complicated.

Bearing in mind the above drawbacks, a lock mechanism has been conceived, according to the present invention, comprising an outer shell defining an inner cylindrical space, a stationary drum at least partially housed in said cylindrical space and rigidly connected to said outer shell, said stationary drum having a bore coaxial with the longitudinal axis of said stationary drum, said stationary drum further having a first base defining a first contact surface having first revolutionary irregularities, a first plurality of spaced apart, substantially radially alined perforations in said first drum and open to said first contact surface, a plurality of springs of which one spring is housed in each of the perforations of said first plurality of perforations, a plurality of pins of which one pin is mounted on each of said springs, said pins being adapted to project out of said perforations, a rotatable drum also at least partially housed in said cylindrical space and rotatably supported by said shell, said rotatable drum further having a second base defining a second contact surface having second revolutionary irregularities complementary to said first revolutionary irregularities and in rotary sliding contact therewith, a shaft integral with said rotatable drum and projecting through said bore, a second plurality of spaced apart, substantially radially alined perforations open to said second contact surface and adapted to face said first plurality of perforations, said rotatable drum further having a third base defining a front face, a key slot in said front face, a key way in said movable drum connecting said key slot with said second plurality of perforations, said plurality of pins being capable of entering said second plurality of perforations and facing said key way, and a key for said lock mechanism having a front end portion of complementary shape to the corresponding portion of said first contact surface and adapted to enter in contact therewith.

From the foregoing it may be understood that it is an object of the present invention to provide a lock mechanism of the cylinder lock type, where the springs of the pins are practically inaccessible from outside.

Another object is to provide a lock mechanism, the integrating parts of which may be easily assembled.

Still another object is to provide a lock mechanism requiring a key, the front end portion of which may be accurately shaped in order to be able to operate the lock, so that in addition to the determined cross section

of the shank an additional safety factor is thereby provided.

A further object is to provide a lock mechanism of the cylinder type which requires only single pins instead of the double pins.

Another object is to provide a cylinder lock mechanism which in addition to the pin blocking arrangement provides a specially shaped pair of contact surfaces representing another additional safety factor.

These and further objects and advantages of the present invention will become more apparent during the course of the following description, in which by way of example several embodiments have been described.

In the drawings:

Figure 1 is a longitudinal section of the lock mechanism, in accordance with the present invention, with the key withdrawn therefrom.

Figure 2 is a similar longitudinal section as Figure 1, but with the key inserted in the lock mechanism.

Figure 3 is a perspective view, partially in section of the rotatable drum and the key of the lock mechanism.

Figure 4 is a plan view of the front face of the lock mechanism in smaller scale.

Figure 5 is a plan view of the second contact surface and shaft of the rotatable drum, also in smaller scale.

Figure 6 is a detail in longitudinal section of a modified embodiment of the two contact surfaces.

As may be seen in Figures 1 and 2, the lock mechanism of the present invention conprises an outer shell **1** having an inwardly projecting rim **2** at its front end. Said outer shell defining a cylindrical space in which a stationary drum **3** is housed and rigidly connected to said outer shell by means of screw **4**. Said stationary drum **3** has a bore **5** coaxial with the longitudinal axis **6** and a first base **7** defining a plurality of revolutionary irregularities, more particularly surfaces **7***a*, **7***b*, **7***c*, **7***d* concentrically arranged about axis **6**.

By "revolutionary irregularities" is to be understood any type of surfaces all of which do not lie in a single plane which are concentrically arranged about the axis of rotation (in this particular case, longitudinal axis **6**) of the corresponding drum.

The stationary drum **3** further comprises a first plurality of spaced apart, substantionally radially alined perforations **8** to open to said first base or first contact surface **7**. In each of said perforations **8** a compression spring **9** is housed and furthermore a single pin **10** is at least partially housed in said perforations **8** and in resting contact with the free end **9'** of the corresponding spring **9**.

A rotatable drum **11** is also housed in said outer shell **1** and rotatably supported thereby. Said rotatable drum **11** has a second base or second contact surface **12** consisting of surfaces **12***a*, **12***b*, **12***c* and **12***d* which are complementary to the surfaces **7***a*, **7***b*, **7***c*, and **7***d*, respectively and therefore are likewise to be considered as second "revolutionary irregularities." A shaft **13** integral with said rotatable drum **11** projects out from said second base **12** and is rotatably housed in said bore **5** of said stationary drum **3** (see also Figure 3). Said shaft **13** comprises a free end portion **14** of smaller diameter, projecting out of said stationary drum **3**. A washer **15** (see Figures 1 and 2 is mounted on said free end portion **14** and bearing against the inner base **16** of said stationary drum **3**. A bolt operating member **17** is further mounted on said free end portion and fastened thereto by pin **18**, passing through perforation **19** (see Figure 3).

