Sept. 3, 1968 R. K. GRAY ET AL 3,399,555

LOCK CONSTRUCTION

Filed March 31, 1966

Fig. 1.

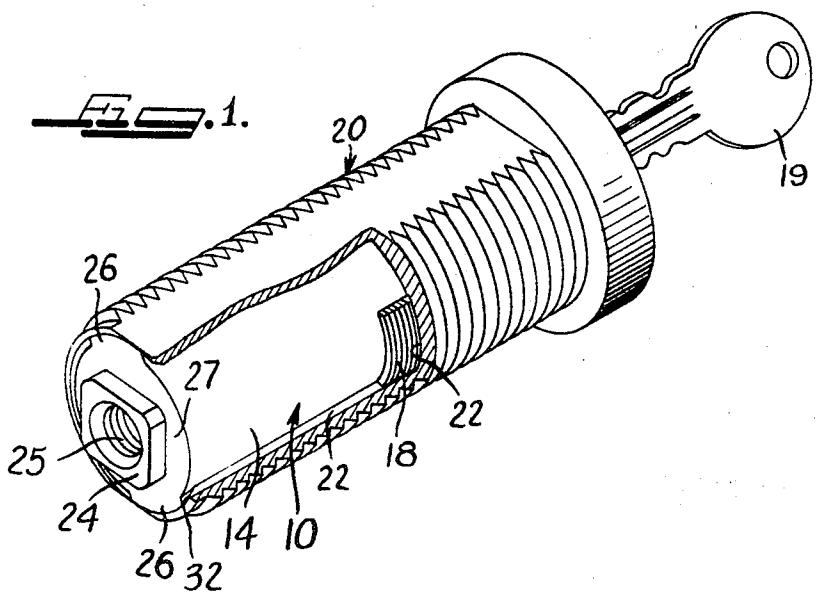


Fig. 3.

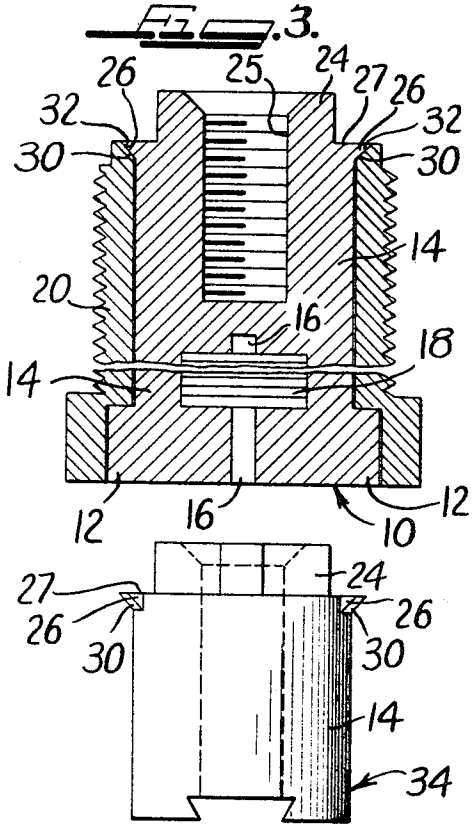


Fig. 4.

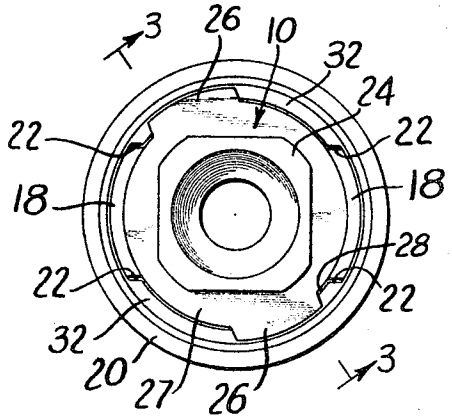


Fig. 2.

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LOCK CONSTRUCTION

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ABSTRACT OF THE DISCLOSURE

A plug and cylinder assembly for a lock in which an outer cylinder has a longitudinal slot along the interior thereof and a rearwardly facing shoulder angularly and rearwardly displaced from at least a portion of the slot. A plug assembly is rotatably received in the cylinder with tumbler means extending radially into the slot and retractable into the plug assembly on insertion of a key into the plug. A lip extends radially from the plug a distance not greater than the depth of the slot, and the lip is angularly displaced from the tumbler means. The lip on the plug bears against the shoulder on the interior of the cylinder to retain the plug assembly within the cylinder, and whereby on retraction of the tumbler means into the plug and out of the slot the plug assembly may be rotated to align the lip with the slot thereby permitting removal of the plug assembly from the cylinder by sliding the lip through the slot.

