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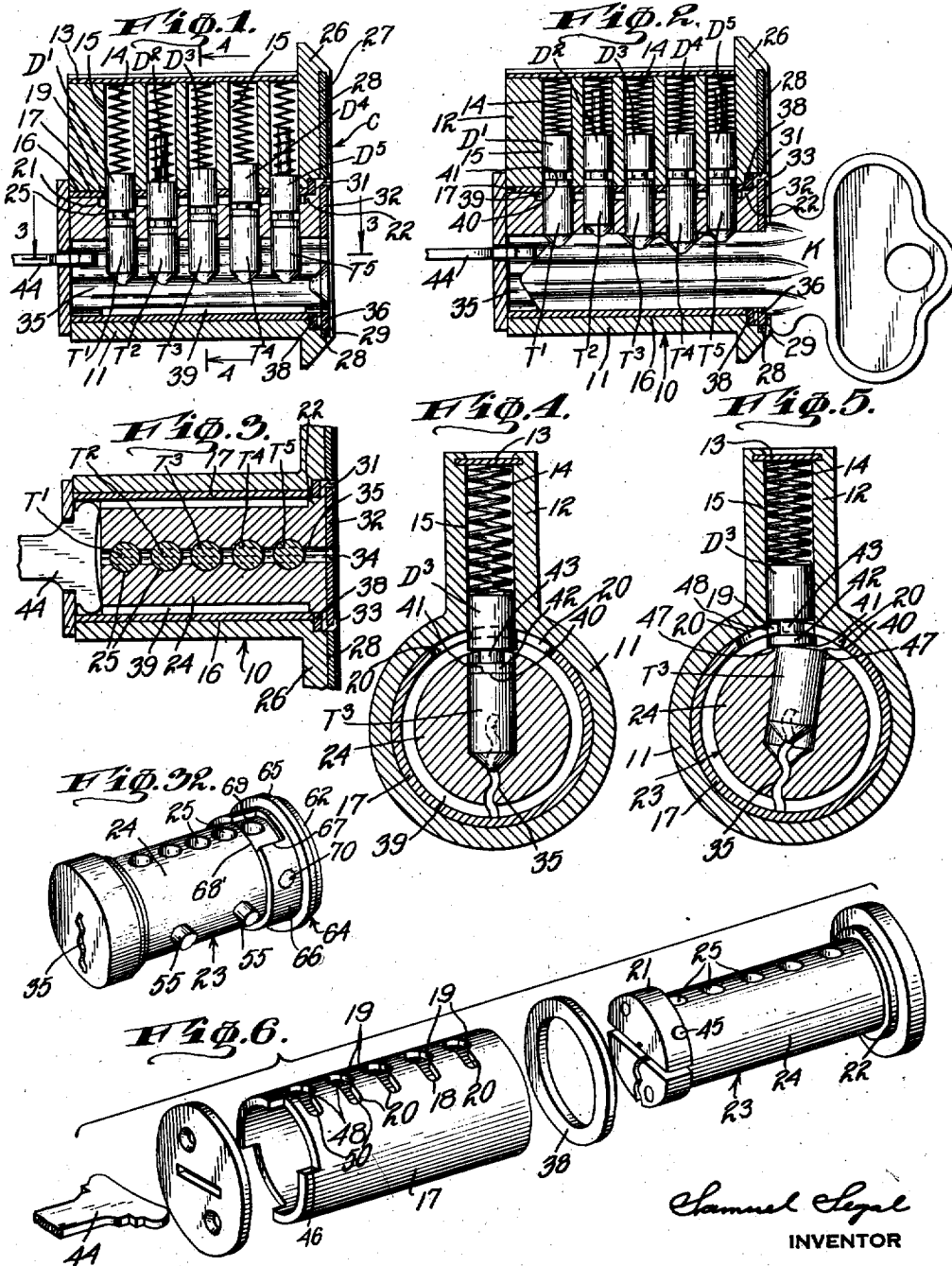
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PICKPROOF LOCK

Filed Dec. 29, 1937

3 Sheets-Sheet 1



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March 15, 1938.

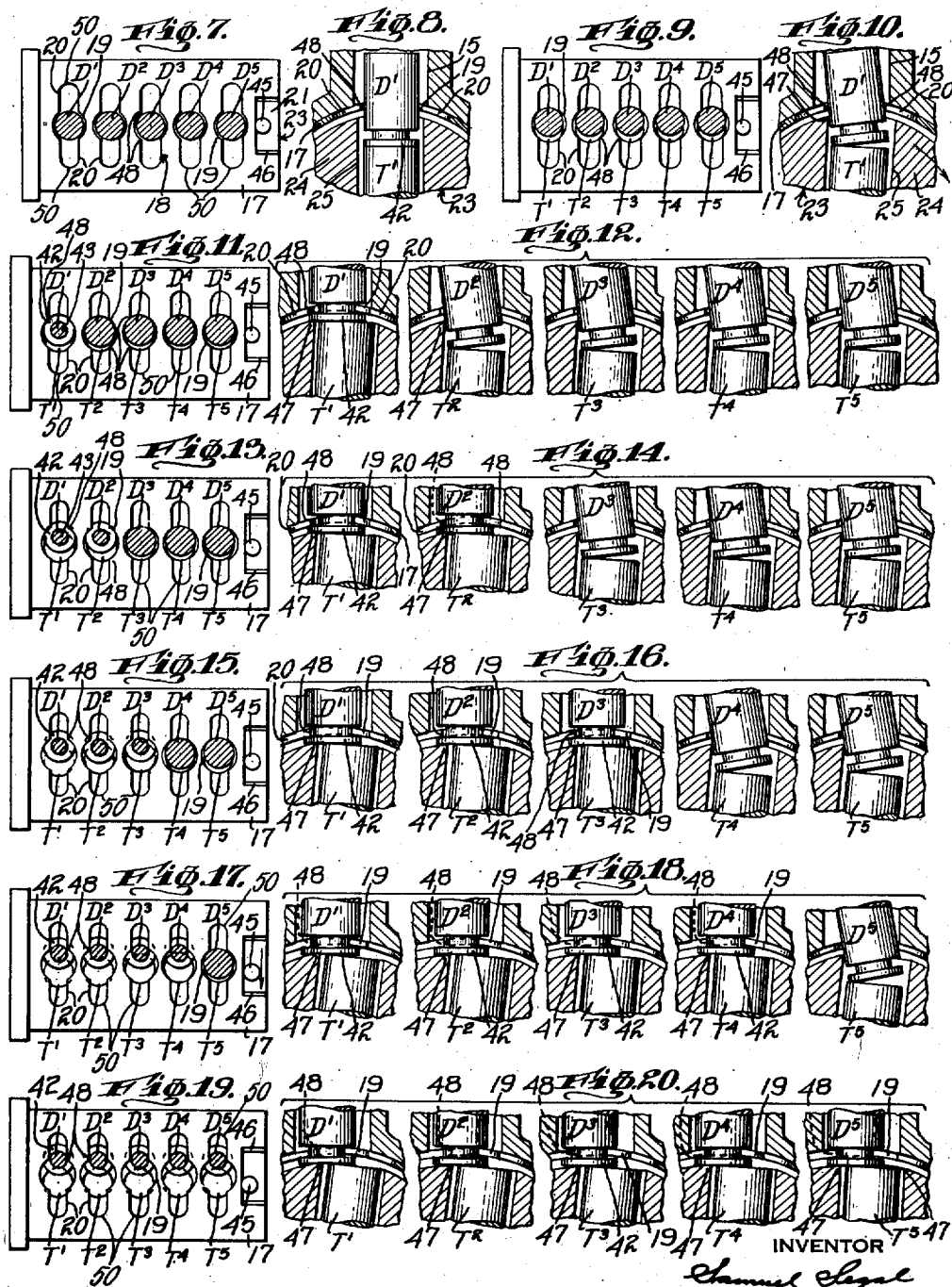
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3 Sheets-Sheet 2



