Sept. 24, 1957 F. E. BEST 2,807,158

MULTIPLE SHEAR LINE LOCK WITH BREECH LOCK ASSEMBLY MEANS

Filed Dec. 14, 1954

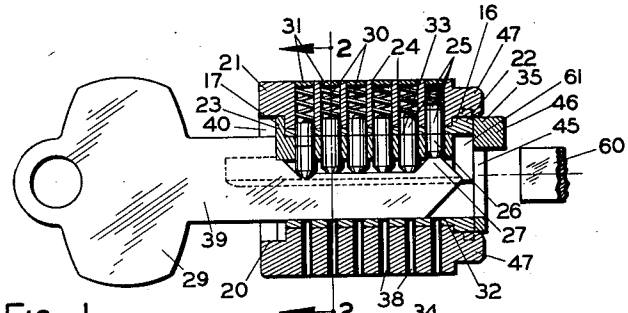


FIG. 1

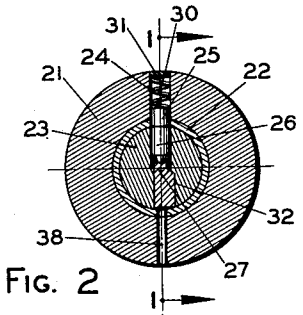


FIG. 2

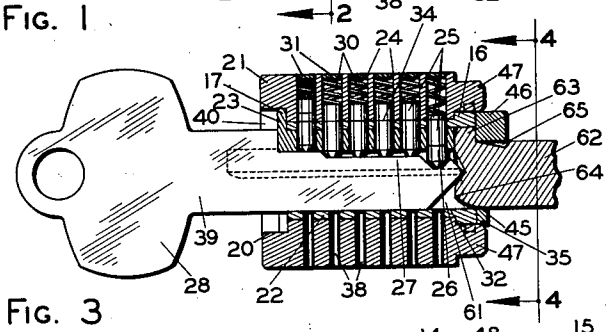


FIG. 3

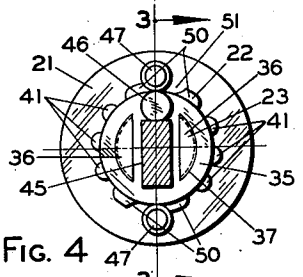


FIG. 4

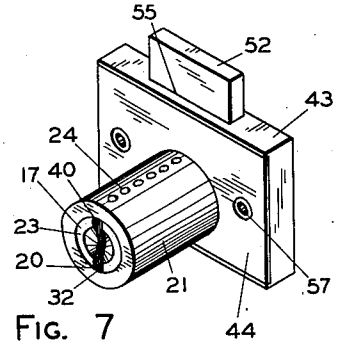


FIG. 7

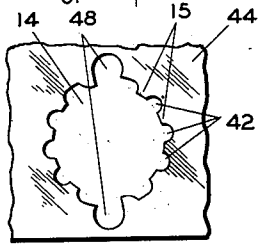


FIG. 6

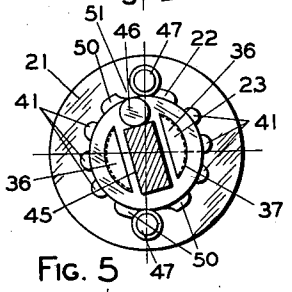


FIG. 5

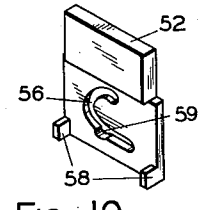


FIG. 10

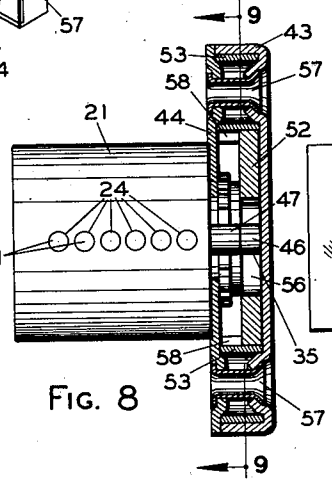


FIG. 8

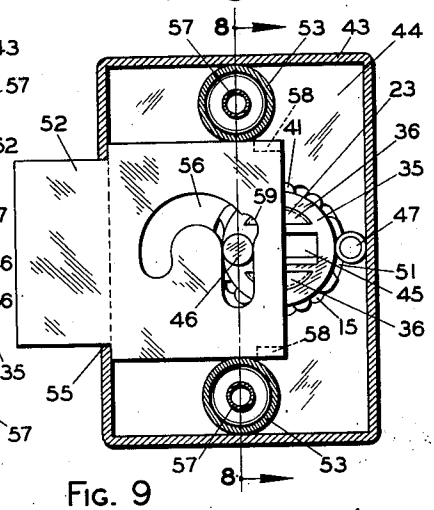


FIG. 9

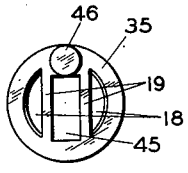


FIG. 11

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United States Patent Office 2,807,158 Patented Sept. 24, 1957

2,807,158

MULTIPLE SHEAR LINE LOCK WITH BREECH LOCK ASSEMBLY MEANS

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Application December 14, 1954, Serial No. 475,065

4 Claims. (Cl. 70—370)

This invention relates to master-keyable pin-tumbler locks of the key-controlled assembly type in which primary lock mechanisms, referred to in the art as "cores," can be assembled and disassembled relative to complementing secondary lock mechanisms by key means.