This invention relates to locking devices and more particularly to a plug and cylinder type lock construction.

A plug and cylinder lock has an outer cylinder in which a rotatable plug is received. The plug carries tumblers which extend radially into one or more slots in the interior wall of the cylinder. When the tumblers are retracted by an appropriate key, the plug can be rotated within the cylinder. Different models of locks have different locking mechanisms secured to the rear face of the plug. One such locking mechanism is a cam which is secured to the rear of the plug and which bears against the rear end of the cylinder preventing the plug from sliding longitudinally out of the cylinder. Other locking mechanisms are provided with retaining means such as washers, snap rings or the like which bear against the rear end of the cylinder to prevent movement of the plug longitudinally out of the cylinder. One problem encountered with such lock constructions occurs when the plug and cylinder assemblies must be handled or shipped without the desired locking mechanism or retaining means being secured to the end of the plug to retain it in the cylinder. Should the plug slide out of the cylinder, the tumblers are free to fall out of the plug. Therefore, there is a need for a plug and cylinder lock which is provided with a simple, efficient means for retaining the plug within the cylinder when the locking mechanism or other retaining means is not secured to the rear of the plug.

A principal object of this invention is the provision of a new and improved plug and cylinder lock construction.

A further object of this invention is to provide a lock construction of the character described including a simple means to retain the plug within the cylinder when the locking mechanism or other retaining means is not secured to the rear face of the plug.

Another object of this invention is to provide a lock construction of the character described including a plug which has means integral therewith and cooperating with the cylinder to retain the plug within the cylinder without employing additional parts such as bearings, snap rings, or other retaining means which must be secured to the rear of the plug to retain the plug within the cylinder.

More particularly, this invention relates to a lock construction of the character described wherein the plug is provided with lips extending radially away from the periphery of its rear face a distance not greater than the depth of the tumbler slots in the interior cylinder wall and being angularly displaced from the tumblers carried by the plug so that on insertion of the key into the plug retracting the tumblers, the plug can be inserted into the cylinder by sliding the lips in the tumbler slots until the lips extend beyond the rear face of the cylinder. The plug can then be rotated to align the tumblers with the tumbler slots and the key can be removed from the plug so that the tumblers extend into the slots to prevent rotating movement of the plug and whereby the lips are angularly displaced out of alignment with the tumbler slots and bear against the rear end of the cylinder to retain the plug within the cylinder.

Further features and advantages will readily be apparent from the following specification and from the drawings, in which:

FIG. 1 is a perspective view of a lock construction embodying the invention, showing the plug retained within the cylinder by the lips of the plug bearing against the rear face of the cylinder, and having a portion of the cylinder cut away for illustration;

FIG. 2 is an elevation view of the rear of the plug and cylinder of FIG. 1;

FIG. 3 is a partial central sectional view taken generally along the line **3—3** of FIG. 1; and

FIG. 4 is a view of a "plug extension" embodying the invention.

The invention is illustrated herein as embodied in a key actuated plug and cylinder lock. Referring to the drawings, a key-lock plug assembly **10** has a front flange portion **12** (FIG. 3), a main plug portion **14**, a key slot **16** extending through the flange portion and main plug portion, and a plurality of tumblers **18** retractable (from their position shown in FIGS. 1 and 2) by inserting a key **19** into the key slot. A cylinder **20** is provided within which the plug assembly **10** is housed. Tumbler slots **22** in the cylinder embrace the tumblers **18** when in their locked position thereby preventing rotation of the plug assembly. On insertion of the key into the plug, the tumblers are retracted to permit rotation of the entire plug assembly **10** to operate a desired locking mechanism (not shown) secured to the rear face of the plug.

For example, the drawings show a rectangular boss **24** to which a locking mechanism such as a cam (not shown) can be secured as by insertion of a threaded bolt into the threaded bore **25**. Should a cam be used, it would bear against the rear end of cylinder **20** to retain the plug assembly **10** in the cylinder. Other locking mechanisms may be used which would normally require a washer, snap ring or the like to be secured to the rear of the plug to retain the plug in the cylinder.

The plug assembly of this invention has a plurality of lips **26** integral therewith and extending radially outward from the periphery of the rear face **27** of the plug assembly **10** to bear against the rear end of cylinder **20** to retain plug **10** in the cylinder. The preferred embodiment, as best seen in FIG. 3, includes a recessed surface or counterbore **28** in the rear end of the cylinder to receive lips **26** so that the rear face **27** of the plug and the integrally formed lips are flush with the rear end of cylinder **20**. The lips **26** extend radially away from the plug **10** a distance not greater than the depth of tumbler slots **22** and are angularly displaced from tumblers **18** which are carried by the plug.