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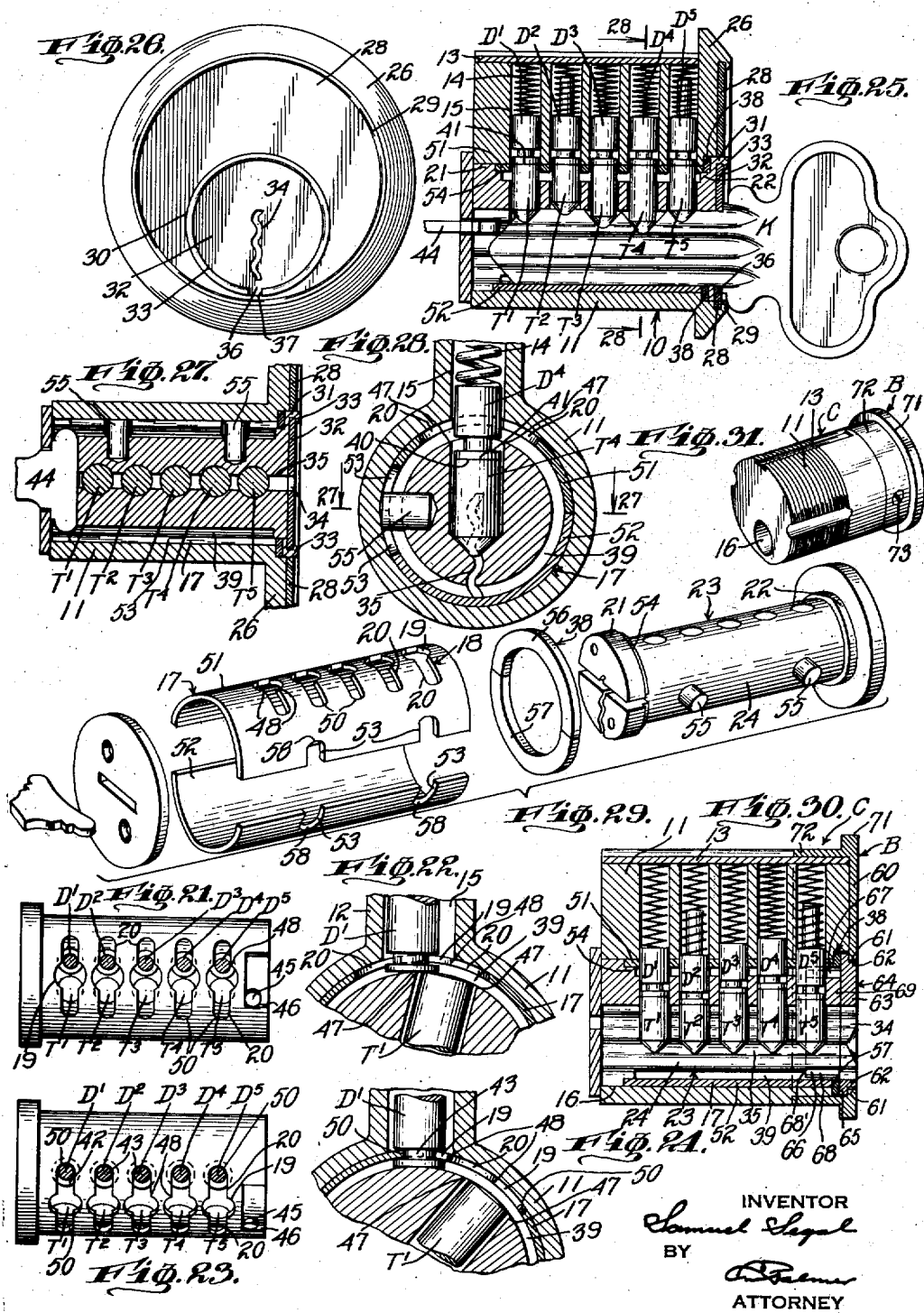
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PICKPROOF LOCK

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UNITED STATES PATENT OFFICE

2,111,098

PICKPROOF LOCK

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55 Claims. (Cl. 70—364)

The present invention is generally directed to locks and is particularly concerned with cylinder locks of the type having a tumbler and key receiving rotatable barrel cooperatively associated with a set of spring controlled driving members slidably disposed in a housing of a shell independent of the barrel and in such manner that upon the insertion of a properly mated key into the barrel the tumblers and the superimposed driving members line up in a predetermined fashion to permit appreciable rotation of the barrel relative to the shell. Cylinder locks of the type referred to are capable of being readily picked by a skilled but unauthorized operator in the utilization of illegal instrumentalities. This practice is well known in the art and the precise process employed need not be pointed out specifically apart from calling attention to the fact that a cylinder lock can be picked because of the play or tolerances ever present between the rotatable barrel and its shell or casing, between the lower set of tumblers and the rotatable barrel, between the upper driving members and the barrel, and between the upper driving members and the housing. Many attempts heretofore have been made to construct a pick proof cylindrical lock of one kind or another. A careful study of the prior art relating especially to so-called cylinder locks will bear out this point of view. However as far as I know cylinder locks of this type can be picked. This fact has been established time and time again and is indisputably recognized in actual practice. Consequently the dominating object of the present invention is realized in the provision of a serviceable cylinder lock which actually and in practice does resist unauthorized attack by picking. The invention has as a further object the provision of a novel and successful non-pickable lock comprising a sleeve having circumferentially disposed so-called butterfly slots and wherein the sleeve is interposed between the bearing of the shell and the key receiving barrel and constitutes means for initially trapping superimposed mushroom type driving members during so-called "tensioning" of the barrel preparatory to the selective operation of picking the lower set of tumblers. The invention has as a further object the provision of an improved non-pickable cylinder lock wherein a movable sleeve having butterfly slots each having a central enlarged part and oppositely extending reduced parts or wings, is mounted on a tumbler receiving cylindrical barrel and wherein the mushroom driving members cooperate with the tumblers upon insertion of a properly mated key

into the barrel to permit adequate rotation of the latter and wherein upon the removal of the properly mated key and in a neutral position of the barrel, the driving members are automatically arranged in part within expanded central parts of the butterfly slots and project into the tumbler receiving bores of the barrel and thus serve as lock means to prevent rotation of the sleeve and barrel. The invention comprehends as a further object the provision of a relatively rugged and durable lock of the character referred to wherein a rotatable sleeve is utilized in association with the key receiving barrel to initially resist proper raising of the driving members above the outside surface of the sleeve during picking operations and wherein subsequently the sleeve is rotatably displaced in respect to these driving members whereby the latter are caused to be closely straddled by adjacent walls of the winged parts of the butterfly slots of the sleeve thus causing the driving members to be interlocked with the sleeve and consequently the driving members cannot be raised above the outer surface of the sleeve and be freed from the latter by an unauthorized operator. The invention has as another important object to provide a sleeve on a key receiving barrel which sleeve may be rotated in respect to the barrel to positively interlock with spaced parts of the driving members at which time the lower set of tumblers are in part or fully out of alignment with companion mushroom driving members and consequently the sleeve in such instance acts as closure means to prevent lifting of the tumblers to prevent their projection at least in part or in whole above the sleeve. Other important objects, advantages, features, and aspects of the invention will be more readily understood from the teachings of the following description considered in connection with the accompanying drawings in which:

Fig. 1 is a longitudinal sectional view of the pick proof lock according to my invention, however showing the spring actuated driving members in a normal position and interlocked with a rotatable sleeve and barrel to prevent rotation of the key receiving barrel.

Fig. 2 is a view similar to Fig. 1 however illustrating a properly mated key within the barrel, and the driving members or "mushroom" drivers lined up with the lower tumblers and outside of the sleeve whereby the barrel may be appreciably rotated.

Fig. 3 is a sectional view taken along the line 3-3 of Fig. 1.

Fig. 4 is an enlarged sectional view taken on the line 4—4 of Fig. 1.

Fig. 5 is a view similar to Fig. 4 but showing the relation of an upper mushroom driver in respect to the barrel and its companion tumbler after the mushroom has been picked from the barrel but unpicked from the encompassing movable sleeve.

Fig. 6 is an exploded view of parts associated with the key receiving barrel shown in perspective.

Fig. 7 is a schematic plan view of the barrel in a neutral position thereof in respect to the sleeve and showing the mushroom drivers in section.