Such cores require two shear lines, one known as the "control" shear line between a body and a sleeve thereof, and the other known as the "operating" shear line between said sleeve and a key plug, the former controlling the assembly and disassembly of the said core relative to the secondary lock mechanism, while the latter operates the secondary lock mechanism.

The most important object of this invention is the provision of key-operable breech lock means, at the rear or inner end of the core, breech-locking said core into a breech plate in the secondary locking means.

This is accomplished by flanging the rear end of the sleeve with an annular pattern of outwardly extending breech lock lugs cooperating with dowel pins integral with the said body and a mating breech lock plate on the secondary mechanism.

Another important object of this invention is to reduce the sleeve to a cylindrical member, as well as the core itself to a concentric cylinder.

Another object is to reduce the distance between the two said shear lines so as to be able frequently to use as few as two pin tumblers in a pin stack with only a single "break" therebetween that serves selectively with each of the said shear lines.

Another object of my invention is to dispense with the need of the ordinary core housing in many adaptations at a great saving in manufacturing costs.

Other objects are to make a smaller, more compact and rugged core, and one that is more flexibly adaptable to a wider range of secondary mechanisms.

Another object is to increase the master-keying flexibility and security of any system using said core as its unit. This is done by using pin tumblers of smaller diameter and placing them closer together so as to provide more pin stacks for a given length of core.

Another object is to improve the key plug retaining means by stronger and more rugged structure more easily applied.

Another important object is to increase the number of, adaptability of, and diversity of, direct throw means available between the core and its secondary mechanism.

Another important object is to provide a core mechanism that can be made on commercial machines with fewest and most ordinary operations to thus cut the cost of manufacture.

Other objects will appear as the description of my invention unfolds in connection with the accompanying drawings.

In the drawings:

Fig. 1 is a longitudinal cross section of a primary lock mechanism taken on line 1—1 of Fig. 2, showing an operating key and tumbler pins in relief with the tumbler pins lined up to provide an operating shear line and showing a fragment of one possible throw member with which the primary lock mechanism may cooperate.

Fig. 2 is a transverse cross section of the primary lock mechanism taken on line 2—2 of Fig. 1 and showing tumbler pins in relief.

Fig. 3 is a longitudinal section of the primary lock mechanism, taken on line 3—3 of Fig. 4 and showing a control key and tumbler pins in relief with the tumbler pins lined up on a control shear line and further showing another possible type of throw member.

Fig. 4 is a transverse sectional view through the throw member taken on line 4—4 of Fig. 3 and showing the breech lock mechanism in a locked position.

Fig. 5 is a view similar to Fig. 4 except that it is shown with the rear breech lock mechanism rotated into an unlocked position through the use of a control key.

Fig. 6 is a fragmentary plan view of a breech plate showing the same in a position for superposing it over Fig. 5.

Fig. 7 is an isometric view of the primary lock mechanism showing the same assembled with a secondary lock mechanism which, in this instance, is a cabinet lock, one of many possible adaptations.

Fig. 8 is a view in cross section of the cabinet lock taken on line 8—8 of Fig. 9 and showing the primary lock mechanism in relief.

Fig. 9 is a cross section of the cabinet lock taken on line 9—9 of Fig. 8 and showing the bolt and breech lock mechanism in relief.

Fig. 10 is a detached isometric view of the secondary bolt member shown in the cabinet lock.

Fig. 11 is a detached plan view of a key plug retainer used on the inner end of the key plug of the primary lock mechanism.

Like reference numerals designate like parts throughout the several views.

The primary lock mechanism shown in Figs. 1 to 5 inclusive and Fig. 11 comprises four main parts, namely, a core body **21**, a sleeve **22**, a key plug **23** and a key plug retainer **35**. The core body **21** houses the sleeve **22** which in turn houses the key plug **23**. Pin holes **24** in the core body and sleeve and key plug receive and hold outer tumbler pin parts **25** and inner taper tipped tumbler pin parts **26**. The tumbler pin parts **26** contact the key bit **27** of either a control key **28** or an operating key **29**. Springs **30** held in place by core caps **31** press the tumbler pins down onto the key bit **27**. If a correct key is inserted in a keyway **32** of the key plug **23** the tumbler pins will line up either on the operating shear line **33**, as shown in Fig. 1, or on the control shear line **34**, as shown in Fig. 3.