The rotatable drum **11** further comprises a second plurality of spaced apart, substantially radially alined perforations **20** (see Figures 1, 3 and 5) open to said second contact surface **12** and adapted to face the corresponding perforations **8** of the stationary drum **3** and thereby, as

may be seen in Figure 1, the pins 10 may enter said perforations 20, when alined with said first mentioned perforations 8 and thus block the rotatable drum 11 together with the bolt operating member 17.

Said rotatable drum 11 has furthermore a third base defining the front face 21 (see Figures 1 to 4) of the lock mechanism and a peripherical front recess 22 (see Figures 1 to 3) into which fits the inwardly projecting rim 2, whereby the rotatable drum 11 is held against longitudinal movement.

A key slot 23 (see Figure 4) of irregular shape is visible in the front face 21 and a cut-out portion 24 is arranged in the inwardly projecting rim 2, adapted to coincide with said key slot 23.

A key-way 25 (see Figure 1) having the same irregular cross section as the key slot 23 is arranged in said rotatable drum 11 and connects the key slot 23 with the second contact surface 12 passing through the second perforations 20 (see Figure 5).

A flat shank key 26 (see Figures 1 to 3) is required for operating the lock mechanism and comprises a front end portion 27 having exactly the same shape as the second base or second contact surface 12 in the corresponding part, so that when said key 26 is inserted to its full extent into the key way 25, as shown in Figure 2, said front end portion 27 forms part of said second contact surface 12. The rear end portion of the shank 26' has a recess 28 (see Figures 1 and 3) the depth of which is equal to the length of rim 2.

For operating the lock mechanism of the present invention, it is obviously necessary to insert the key 26 through key slot 23 to its full extent into key way 25, whereby the front end portion 27 will completely push the pins 10 into the perforations 8 and the front of rim 2 will extend into the recess 28, so that it becomes possible to rotate the rotatable drum 11 by means of key 26 in either directions as indicated by double arrow 29 in Figure 4. As soon as the rotatable drum 11 is rotated from its start position, key 26 cannot be withdrawn due to rim 2, until rotatable drum 11 is returned to the start position.

It will be understood that if shank 26' has not the correct cross section it may not be inserted into the lock mechanism. Furthermore even if the cross section is correct and the recess 28 has not the proper shape the rotatable drum 11 cannot be operated. Furthermore if the front end portion 27 has not the correct shape the pins 10 will not disconnect the rotatable drum 11 from the stationary drum 3. Finally if the revolutionary irregularities 7 and 12 do not coincide, the rotatable drum 11 cannot rotate. Thus, four safety conditions must be met in order to operate the lock mechanism and at the same time the springs 9 are not accessible from outside.

Obviously a number of modifications may be introduced in the above described structure, such as instead of providing the two drums 3 and 11 with the surfaces 7*a* to 7*d* and the complementary surfaces 12*a* to 12*d* any other shape may be provided and evidently not all recesses must be arranged in the rotatable drum 11 nor all projections must be provided by the stationary drum 3. Thus in Figure 6, the stationary drum 103 comprises a semicircular cross sectional circular recess 107' and a triangular cross sectional circular recess 107'' and the rotatable drum 111 comprises a semicircular cross sectional circular projection 112' and a triangular cross sectional circular projection 112''.

The outer shell 1 is not required if the lock mechanism is directly mounted in a casing providing a suitable housing for the two drums 3 and 11.

I claim:

1. A lock mechanism comprising a stationary drum having a bore coaxial with the longitudinal axis of said stationary drum, said stationary drum further having a first base defining a first contact surface having first revolutionary irregularities, a first plurality of spaced apart, substantially radially alined perforations in said first drum and open to said first contact surface, a plurality fo springs of which one spring is housed in each of the perforations of said first plurality of perforations, a plurality of pins of which one pin is mounted on each of said springs, said pins being adapted to project out of said perforations, a rotatable drum having a second base defining a second contact surface having second revolutionary irregularities complementary to said first revolutionary irregularities and in rotary sliding contact therewith, a shaft integral with said rotatable drum and projecting through said bore and rotatably supported thereby, a second plurality of spaced apart, substantially radially alined perforations open to said second contact surface and adapted to face said first plurality of perforations, said rotatable drum further having a third base defining a front face, a key slot in said front face, a key way in said movable drum connecting said key slot with said second plurality of perforations, said plurality of pins being capable of entering said second plurality of perforations and facing said key way, and a key for said lock mechanism having a front end portion of complementary shape to the corresponding portion of said first contact surface and adapted to enter in contact therewith.