Fig. 8 is a fragmentary enlarged sectional schematic and exaggerated view to show the relation of a tumbler and its companion driver when the barrel is in a neutral position in respect to the movable sleeve.

Fig. 9 is a view similar to Fig. 7 but illustrating the barrel under tension and the relation thereof in respect to the movable sleeve preparatory to the operation of picking.

Fig. 10 is a view similar to Fig. 8 but illustrating the cocked relation of a mushroom driver when the barrel has been slightly rotated or placed under tension.

Fig. 11 is a schematic plan view showing the relation of the sleeve with respect to the barrel and mushroom drivers when one of the mushroom drivers has been picked from the barrel.

Fig. 12 is a fragmentary but magnified sectional and exaggerated view illustrating the relation of the drivers and tumblers when in the condition shown in Fig. 11.

Fig. 13 is a schematic plan view showing the relation of the sleeve in respect to the barrel and mushroom drivers when two of the mushroom drivers have been picked from the barrel.

Fig. 14 is a fragmentary enlarged sectional and schematic view showing the relation of the drivers and tumblers when two of the drivers have been picked.

Fig. 15 is a view similar to Fig. 13 but showing three drivers picked from the barrel.

Fig. 16 is a view similar to Fig. 14 but showing the relation of the drivers and tumblers when three of the drivers have been picked from the barrel.

Fig. 17 is a view similar to Fig. 15 but illustrating four drivers picked from the barrel.

Fig. 18 is a view similar to Fig. 16 showing four picked drivers and one cocked or unpicked driver to illustrate the relation of the drivers and tumblers shown in Fig. 17.

Fig. 19 is a view similar to Fig. 17 however depicting all of the five drivers in a picked relation in respect to the barrel but in an unpicked relation to the movable sleeve.

Fig. 20 illustrates in section and in a magnified and exaggerated fashion, the relation of the drivers and tumblers in the condition shown in Fig. 19.

Fig. 21 is a view similar to Fig. 19 but showing all of the drivers picked from the barrel and the driving pin of the barrel is starting to abut the sleeve to set the latter in rotation from its previous fixed position.

Fig. 22 is an enlarged fragmentary transverse sectional view of Fig. 21 showing a superimposed driver picked from the barrel but unpicked in respect to the sleeve and the barrel in rotatable relation in respect to the driver.

Fig. 23 is a view showing the relation of the sleeve and the drivers after the sleeve has been rotated to one extreme limit by the plug and in

such relation the attenuated parts of the drivers are at the extreme limit of associated attenuated winged parts of the butterfly slots of the sleeve.

Fig. 24 is a magnified fragmentary sectional view of Fig. 23 showing a mushroom driver at one end of the winged part of its butterfly slot and its companion tumbler completely out of alignment therewith.

Fig. 25 is a view similar to Fig. 2 but in Fig. 24 a split movable trap or sleeve is employed of the type shown in Fig. 29.

Fig. 26 is a front view of Fig. 2 or 25 but with the mated key thereof removed.

Fig. 27 is a sectional view taken on the line 27—27 of Fig. 28.

Fig. 28 is a sectional view on the line 28—28 of Fig. 25 and

Fig. 29 is an exploded view showing the barrel, the split sleeve and associated parts thereof in perspective of the form shown in Fig. 28.

Fig. 30 is a vertical sectional view of another embodiment according to the invention.

Fig. 31 is a perspective view of the lock shown in Fig. 30 and

Fig. 32 is a perspective view of the key receiving rotatable barrel shown in Fig. 30 with the butterfly slotted sleeve thereof removed.

Illustrative of the several embodiments disclosed, the cylinder lock is generally denoted C and comprises a casing having a cylindrical shell 11 integrally associated with the upstanding spaced walls 12 bridged by fixed closure plate 13 and defining a housing, enclosing helicoidal springs 14 mounted on cylindrical drivers D¹, D², D³, D⁴ and D⁵ slidably arranged in bores 15 of the housing. Shell 11 includes a cylindrical bore or bearing 16 for rotatably guiding a cylindrical sleeve 17 having a plurality of circumferentially arranged so called butterfly slots 18 spaced lengthwise of the sleeve.

Each butterfly slot 18 comprises an enlarged circular and central cut out portion 19 and laterally extending restricted gaps or winged openings 20 and sleeve 17 is rotatably mounted and guided on the annular shoulders 21 and 22 of the rotatable barrel generally designated 23 which includes a reduced shank or body 24 provided with a plurality of spaced bores 25 for slidably guiding the lower set of cylindrical tumblers T¹, T², T³, T⁴ and T⁵.

Integral with the forward part of casing 10 is an annular flange 26 having a recess 27 in which is arranged a hardened steel disc 28 suitably anchored in place by the inwardly turned annular lip 29. This disc 28 may be of armor steel to resist drilling and is provided with a circular but eccentrically disposed opening 30 which closely encompasses the interrupted annular forwardly projecting flange 31 which in turn closely encompasses the hardened steel disc 32 anchored in place by the inwardly turned interrupted lip 33 of the forwardly projecting flange 31 extending from the barrel. Disc 32 may be also of armor steel and is provided with a key receiving slot 34 in registration with the key receiving slot 35 of the shank 24 of the barrel 23. The drill resisting disc 32 embodies a lug or key 36 fitting closely into gap 37 defined by the spaced terminals of the interrupted annular lip 33 (see Fig. 26).

As shown disc 32 is in advance of the hard steel floating ring 38 which is rotatably seated and guided on the annular shoulder 22 and is arranged to freely rotate against an annular shoulder in the casing near the forward end of

sleeve 17. This ring constitutes means to resist unauthorized attack of the sleeve and in effect is a guard for the sleeve which in association with the shank 24 of the barrel defines the annular gap 39. In other words, ring 28 is a shield to prevent access to the sleeve and cannot be effectively utilized during "jamming" by an unauthorized person to directly couple the sleeve and barrel.

As shown in Fig. 1, the cylindrical drivers D^1 , D^2 , etc. project into the enlarged circular openings 19 of the butterfly slots 18. Therefore the sleeve is locked and cannot be rotated. The lower parts of several of these drivers also project into bores 25 of shank 24. Hence the barrel is also locked and cannot be rotated. In Fig. 1, the properly mated key K is withdrawn from the barrel and consequently springs 14 automatically set the superimposed drivers to interlock with the sleeve and barrel as indicated and consequently the lower set of tumblers fall to their lowest position.

If the properly mated key K be inserted within the barrel the tumblers are raised and consequently their companion drivers are lifted. If the key K be properly mated with the tumblers, the lower parts of the drivers are slidably forced out of the expanded central openings 19 of the slotted sleeve 17 while the upper parts of the tumblers project into these central openings 19 of the butterfly slots and are flush with the exterior surface of the sleeve (as shown in Fig. 2). In such relation of the drivers and tumblers the key K may be rotated. Therefore the barrel or plug is rotated but the sleeve 17 is also rotated since the upper parts of the tumblers serve as the driving means for the sleeve. In other words when a properly mated key be inserted into the barrel, the upper surface 40 of the tumblers and lower surfaces 41 of the disc shaped flanges or mushrooms 42 depending from the depending neck or attenuated parts 43 of the drivers are in alignment with the exterior surface of the sleeve. Thus the sleeve is freed of the drivers and the tumblers are in position to lock the sleeve to permit the latter to be bodily rotated with the barrel and in such event tongue 44 suitably retained by the barrel is also rotated to control bolt operating means not shown.

Referring now to Figs. 7 to 24 inclusive, it will be noted that in Fig. 1 the barrel 23 is in a neutral position relative to sleeve 17 and the drivers D^1 , D^2 , etc. are within the openings 19 of the butterfly slots 18. Hence the plug defined by sleeve 17 and barrel 23 cannot be rotated unless a properly mated key has been inserted into the barrel. Normally therefore, with the key withdrawn, the sleeve 17 may be said to take its neutral position shown in Figs. 1 and 7 and in such neutral position driving pin 45 secured to flange 21 is centrally disposed in slot 46 at the rear end of the sleeve 17.

In Figs. 7 to 24 inclusive, the tolerances or clearances between the drivers, housing, sleeve, and barrel have been exaggerated to show schematically the relation of the tumblers and drivers in respect to the sleeve, barrel, and housing during unauthorized picking or attack of the pick proof lock according to the invention.