In order that the plug assembly **10** and cylinder **20** may be handled or shipped without securing a locking mechanism or other retaining means to the rear face of the plug, the plug may be assembled to and retained in cylinder **20** in acordance with the following steps. The appropriate key

is inserted into plug assembly **10** to retract tumblers **18** whereby the plug assembly can be inserted into cylinder **20** by sliding lips **26** in tumbler slots **22** until the lips are sufficiently beyond the rear face of the cylinder to permit free rotation of the plug within the cylinder. The counterbore **28** can be provided to receive the lips. The plug is rotated to a point where tumblers **18** are in alignment with tumbler slots **22** and the lips **26** are angularly displaced out of alignment with the tumbler slots. On removing the key from the plug assembly, the tumblers will extend into tumbler slots **22** to prevent rotation of the plug assembly within cylinder **20**. The lips **26**, now being out of alignment with the tumbler slots, bear against the rear end of the cylinder and retain the plug assembly in cylinder **20** without any additional parts being necessary.

The inner surface **30** of each of the lips **26** and the annular surface **32** of the counterbore **28** are but one possible embodiment of interengaging surfaces which may be employed to accomplish the objects of this invention. The surfaces are in engagement when the tumblers **18** are aligned with the tumbler slots **22** to prevent relative longitudinal movement between the plug **10** and cylinder **20**, and are out of engagement when the tumblers are out of alignment with the tumbler slots and the lips **26** are aligned with tumbler slots **22** to permit the plug to move longitudinally out of the cylinder by sliding the lips out through the tumbler slots.

The width of the tumblers **18** (and slots **22**) and the width of the lips **26** may be such that each comprises one-fourth of the perimeter dimension of the plug assembly **10** whereby the lips **26** necessarily are out of alignment with slots **22** when the tumblers are aligned with the slots and whereby the lips necessarily are in alignment with slots **22** when the tumblers are completely out of alignment with the slots.

Thus it can be seen that lips **26** provide a means integral with the plug to retain the same within the cylinder so that these two parts can be handled or shipped without having the desired locking mechanism or other retaining means secured to the rear face thereof. In addition, the lips **26** can be employed with "plug extensions" such as that generally designated **34** and as shown in FIG. 4, and disclosed in our prior application for "Cylinder Lock Construction," Ser. No. 457,619, filed May 21, 1965, and assigned to the assignee of this invention, now Patent 3,336,774.

While we have shown and described certain embodiments of our invention, it is to be understood that it is capable of many modifications. Changes, therefore, in the construction and arrangement may be made without departing from the spirit and scope of the invention as disclosed in the appended claims.

We claim:

1. A plug and cylinder assembly for a lock, comprising: an outer cylinder having a rear end and a generally cylindrical interior wall having a longitudinal slot along the entire length thereof; a plug assembly rotatably received in said cylinder and having a front end adapted to receive a key and a rear end adjacent the rear end of said cylinder; tumbler means carried by said plug intermediate its ends and extending radially into the slot in said cylinder and retractable into said plug assembly on insertion of the key into said plug; and a lip on the rear end of said plug and extending radially therefrom a distance not greater than the depth of said slot, said lip being angularly displaced from said tumbler means and bearing against the rear end of said cylinder to retain said plug assembly within said cylinder, and whereby on retraction of said tumbler means into said plug assembly and out of said slot said plug assembly may be rotated to align said lip with said slot thereby permitting removal of said plug assembly from said cylinder by sliding said lip through said slot.

2. The lock of claim **1** wherein said cylinder includes means defining a rear face which includes a counterbore to receive said lip whereby the lip is substantially flush with the rear end of said cylinder.

3. A plug and cylinder assembly for a lock, comprising: an outer cylinder having a generally cylindrical interior wall having a longitudinal slot therein, and a rearwardly facing shoulder angularly and rearwardly displaced from at least a portion of said slot; a plug assembly rotatably received in said cylinder; tumbler means carried by said plug assembly and extending radially into the slot in said cylinder and retractable into said plug assembly on insertion of a key into said plug; and a lip on said plug extending radially therefrom a distance not greater than the depth of said slot, said lip being angularly displaced from said tumbler means and bearing against said shoulder on said cylinder to retain said plug assembly within said cylinder, and whereby on retraction of said tumbler means into said plug assembly and out of said slot said plug assembly may be rotated to align said lip with said slot thereby permitting removal of said plug assembly from said cylinder by sliding said lip through said slot.

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