2. A lock mechanism comprising an outer shell defining an inner cylindrical space, a stationary drum at least partially housed in said cylindrical space and rigidly connected to said outer shell, said stationary drum having a bore coaxial with the longitudinal axis of said stationary drum, said stationary drum further having a first base defining a first contact surface having first revolutionary irregularities, a first plurality of spaced apart, substantially radially alined perforations in said first drum and open to said first contact surface, a plurality of springs of which one spring is housed in each of the perforations of said first plurality of perforations, a plurality of pins of which one pin is mounted on each of said springs, said pins being adapted to project out of said perforations, a rotatable drum also at least partially housed in said cylindrical space and rotatably supported by said shell, said rotatable drum further having a second base defining a second contact surface having second revolutionary irregularities complementary to said first revolutionary irregularities and in rotary sliding contact therewith, a shaft integral with said rotatable drum and projecting through said bore, a second plurality of spaced apart, substantially radially alined perforations open to said second contact surface and adapted to face said first plurality of perforations, said rotatable drum further having a third base defining a front face, a key slot in said front face, a key way in said movable drum connecting said key slot with said second plurality of perforations, said plurality of pins being capable of entering said second plurality of perforations and facing said key way, and a key for said lock mechanism having a front end portion of complementary shape to the corresponding portion of said first contact surface and adapted to enter in contact therewith.

3. A lock mechanism comprising an outer shell having an end portion and defining an inner cylindrical space, a rim integral with said end portion and projection into said cylindrical space, a stationary drum at least partially housed in said cylindrical space and rigidly connected to said outer shell, said stationary drum having a bore coaxial with the longitudinal axis of said stationary drum, said stationary drum further having a first base defining a first contact surface having first revolutionary irregularities, a first plurality of spaced apart, substantially radially alined perforations in said first drum and open to said first contact surface, a plurality of springs of which one spring is housed in each of the perforations of said first plurality of perforations, a plurality of pins of which one pin is mounted on each of said springs, said pins being adapted to project out of said perforations, a rotat-

able drum also at least partially housed in said cylindrical space and rotatably supported by said shell, said rotatable drum further having a second base defining a second contact surface having second revolutionary irregularities complementary to said first revolutionary irregularities and in rotary sliding contact therewith, a shaft integral with said rotatable drum and projecting through said bore, a second plurality of spaced apart, substantially radially alined perforations open to said second contact surface and adapted to face said first plurality of perforations, said rotatable drum further having a peripherical front recess in structural relationship with said rim, said rotatable drum also including a third base defining a front face, a key slot in said front face, a key way in said movable drum connecting said key slot with said second plurality of perforations, said plurality of pins being capable of entering said second plurality of perforations and facing said key way, and a flat shank key for said lock mechanism, the flat shank having a front end portion of complementary shape to the corresponding portion of said first contact surface and adapted to enter in contact therewith, said rim having a cut-out portion for being in alinement with said key slot and said flat shank further having a recess the depth of which is at least equal to the length of said rim and capable of facing said rim.

4. A lock mechanism comprising an outer shell defining an inner cylindrical space, a stationary drum at least partially housed in said cylindrical space and rigidly connected to said outer shell, said stationary drum having a bore coaxial with the longitudinal axis of said stationary drum, said stationary drum further having a first base defining a first contact surface having first revolutionary irregularities, a first plurality of spaced apart, substantially radially alined perforations in said first drum and open to said first contact

surface, a plurality of springs of which one spring is housed in each of the perforations of said first plurality of perforations, a plurality of pins of which one pin is mounted on each of said springs, said pins being adapted to project out of said perforations, a rotatable drum also at least partially housed in said cylindrical space and rotatably supported by said shell, said rotatable drum further having a second base defining a second contact surface having second revolutionary irregularities complementary to said first revolutionary irregularities and in rotary sliding contact therewith, a shaft integral with said rotatable drum and projecting through said bore, said shaft having a free end portion projecting out of said stationary drum, a washer mounted on said free end portion and a bolt operating member also mounted on said free end portion, said washer being arranged between said stationary drum and said bolt operating member, a second plurality of spaced apart, substantially radially alined perforations open to said second contact surface and adapted to face said first plurality of perforations, said rotatable drum further having a third base defining a front face, a key slot in said front face, a key way in said movable drum connecting said key slot with said second plurality of perforations, said plurality of pins being capable of entering said second plurality of perforations and facing said key way, and a key for said lock mechanism having a front end portion of complementary shape to the corresponding portion of said first contact surface and adapted to enter in contact therewith.

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