The showing of Fig. 8 may be said to indicate a neutral position of sleeve 17 and the tolerances existing around the drivers and tumblers are taken advantage of to actually trap the drivers during unauthorized attack. The initial step in picking is to "tension" the barrel, that is, to

slightly rotate the barrel to take up its play. If it is assumed that the play has been taken up by turning the barrel in a clockwise direction as indicated by the arrow in Fig. 10 the drivers become slightly tilted and there is a slight clearance or offset between the drivers and tumblers as shown in Fig. 9 and the drivers are caused to tilt slightly by reason of corners 47 striking the lower parts of the drivers.

If therefore an unauthorized tool be inserted into the key receiving slot of the barrel to actuate any of the lower tumblers, say for example, T^1 in the attempt to pick its companion driver D^1 , tumbler T^1 may be lifted to raise its driver D^1 above corner 47, (Fig. 12) that is, its mushroom 42 can in picking be raised above corner 47 but the marginal portions thereof come slightly under the nibs 48 defined by the walls of the adjacent gap 20 and the central opening 19 of the companion butterfly slot 18. Hence this mushroom 42 is caught by the sleeve and hence it cannot be elevated further, or out of the sleeve and under such circumstances driver D^1 may be said to be picked from the barrel but unpicked from the sleeve and now there exists a slightly greater offset between the driver D^1 and its tumbler T^1 although the remaining drivers are merely under tension as shown in Figs. 11 and 12.

Feeling fairly contented that driver D^1 has now been "picked", the unauthorized operator, may then start to attempt to free the next driver D^2 . Under such circumstances, tumbler T^2 is manipulated by an unauthorized tool and if sufficiently raised the companion mushroom 42 of driver D^2 can be elevated above the associated corner 47 but it also moves under adjacent spaced nibs 48 of its butterfly slot and thus extends appreciably under the nearest winged opening 20 as shown in Figs. 13 and 14, thereof leaving a larger offset or clearance between the driver D^2 and its tumbler T^2 as shown and in this instance the driver D^1 also takes a similar offset position in respect to its tumbler T^1 .

Now drivers D^1 and D^2 have been raised and locked against upward movement in respect to the sleeve but driver D^3 , D^4 and D^5 remain in their tensioned relation as clearly evidenced by Figs. 13 and 14. If therefore driver D^3 is manipulated by operating its companion tumbler T^3 its mushroom flange 42 may be raised above its associated corner 47 of the barrel and in such case it is locked by nibs 48 and the marginal portions of the walls adjacent its winged opening 20 against upward displacement. However at this time the previously raised drivers D^1 and D^2 increase their offset relation in respect to their companion tumblers and thus become further trapped as shown in Fig. 15. With the drivers D^1 , D^2 and D^3 raised out of the barrel, the remaining drivers are held under tension (Fig. 16).

Having positioned drivers D^1 , D^2 and D^3 , tumbler T^4 is attacked to elevate its companion driver D^4 which may be raised above corner 47 as shown in Fig. 18 but it should be noted that its mushroom 42 is clear of corner 47 and is considerably underneath the sides of its companion winged opening 20 and at this time the mushrooms 42 of the previously raised drivers D^1 , D^2 and D^3 likewise have crept further and considerably underneath the walls of their respective winged slots 20. It should be noted also that when drivers D^1 , D^2 , D^3 and D^4 have been raised from the barrel during picking and are in the position illustrated in Fig. 17, their depending

necks 42 have just about entered the adjacent winged openings 20.

In Figs. 19 and 20 all of the drivers have been picked to be clear of the barrel but prevented from being raised from the sleeve since the mushroom flanges 42 and the body of the driver above the necks 42 now straddle the sides of the winged or attenuated openings 20 of the butterfly slots and thus interlock with the sleeve and consequently they cannot be raised out of the sleeve. With all of the drivers free of the barrel the latter may be appreciably rotated since at this time all of the mushroom 42 merely yieldingly engage the exterior surface of the shank 24 of the barrel. Such rotation however is limited by the action of the depending necks 43 when struck by the end walls 50 of the winged openings.

With Figs. 19 and 20 under consideration attention is directed to the appreciable offset relation of the upper drivers in respect to their companion tumblers and the position of driving pin 45 of the barrel relative to slot 46 of the sleeve 17.

Now although the necks of all of the drivers are within gaps 20 of the butterfly slots 16 and all of the mushrooms are prevented from being upwardly displaced because of the interlocked relation of the drivers with the sleeve, the barrel still may be rotated in respect to the sleeve and consequently as the barrel is rotated in the same direction, that is, as indicated by the arrow in Fig. 17, driving pin 45 ultimately reaches an end wall of slot 46 of the sleeve as shown in Fig. 21.

With pin 45 against an end wall of the slot 46, rotation of the barrel will cause the sleeve 17 to rotate in the same or unitary direction that is, bodily therewith and consequently necks 43 of the drivers are ultimately struck by ends 50 of the attenuated gaps 20, that is to say, as the sleeve is rotated, the drivers although now stationary become further and further trapped by the sleeve and when corresponding ends 50 of the butterfly slots strike necks 43 neither the sleeve nor barrel can be turned in the same direction since these necks now act as stops for the sleeve (see Figs. 23 and 24). In the tumbler and driver relation shown in Figs. 23 and 24, the drivers cannot be removed from the sleeve and the tumblers cannot be raised out of the sleeve which acts as a stop and are underneath the reduced gaps 19 of butterfly slots.

It follows that even though the barrel may be rotated appreciably although not sufficiently to actuate tongue 44 the required throw, the drivers cannot be raised to a position to be outside of the sleeve in the process of picking with unauthorized means and if the attempt is made to raise the tumblers out of the sleeve in the position shown in Fig. 24, they will strike the sleeve but could not be positioned above or through the latter.

The unauthorized operator therefore finds himself in a very uncomfortable situation even though all the drivers have been raised above the barrel which gives the operator an initial feeling that he has made considerable progress but ultimately finds himself completely at a loss unless of course he desires to start all over again by revolving the barrel in a counter direction to cause pin 45 to rotate the sleeve in a similar direction until reduced gaps 20 leave necks 43 of the drivers but in such event the tumblers line up with the drivers and the mushrooms 42 are automatically projected into bores 25 of the barrel and the drivers enter circular openings 19 of the butterfly slots and therefore the unauthorized

operator is in no better position and in fact is again at a starting point. If after starting again he tensions the plug by rotating it in a counter-clockwise direction, and again starts picking he will merely arrange the other winged parts of the butterfly slots to receive the necks of the drivers and therefore is left with the same dilemma.

Coming now to the embodiment shown in Figs. 25 to 29 inclusive, it will be noted, that the sleeve 17 and ring 38 are split and in section. For example sleeve 17 comprises two semi-cylindrical parts 51 and 52 provided with the spaced gaps 53 adapted to line up when the complementary sections 51 and 52 are positioned on shoulders 22 and 54 of the barrel 23. Aligned gaps 53 define elongated slots for receiving pins 55 fixed to shank 24 of the barrel and in the neutral position of the split sleeve 17 pins 52 are centrally disposed in the slots defined by the aligned gap 53 as indicated in Fig. 28. Upper complement 51 is also provided with a plurality of butterfly slots 18 of the type alluded to, to wit, comprising expanded portions 19 merging with reduced and wing portions 20 to cooperate with the upper drivers in a manner already set forth. Hardened ring 34 is made in sections 56 and 57 in order that it may be conveniently assembled on the shoulder 22.

According to the form shown in Figs. 25 to 29, pins 55 selectively cooperate with corresponding end walls 58 of the slots formed by gaps 53 to rotate the sleeve after the drivers have been picked from the barrel and disposed on the exterior surface of shank 24 of the barrel whereby the mushroom drivers also cooperate to guide the rotation of the sleeve in case the mushrooms are within gap 39 even though the drivers cannot be raised above the sleeve in a manner hitherto explained. In other aspects, the form according to Figs. 25 to 29 is along the lines of the embodiment set forth in connection with Figs. 1-24 inclusive.