A key plug retainer member **35** is secured to the inner end of the key plug **23**. The key plug retainer **35** has a normally upright medially positioned rectangular slot **45**, Fig. 11, to receive a throw bar. Two lands or strips of metal **19** separate the slot **45** from two symmertically positioned stake receiving slots **18**. The inner end of the key plug **23** is provided with two integral stakes or studs **36** and the key plug retainer **35** is attached to the key plug **23** by riveting the studs **36** of the plug **23** outwardly over adjacent parts of the retainer **35**, as indicated by **37** in Figs. 4 and 5. The lands **19** prevent bending the key plug studs **36** inwardly in the process of riveting the outer portions of these studs over the retainer **35**.

The key plug **23** has a shoulder **17** on its outer end which overlaps the outer end of the sleeve **22** and also overlaps part of the core body **21**. This shoulder or flange **17** is positioned within a suitable recess **20** in the end of the core body **21**. The inner end of the sleeve has an outwardly extending flange **16** which overlaps a portion of the inner end of the core body **21**. The key plug retainer **35** and flanges **16** and **17** cooperate in preventing

relative longitudinal displacement of the core body **21**, sleeve **22** and key plug **23**.

Ejector holes **38** in the core body **21** and sleeve **22** make it possible to re-combinate the primary mechanism by permitting a tool of small diameter to be inserted through these holes to press the pins **25** and **26** and springs **30** and caps **31** upwardly and out of the parts **21**, **22** and **23**. The plug **23** acts as a key stop with the key shaft **39** fitting into a cross slot **40** in the outer end of the key plug **23**. This cross slot **40** acts as a drive slot and takes the torsional load between the key and the key plug and reduces the danger of the key bit being sheared off.

The sleeve **22** carries breech lock lugs **41** and **50**. These lugs **41** and **50** are spaced apart and extend outwardly from the sleeve flange **16** and are dimensioned and positioned so as to allow them to pass between inwardly directed segments **15** and through slots **42** which are arranged around a sleeve receiving opening **14** in a breech plate **44**. The breech plate **44** is usually part of a secondary lock housing but obviously it could be part of a different mechanism. The breech plate **44** has at least one and preferably two larger notches **48** which extend outwardly far enough so as to overlap part of the end of the core body **21** and will receive and fit over studs **47** on the inner end of said core body.

The contour of the part of the breech plate **44** bordering or extending around the opening **14** is the same in all instances but the secondary mechanism with which the breech plate is assembled or associated may vary widely, depending on requirements. The torque take-off means shown in Fig. 1 is a throw member or bar **60** of rectangular cross section which may be an attached part of a secondary lock mechanism capable of operating a secondary bolt. The end portion of this throw member **60** simply fits into and is received within the slot **45**, and possibly within an adjacent slot **61** in the key plug **23**, when the primary lock mechanism is applied to the secondary lock mechanism. Another throw member or bar **62**, also rectangular in cross section, is constructed so that it will be withdrawn from the secondary mechanism when the primary lock mechanism is dis-assembled therefrom. This throw bar **62** has a lug **63** on the outer end thereof which enters the slot **61** in the inner end of the key plug and engages with the key plug retainer **35** like a hook. A corner **64** of the bar **62** is rounded off and a notch **65** is provided in said bar adjacent the lug **63** so that the throw bar **62** may be applied to and detached from the primary lock mechanism by tilting the extended end of the bar upwardly from the position in which it is shown in Fig. 3. As illustrative of a third type of torque take-off or throw means an eccentric throw pin **46** is provided on the key plug retainer **35** and may operate as hereinafter described to move a secondary bolt.

The studs or dowel pins **47**, which are preferably integrally formed on the inner end of the core body **21**, are beveled to facilitate their insertion into the larger notches **48** of the breech plate **44**. Breech lugs **50** on the sleeve **22** are positioned on opposite sides of the dowel pins **47** and restrict rotary movement of the sleeve **22** to the amount allowed by the space **51** between each pair of lugs **50**.

Figs. 4 and 5 show two extreme rotated positions of the sleeve **22** and Fig. 5 shows the lugs **41** and **50** of said sleeve **22** correctly positioned for assembly with the breech plate **44** of Fig. 6. The lugs **41** and **50** are moved into the Fig. 5 position by inserting the control key **28** and rotatively moving the sleeve **22** and plug **23** counter-clockwise, as respects the showing in Fig. 5, until stopped by engagement of the lugs **50** with the dowel pins **47**. After the lugs **41** and **50** have been passed through the breech plate slots **42** the control key **28** is rotatively moved in the opposite direction back to a starting position. This moves the lugs **41** and **50** out of registration with the notches **42** and into alignment with the segments **15**. The control key **28** may then be withdrawn leaving the lugs **41** and **50** locked in engagement with the segments **15**. In this position the dowel pins **47** are seated in the openings **48** of the breech plate **44** and the primary lock mechanism is firmly and immovably locked to the breech plate.