According to the form illustrated in Figs. 30, 31 and 32, cylinder lock C has its shell 11 provided with a head or bushing generally denoted B. This bushing is of hardened or armor steel to resist drilling and it includes a front closure wall 60 provided with the eccentrically disposed opening 61 which serves as a bearing for the annular forwardly projecting shoulder 62 of a front cylindrical projection 63 of a hardened or armor steel collar broadly denoted 64 having an annular flange 65 integrally merged with the rearwardly extending interrupted annular flange 66 having diametrically arranged upper and lower slots 67 and 68 respectively.

Shank 24 of the barrel 23 is provided with an annular stop shoulder 68' which cooperates with the rear end of the interrupter flange 66 to limit the insertion of shank 24 within collar 64 at which time the forward part 69 of shank 24 of the barrel is against the front closure projection 63 which is provided with key receiving slot 34 in registration with slot 35 of the shank 24.

The lower slot 68 of the collar clears the key receiving slot 35 of the barrel while the upper slot 67 clears the front tumbler receiving slot 25 of the barrel 23 and the collar 64 is fixedly held in place on shank 24 by pin means 70 (Fig. 32). Hence if the barrel be rotated collar 64 bodily rotates therewith.

As in the case of the form shown in Fig. 29, sleeve 17 is split and includes the complementary sections 51 and 52 against which the split hard-

ened ring 38 rotates and of course this sleeve 17 includes the butterfly slots 18 of the type shown in Fig. 29 for cooperation with driving pins 55 fixed to the shank as heretofore described.

5 It should be observed that the front wall 60 extends considerably beyond shell 11 to characterize the annular flange 71 which is integral with the annular wall 72 fixed to the shell by suitable fastening means 73.

10 Thus by the present arrangement, the metal barrel 23 made in sections with the front part or collar 64 of drill resisting metal while the metal shell is also made in sections and cooperates with bushing B which also is of drill resisting material and constitutes with shell 11 the lock casing. In
15 other aspects, the form according to Figs. 30-32 is along the lines of the embodiment described in connection with Figs. 26 to 29 inclusive.

In the specification and claims, the expressions "tumbler" or "tumbler means" refer to a
20 tumbler pin or one or more tumbler pins respectively while the expressions "driver" or "driving means" refer to a driving pin or one or more driving pins respectively while the expression
25 "pin tumbler" is directed to include a driving pin and a companion tumbler pin, and where the expression "mushroom flange" is mentioned such feature may be considered as a member intervening a depending neck or a reduced part of
30 an associated driver slidably guided in the casing and a companion tumbler guided in the plug and in case of the "butterfly slots" the central portions thereof may be considered as enlarged or expanded means and the wings thereof as con-
35 stricted or reduced means.

Variations and modifications may be made within the scope of this invention and portions of the improvements may be used without others and as many changes could be made in the above
40 set forth embodiments and many widely different embodiments could be devised without departing from the scope thereof, it is intended that all matter contained in the above description as shown in the accompanying drawings shall be
45 interpreted as illustrative and not in a limiting sense.

I claim:

1. In a cylinder lock, a casing, a key receiving barrel rotatable within said casing, a sleeve
50 mounted on said barrel and having an elongated slot comprising an expanded and a reduced portion, resiliently controlled driving means slidably guided in said casing and projectable into said
55 expanded portion and barrel to prevent rotation of said barrel and sleeve and comprising a neck projectable into said reduced portion and having a depending flange projectable under said reduced portion to prevent removal of said driving
60 means from said sleeve, and slidable tumbler means within said barrel for projecting said driving means fully out of said expanded portion upon insertion of a key properly mated with said tumbler means into said barrel whereby
65 said expanded portion to permit bodily rotation of said sleeve and barrel relative to said casing.

2. In a cylinder lock, a casing, a key receiving barrel rotatable within said casing, a sleeve
70 mounted on said barrel and having an elongated slot comprising an expanded and a reduced portion, driving means slidably guided by and within said casing and projectable through said expanded portion and into said barrel to prevent
75 rotation of said barrel and sleeve and comprising a reduced part and a depending flange, and slid-

able tumbler means for lifting said driving means to remove the latter out of said barrel following slight rotation of the latter relative to said casing to position parts of said sleeve adjacent said reduced portion in overlapping relation in respect
5 to said flange to prevent removal of said driving means from said sleeve.

3. In a cylinder lock, a casing, a key receiving barrel rotatable within said casing, a sleeve
10 mounted on said barrel and having a slot including an expanded and a reduced portion defining nib means, tumbler means slidably mounted in said barrel, slidable driving means movably
15 guided in said casing and contacting said tumbler means and comprising a reduced part and a depending flange, said barrel upon slight rotation thereof and upon sufficient elevation of said
20 tumbler means to cause said driving means to be removed from said barrel and thus disposing said flange in overlapping relation with said nib means to prevent removal of said driving
25 means from said sleeve.

4. In a cylinder lock, a casing, a key receiving barrel rotatable within said casing, a sleeve
30 mounted on said barrel and having an elongated slot comprising an expanded and a reduced portion, driving means slidably guided within and by said casing and projectable through said expanded portion and into said barrel to prevent
35 rotation of said barrel and sleeve and comprising a reduced part and a depending flange, and slidable tumbler means for actuating said driving means to remove the latter out of said barrel subsequent to slight rotation of said barrel in respect
40 to said casing to position the sides of said reduced portion to straddle said reduced part and dispose portions of said sleeve adjacent said sides in overlapping relation in respect to said
45 flange to prevent removal of said driving means from said sleeve.

5. In a cylinder lock, a casing, a key receiving barrel rotatable within said casing, a sleeve
50 mounted on said barrel and having a circumferentially arranged slot comprising an expanded and a reduced portion, spring controlled driving means slidably guided within and by said casing and projectable in part through said expanded
55 portion and into said barrel to prevent rotation of said sleeve and barrel and comprising a neck having a depending flange, tumbler means slidably guided in said barrel and adapted to elevate said driving means even subsequent to slight
60 rotation of said barrel relative to said casing for positioning said driving means out of said barrel to permit rotation of said barrel relative to said sleeve, and means carried by said barrel for rotating
65 said sleeve bodily therewith to move said reduced portion of said slot towards said neck to permit the sides of said reduced portion to straddle said neck whereby portions of said sleeve adjacent said reduced portion overlap said
70 flange to prevent removal of said driving means from said sleeve.

6. In a cylinder lock, a casing, a key receiving barrel rotatable within said casing, a sleeve
75 rotatably mounted on said barrel and having a circumferentially arranged slot comprising an expanded and a reduced portion, spring controlled driving means slidably guided in said casing and projectable in part through said expanded portion and into said barrel to prevent rotation of
said sleeve and barrel and comprising a neck having a depending flange, tumbler means slidably guided in said barrel and adapted to lift
said driving means subsequent to slight rotation

of said barrel relative to said casing for positioning said driving means out of said barrel to permit rotation of said barrel relative to said sleeve, means associated with said barrel and sleeve to rotatably move said reduced portion of said slot towards said neck to permit the sides of said reduced portion to straddle said neck whereby portions of said sleeve adjacent said reduced portion overlap said flange whereby said sleeve is rotatably interlocked with said driving means, and means to limit rotational displacement of said barrel and sleeve when said flange is out of said barrel.

7. In a cylinder lock, a casing, a key receiving barrel rotatable within said casing, a sleeve rotatably mounted on said barrel and having a circumferentially arranged slot comprising an expanded and a reduced portion, spring controlled driving means slidably guided in said casing and projectable in part through said expanded portion and into said barrel to prevent rotation of said sleeve and barrel and comprising a neck having a depending flange, tumbler means slidably guided in said barrel for lifting said driving means even subsequent to slight rotation of said barrel relative to said casing for positioning said driving means out of said barrel to permit rotation of said barrel relative to said sleeve, and a lost motion connection between said barrel and sleeve to permit the barrel to rotate relative to said sleeve when said driving means is removed from the barrel, said connection having means to permit appreciable rotation of said sleeve upon rotation of said barrel whereby said sleeve bodily rotates with said barrel, and means to limit bodily rotational displacement of said sleeve and barrel.

8. In a cylinder lock, a casing, a key receiving barrel rotatable within said casing, a sleeve rotatably mounted on said barrel and having a circumferentially arranged slot comprising an expanded and a reduced portion, spring controlled driving means slidably guided in said casing and projectable in part through said expanded portion and into said barrel to prevent rotation of said sleeve and barrel and comprising a neck having a depending flange, tumbler means slidably guided on said barrel to lift said driving means for positioning said driving means out of said barrel and said neck into said reduced portion to permit rotation of said barrel relative to said sleeve, and a lost motion connection between said barrel and sleeve to permit said barrel to rotate relative to said sleeve, said connection comprising pin means carried by said barrel and a slot arranged in said sleeve to permit appreciable rotation of said barrel relative to said sleeve, said last mentioned slot having a wall adapted to be engaged by said pin means to rotate said sleeve during rotation of said barrel at which time the sides of said reduced portion straddle said neck and cooperate with said flange to prevent removal of said driving means from said sleeve.

9. In a cylinder lock, a casing, a key receiving barrel rotatable within said casing, a sleeve rotatably guided on said barrel and having a circumferentially arranged slot comprising an expanded and a reduced portion, spring controlled driving means slidably guided in said casing and projectable in part through said expanded portion and into said barrel to prevent rotation of said sleeve and barrel and comprising a neck having a depending flange, tumbler means slidably guided in said barrel for positioning said driving means out of said barrel and said neck

into said reduced portion to permit rotation of said barrel relative to said sleeve, a lost motion connection between said barrel and sleeve to permit said barrel to rotate relative said sleeve, said connection comprising pin means carried by said barrel and a slot arranged in said sleeve to permit appreciable rotation of said barrel relative to said sleeve, said last mentioned slot having a wall adapted to be engaged by said pin means to rotate said sleeve during rotation of said barrel whereby the sides of said reduced portion straddle said neck and cooperate with said flange to interlock said driving means to prevent removal of said driving means from said sleeve, and means to limit rotational displacement of said sleeve and barrel.

10. In a lock, a casing, a barrel rotatably supported by said casing, a sleeve rotatably surrounding said barrel and having a slot comprising an expanded and a reduced portion, a tumbler slidably guided by said barrel, and a spring controlled slidable driving member within said casing and movably guided thereby and contacting said tumbler and comprising a depending neck and a flange depending from said neck, said slidable driving means in a locked relation of said barrel and casing extending in part into said expanded portion while said reduced portion communicates with said expanded portion and extends laterally thereof for cooperation with said neck and flange to permit rotation of said barrel relative to said sleeve and prevent withdrawal of said driving means from said sleeve.

11. In a lock, a casing, a key receiving barrel rotatably supported by said casing, a sleeve surrounding said barrel and having a circumferentially arranged slot comprising an expanded and a reduced portion, a tumbler slidably guided by said barrel, spring controlled slidable driving means movably guided within said casing and contacting said tumbler and comprising a depending neck adapted to be received by said reduced portion of said slot, and a flange depending from said neck adapted to be interposed between said sleeve and barrel to prevent removal of said driving means out of said sleeve.

12. In a lock, a casing, a key receiving barrel rotatably supported by said casing, a movable sleeve surrounding and in part spaced from said barrel and comprising a circumferentially arranged slot having an expanded and a reduced portion, a tumbler slidably arranged in said barrel, a driving member mounted on said tumbler and comprising a neck adapted to be received in said reduced portion and having a depending flange projectable underneath said reduced portion and cooperating with said sleeve to prevent removal of said driving member therefrom, and a loose driving connection between said sleeve and barrel.

13. In a lock, a casing, a key receiving barrel rotatably supported by said barrel and comprising a reduced shank, a sleeve rotatably mounted on said barrel and defining with said shank a gap, a loose driving connection for rotatably moving said sleeve on said barrel, said sleeve having a circumferentially arranged slot comprising an expanded and a reduced portion, tumbler means slidably guided by said barrel, and spring controlled driving means slidably guided within and by said casing and projectable into said expanded portion and said barrel to prevent rotation of said sleeve and barrel, said driving means comprising neck means and flange means, said barrel adapted to be slightly rotated relative to said

sleeve to place said driving means under stress, said tumbler means adapted to be actuated to raise said driving means out of said shank to position said flange means in said gap to cooperate with portions of said sleeve adjacent said expanded portion and reduced portion of said slot to prevent removal of said driving means from said sleeve.

14. In a lock, a casing, a key receiving barrel rotatably supported by said casing, a movable sleeve surrounding said barrel and defining therewith a gap and comprising a circumferentially arranged slot having an expanded and a reduced portion, a tumbler slidably arranged in said barrel, a slidable driving member slidably guided by said casing and mounted on said tumbler and comprising a neck having a depending flange projectable into said gap and underneath said reduced portion to extend beyond the sides of the latter and cooperating therewith to prevent removal of said driving member out of said sleeve, and a loose driving connection for said sleeve and barrel, said neck adapted to be straddled by the sides of said reduced portion of said slot when said flange is disposed in said gap, said sleeve constituting closure means to prevent projection of said tumbler through said sleeve when said neck is disposed within said reduced portion.

15. In a lock, a casing, a key receiving barrel rotatably supported in said casing and comprising a reduced shank, a sleeve rotatably mounted on said barrel and defining with said shank a gap, a loose driving connection for rotatably guiding said sleeve on said barrel, said barrel having a circumferentially arranged slot comprising an expanded and a reduced portion, tumbler means slidably guided by said barrel, and spring controlled driving means slidably guided by said casing and projectable into said expanded portion and barrel to prevent rotation of said sleeve and barrel, said driving means comprising neck means and flange means, said barrel adapted to be slightly rotated relative to said sleeve to place said driving means under stress, said tumbler means adapted to be actuated to raise said driving means out of said shank to position said flange means in said gap and cooperate with a portion of said sleeve adjacent said expanded portion and reduced portion of said slot, said barrel adapted to be rotated relative to said sleeve when said driving means is out of said shank and cause said connection to rotate said sleeve upon rotation of said barrel, and means to limit bodily rotational displacement of said sleeve and barrel.

16. In a lock, a casing having a rotatable key receiving barrel, a rotatable sleeve mounted on said barrel and provided with a circumferentially arranged slot having an expanded and a reduced portion, tumbler means slidably guided in said barrel, slidable driving means movably retained within said casing and mounted on said tumbler means and projectable into said sleeve and barrel to prevent rotation of said barrel and sleeve and comprising a neck having a depending flange, means for rotatably guiding said sleeve, said tumbler means adapted to shift said driving means to unlock said barrel although said driving means in part projects through said expanded portion to prevent rotation of said sleeve, said barrel adapted to be rotated relative to said sleeve to permit the sides of said reduced portion to straddle said neck, said flange upon rotation of said barrel relative to said sleeve adapted to be interposed between said barrel and sleeve to pre-

vent said driving means to be projected out of said sleeve, said sleeve constituting means to prevent projection of said tumbler means out of said sleeve when said flange cooperates with said sleeve to prevent said driving means to be projected fully out of said sleeve.

17. In a lock, a casing, a barrel rotatably carried by said casing, a sleeve interposed between said casing and barrel and comprising a plurality of spaced slots each having an expanded and a constricted portion, a rotatable ring mounted on said barrel and in front of said sleeve, driving means adapted to project through said expanded portions of said slots and cooperating with said sleeve and barrel to prevent rotation thereof, and tumbler means for actuating said driving means to remove the latter out of said barrel and in part into said constricted portions to permit rotation of said barrel relative to said sleeve and to cause said driving means to interlock with portions of said sleeve adjacent said constricted portions to prevent removal of driving means from said sleeve.

18. In a lock, a casing comprising a shell and a drill resisting bushing mounted on said shell, a key receiving barrel comprising a shank and a drill resisting collar mounted on said shank, a sleeve mounted on said barrel and including a plurality of "butterfly" shaped slots each having an enlarged portion and oppositely extending narrowed portions, a ring rotatably mounted on said barrel to prevent jamming of said sleeve, slidable spring controlled driving means movably guided in said casing and adapted to be received by said expanded portions and shank to prevent rotation of said sleeve and barrel, and tumbler means for actuating said driving means.