Figs. 7 to 10 inclusive illustrate an adaptation of this primary lock mechanism to a secondary lock mechanism in the form of a cabinet lock which comprises a housing **43** having, as its front wall, the breech plate **44**. This cabinet lock has a bolt **52** which is guided between two tubular guide and spacer members **53** and is slidable in an opening **55** in an edge of the housing **43**. Hollow rivets **57** extend through the tubular spacer members **53** and secure the breech plate **44** to the housing **43**. The inner part of the bolt **52** is preferably thinner than the outer or locking portion of said bolt and this thinner bolt part may have short legs **58** which extend transversely from the inner end portion thereof and contact the breech plate **44**. This conveniently supports the thinner portion of the bolt **52** in spaced relation from the breech plate **44** and provides clearance for the parts of the primary lock mechanism which protrude through the breech plate **44** into the secondary lock housing **43**.

An approximately J-shaped slot **56** in the thinner part of the bolt **52** receives the throw pin **46** of key plug retainer **35**. A notch **59** in the wall of the J slot **56** prevents rotary movement of the primary lock mechanism, including throw pin **46**, in the wrong direction, namely clockwise as respects the showing in Fig. 9. This obviates confusion on the part of persons operating the lock. The primary lock parts are always in the position in which they are shown in Fig. 9 when the key plug **23** is locked against rotation. If the bolt **52** is in an outwardly projected position, as in Fig. 9, then inserting an operating key **29** in the primary lock mechanism and moving the throw pin **46** three hundred sixty degrees counter-clockwise will retract the bolt **52** and leave it locked in the retracted position with the throw pin **46** in the shorter arm of the "J" shaped slot **56**. From this retracted position of the bolt **52** movement of the throw pin **46** three hundred sixty degrees in a clockwise direction will return the bolt **52** to the locking position in which it is shown in Fig. 9 and leave it locked in this position.

Obviously changes in this invention may be made within the scope and spirit of the appended claims.

Having described my invention what I claim as new and desire to protect by Letters Patent is:

1. In a lock having at least two shear lines, primary lock mechanism including a rotatively movable key operated sleeve; secondary lock means including a breech plate having a sleeve-receiving opening therein, the annular part of the breech plate extending around the sleeve-receiving opening, having inwardly directed spaced apart segments with notches therebetween; and outwardly extending spaced apart breech lock lugs on the inner end portion of said sleeve interfitting and releasably engaging with the notched and segmented portion of said breech plate and locking said primary lock mechanism and said secondary lock means together.

2. In a lock, a core body having at least one dowel pin protruding from its inner end; a sleev rotatively movable in said core body; a key plug rotatable in said sleeve; tumbler pins interconnecting said key plug and sleeve and core body providing two shear lines aligned by different key combinations; a breech plate extending across the inner end of said key plug and sleeve and core body, said breech plate having therein a sleeve-receiving opening, the annular part of the breech plate extending around said sleeve-receiving opening having spaced apart inwardly directed segments with notches therebetween, at least one of said notches overlapping the inner end of said core body and receiving therein a dowel pin of the core body, whereby the core body and breech plate are supported against relative rotation; and outwardly extending spaced apart lugs on the inner end portion of said sleeve mating

and interfitting the segments and notches of the breech plate and releasably securing the core body and sleeve and key plug to the breech plate.

3. The apparatus as claimed in claim 2 in which at least two adjacent breech lock lugs on the inner end portion of the sleeves are spaced apart a distance greater than the transverse dimension of the dowel pin on the inner end of the core body and are positioned to receive therebetween said core body dowel pin, whereby a predetermined limited amount of rotary movement of the sleeve in the core body is provided.

4. In a lock, a core body; a sleeve rotatively movable in said core body; a flange on the inner end of said sleeve overlapping said core body; a key plug rotatable in said sleeve; a flange on the outer end of said key plug overlapping said sleeve and said core body; a plug retained secured to the inner end of said key plug and overlapping said sleeve; tumbler pins interconnecting said key plug and sleeve and core body providing two shear lines aligned by different key combinations, one shear line providing

rotary movement of the sleeve and key plug within the core body and the other shear line providing rotary movement of the key plug within the sleeve; secondary lock mechanism including a breech plate having an opening, the marginal portion of said breech plate around said opening having inwardly directed segments with notches therebetween; and outwardly extending spaced apart lugs on the inner end portion of said sleeve mating and interfitting the segments and notches of said breech plate and releasably securing said sleeve and core body and key plug to said breech plate.

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