19. In a lock, a casing, a key receiving barrel, a sectional sleeve interposed between said casing and barrel and having a plurality of circumferentially disposed and spaced slots each comprising an expanded portion and communicating oppositely and laterally extending reduced portions, tumbler means slidably guided by said barrel, and driving means slidably guided in said casing and adapted to be actuated by said tumbler means and having means cooperating with parts of said sleeve adjacent corresponding reduced portions of said slots to prevent removal of said driving means from said sleeve.

20. In a cylinder lock, a casing, a barrel rotatable within said casing and comprising a shank, a member mounted on said barrel and defining with said shank a gap and having a slot including an expanded and a constricted portion, tumbler means slidably guided in said barrel, and slidable driving means guided in said casing and projectable through said expanded portion and into said barrel and contacting said tumbler means, said driving means having a flange and a reduced part, said barrel upon slight rotation thereof and upon sufficient elevation of said tumbler means causing said expanded portion to be shifted in a direction away from said reduced part to permit said constricted portion of said slot to move in a direction towards said reduced part to receive the latter whereby said flange is disposed in said gap and between said shank and member to prevent removal of said driving means from said barrel.

21. In a cylinder lock, a casing, a key receiving plug rotatable within said casing and comprising a sleeve having a circumferentially arranged slot having an expanded opening and communicating laterally extending narrow open-

ings, tumbler means slidably guided in said plug, and driving means slidably guided by said casing and by walls of said expanded opening and contacting said tumbler means and including an
 5 intermediately disposed depending reduced part, said plug upon slight rotation thereof and upon sufficient elevation of said tumbler means causing said expanded opening to be shifted in a
 10 direction away from said depending reduced part to permit one of said narrow openings to move in a direction towards said reduced part to receive the latter whereby a part of said sleeve adjacent said last mentioned narrow opening movably interlocks with spaced upper and lower portions of
 15 said driving means to prevent removal of the latter from said plug.

22. In a cylinder lock, a casing, a key receiving plug rotatable within said casing and comprising a shank, and a sleeve surrounding said shank
 20 and defining therewith a gap and having a circumferentially arranged slot comprising an expanded opening and a narrow opening, tumbler means slidably guided in said plug, driving means projectable through said expanded opening
 25 and slidably guided in said casing and contacting said tumbler means, said driving means having a depending reduced part and a flange, said plug upon slight rotation thereof and upon sufficient elevation of said tumbler means causing
 30 said expanded opening to be shifted slightly in a direction away from said depending reduced part to permit said narrow opening to move in a direction towards said reduced part to receive the latter whereby said flange is disposed in said gap
 35 and below but adjacent a part of said sleeve adjacent said narrow opening to prevent removal of said driving means from said sleeve, said sleeve and depending reduced part having means to limit rotation of said plug when said depending reduced part is disposed within said narrow opening.

23. In a cylinder lock, a casing, a plug rotatable within said casing and comprising a reduced shank and a sleeve spaced from said shank and
 45 having a slot including an expanded opening and narrow and opposite openings extending laterally of said expanded opening, tumbler means slidably guided in said plug, and slidable driving means guided in said casing and contacting said
 50 tumbler means, said driving means having a flange and a reduced part, said plug upon slight rotation thereof and upon sufficient elevation of said tumbler means causing said expanded opening to be shifted in a direction away from said
 55 reduced part to permit one of said narrow openings to move in a direction towards said reduced part whereby said flange is disposed between said shank and sleeve and slightly below said last mentioned narrow opening to permit spaced portions of said sleeve to rotatably interlock with
 60 said driving means to prevent removal of said driving means from said plug, and means to prevent rotation of said plug when said sleeve is interlocked with said driving means.

24. In a cylinder lock, a casing, key receiving rotatable means rotatably guided in said casing and including an expanded opening and a reduced opening adjacent said expanded opening, driving means slidably guided in said casing and
 70 comprising a reduced depending part, tumbler means slidably guided in said rotatable means for elevating said driving means above said rotatable means upon insertion of a key properly mating with said tumbler means into said rotatable means, spring means for projecting said

driving means at least in part through said expanded opening and into said rotatable means upon withdrawal of said key to prevent appreciable rotation of and thus lock said rotatable means against rotation, said rotatable means
 5 when locked adapted to be slightly rotatably displaceable in respect to said casing to slightly offset said driving means and tumbler means relative to each other, said tumbler means in the offset relation thereof in respect to said driving means and upon sufficient elevation thereof
 10 adapted to lift said driving means and displace said depending part into said reduced opening, and means cooperating with said depending part to prevent rotation of said rotatable means relative to said casing.

25. In a cylinder lock, a casing, a plug rotatable within said casing and comprising a member having a slot including an expanded and a reduced opening, tumbler means slidably guided
 20 in said plug, and slidable driving means projectable through said expanded opening and guided in said casing and contacting said tumbler means and having a reduced part, said plug upon slight rotation thereof and upon sufficient elevation of said tumbler means causing said expanded opening to be shifted in a direction away from said reduced part to permit said reduced opening to move in a direction towards said reduced part to receive the latter to permit rotation of said
 25 plug relative to said casing, said reduced opening having a wall cooperating with said reduced part to limit rotation of said plug.

26. In a cylinder lock, a casing, a plug rotatable within said casing and comprising a shank, a
 35 member interposed between said shank and casing and having a slot substantially normal to the longitudinal axis thereof and including an expanded and a reduced portion, tumbler means slidably guided in said plug, and slidable driving means in longitudinal alignment with said tumbler means and guided in said casing and contacting said tumbler means, said driving means having a flange and a reduced part, said plug upon slight rotation thereof and upon sufficient elevation of said tumbler means causing said expanded portion to be shifted in a direction
 40 away from said reduced part to permit said reduced portion of said slot to move in a direction towards said reduced part to receive the latter whereby said flange is interposed between said shank and member to cause said driving means to interlock with said member to prevent removal of said driving means from said member and from
 45 said plug, said plug in the interlocked relation of said driving means and member adapted to be rotated relative to said casing whereby said tumbler means is appreciably out of said alignment with said driving means, and means to limit rotation of said plug when said driving means is
 50 interlocked with said member.

27. In a cylinder lock, a casing, a key receiving plug rotatable within said casing and comprising a barrel having a shank and a curved member spaced from said shank and including a circumferentially arranged slot having an expanded opening and laterally extending reduced openings, tumbler means slidably guided in said barrel, and driving means slidably guided in said casing and contacting said tumbler means, said
 70 driving means having a depending reduced part and a flange, said plug upon slight rotation thereof and upon sufficient elevation of said tumbler means causing said expanded opening to be shifted in a direction away from said depending
 75

reduced part to permit one of said reduced openings to move in a direction away from said reduced part and another of said reduced openings to move in a direction towards said reduced part to receive the latter whereby said flange is interposed between said member and shank and below a part of said sleeve adjacent said last mentioned reduced opening to prevent removal of said driving means from said plug.

28. In a cylinder lock, a casing, a key receiving plug rotatable within said casing and comprising a barrel having a reduced shank and a split sleeve surrounding said shank and including circumferentially arranged slots defining centrally arranged expanded openings and laterally extending reduced openings, tumbler means slidably guided in said barrel, driving means projectable through said expanded openings and slidably guided in said casing and contacting said tumbler means, said driving means having depending reduced means and flange means, said plug upon slight rotation thereof and upon sufficient elevation of said tumbler means causing said expanded openings to be shifted in a direction away from said depending reduced means to permit one or more of said reduced openings to move in a direction towards said reduced means to receive the latter whereby said flange means is interposed between said shank and sleeve and said driving means is interlocked with said sleeve to prevent removal thereof from said plug, said plug in the interlocked relation of said driving means and sleeve adapted to be rotated until at least one end of said reduced openings strikes said reduced means.

29. In a cylinder lock, a casing, a key receiving plug rotatable within said casing and comprising a barrel having a shank and a split sleeve surrounding and spaced from said shank and including circumferentially arranged and spaced slots each defining an expanded opening and a narrow opening, a plurality of tumbler means slidably guided in said barrel, and a plurality of driving means slidably guided in said casing and projectable through said expanded openings and contacting and normally in longitudinal alignment with said tumbler means, said driving means each having a depending reduced part and a flange, said plug upon slight rotation thereof and upon sufficient elevation of said tumbler means causing said expanded openings to be shifted in a direction away from said depending reduced parts to permit said narrow openings to move in a direction towards said reduced parts to receive the latter whereby said flanges are disposed between said shank and sleeve to cause said driving means to interlock with said sleeve to prevent removal of said driving means from said plug although permitting said sleeve to be rotated relative to said casing until one end of one of said narrow openings strikes at least one of said reduced parts, said plug in the interlocked relation of said driving means and sleeve and during rotation thereof causing said tumbler means to be moved out of said contact and completely out of said alignment with said driving means.

30. In a cylinder lock, a casing, a key receiving plug rotatable within said casing and comprising a barrel having a shank, a member spaced from said shank and carried by said barrel and comprising spaced circumferentially arranged slot means having centrally disposed expanded means and oppositely extending reduced means in communication with said expanded means,

tumbler means slidably guided in said barrel, and driving means projectable through said expanded means and into said shank and slidably guided in said casing and normally contacting said tumbler means and having a depending reduced part and a flange, said plug upon slight rotation thereof and upon sufficient elevation of said tumbler means causing one of said reduced means to be moved in a direction towards said depending reduced part to receive the latter whereby said flange is disposed out of said shank and between said barrel and member and cooperating with a part of the latter to prevent removal of said driving means from said plug although permitting the latter to rotate relative to said casing, and means to limit rotation of said plug relative to said casing.

31. In a cylinder lock, a casing, a key receiving plug rotatable within said casing and comprising a barrel, a member mounted on said barrel and having a plurality of spaced and circumferentially arranged slots each having an expanded opening and aligned and oppositely extending narrow openings, a plurality of driving means slidably guided in said casing and projectable through said expanded openings and into said barrel to prevent rotation of said barrel and sleeve and each comprising a reduced part, a plurality of slidable tumbler means for lifting said driving means to remove the latter out of said barrel following slight rotation of the latter relative to said casing to position said reduced parts of said driving means within corresponding narrow openings of said slots to permit rotation of said member relative to said casing, and means cooperating with said reduced parts to limit rotation of said member in respect to said casing.

32. In a cylinder lock, a casing, key receiving rotatable means guided by said casing and including a plurality of expanded openings and a plurality of reduced openings, a plurality of drivers slidably guided in said casing and each comprising a reduced depending part, a plurality of tumbler means slidably guided in said rotatable means for elevating said drivers above said rotatable means upon insertion of a key properly mated with said tumbler means into said rotatable means to permit the latter to rotate relative to said casing, and spring means for moving said drivers at least in part into said expanded openings to lock said rotatable means against appreciable rotation relative to said casing, said rotatable means adapted to be slightly rotated in the locked relation thereof relative to said casing to slightly offset the longitudinal axis of said depending parts in respect to the longitudinal axis of said tumbler means, said tumbler means in the offset relation thereof in respect to said depending parts adapted to be elevated to arrange said depending parts in said reduced openings, said rotatable means having portions forming ends of said reduced openings cooperating with said depending parts to prevent rotation of said rotatable means relative to said casing.

33. In a cylinder lock, a casing, a plug comprising a key receiving barrel rotatably guided by said casing and including a reduced shank, and a sleeve concentrically mounted on said barrel and defining with said reduced shank a gap and including a plurality of spaced and circumferentially arranged slots each having an expanded portion and a laterally extending reduced portion, a plurality of driving means within and slidably guided by said casing and each including

a reduced depending part, substantially disc shaped members disposed adjacent said depending parts, and a plurality of tumbler means for actuating said driving means, and spring means acting on said driving means to project the latter, said members and said depending reduced parts through expanded portions of said slots and into said shank for locking said sleeve and barrel to prevent appreciable rotation of said plug relative to said casing, said barrel in the locked relation of said plug adapted to be slightly rotated relative to said casing, said tumbler means in the locked relation of said plug adapted to elevate said driving means and members to arrange said reduced depending parts at least in part within said gap outside of said shank and within said reduced portions of said slots to permit rotation of said plug, said depending parts and said reduced portions of said slots constituting means to prevent rotation of said plug relative to said casing.

34. In a cylinder lock, a casing, a key receiving plug including a plurality of circumferentially arranged slots each having an expanded portion and a laterally extending reduced portion, a plurality of driving means within and slidably guided by said casing and each comprising a depending reduced part, a plurality of intervening members disposed adjacent said depending reduced parts, tumbler means for actuating said intervening members to elevate said driving means, spring means acting on said driving means to project said driving means with said intervening members through said expanded portions and into said plug for locking the latter to prevent appreciable rotation thereof relative to said casing, said plug adapted to be slightly rotatable in the locked relation thereof relative to said casing, said tumbler means in the locked relation of said plug adapted to elevate said intervening members and dispose said reduced depending parts at least in part within said reduced portions of said slots to permit rotation of said plug, and means to limit rotation of said plug when said reduced parts are within said reduced portions.

35. In a cylinder lock, a casing, a key receiving barrel rotatable within said casing, a sleeve mounted on said barrel and having a circumferentially arranged slot comprising an expanded opening and opposite and reduced openings, spring controlled driving means slidably guided in said casing and projectable in part through said expanded opening and into said barrel to prevent rotation of said sleeve and barrel and comprising a neck, and tumbler means slidably guided in said barrel, said driving means having an intervenor slidably guided in said barrel and interposed between said neck and tumbler means, the latter cooperating with said intervenor to lift said neck from said barrel and into one of said reduced openings to permit rotation of said sleeve relative to said casing, said neck and one of said reduced openings constituting means to limit rotation of said sleeve relative to said casing.

36. In a cylinder lock, a casing, a key receiving barrel rotatable within said casing, a movable sleeve mounted on said barrel and having a circumferentially arranged slot comprising an expanded opening and reduced openings in communication with said expanded opening, spring controlled driving means slidably guided in said casing and projectable in part through said expanded opening and into said barrel to prevent

rotation of said sleeve and barrel and comprising a neck, tumbler means slidably guided in said barrel to lift said driving means for positioning said driving means out of said barrel and said neck into one of said reduced openings to permit rotation of said sleeve relative to said barrel, and a lost motion connection between said barrel and sleeve comprising pin means carried by said barrel and a slot arranged in said sleeve to permit appreciable rotation of said barrel relative to said sleeve, said last mentioned slot having a wall adapted to be engaged by said pin means to rotate said sleeve during further rotation of said barrel.

37. In a cylinder lock, a casing, a key receiving barrel rotatable within said casing, a sleeve rotatably mounted on said barrel and in part spaced therefrom and having a plurality of circumferentially arranged slots each comprising an expanded opening and opposite laterally extending reduced openings, a plurality of spring controlled driving means slidably guided in said casing and projectable in part through said expanded openings and into said barrel to prevent rotation of said sleeve and barrel and each comprising a neck, a plurality of tumbler means slidably guided in said barrel, said driving means having intervening means interposed between said necks and tumbler means and cooperating with said necks for positioning the latter out of said barrel and in corresponding reduced openings of said slots to permit rotation of said sleeve relative to said casing, and a lost motion connection between said barrel and sleeve to permit said barrel to rotate relative to said sleeve, said connection comprising pin means carried by said barrel and a slot arranged in said sleeve to permit appreciable rotation of said barrel relative to said sleeve, said last mentioned slot having a wall adapted to be engaged by said pin means to rotate said sleeve during rotation of said barrel, one or more of said reduced openings having means cooperating with one or more of said necks to prevent bodily rotation of said barrel and sleeve.

38. In a cylinder lock, a casing, a key receiving barrel having a reduced shank rotatable within said casing, a sleeve movably mounted on said barrel and spaced from and surrounding said shank and having a plurality of circumferentially arranged slots spaced longitudinally of said sleeve and each comprising an expanded opening and oppositely extending and narrow openings in communication with said expanded opening, a plurality of spring controlled driving means slidably guided in said casing and projectable in part through said expanded openings and into said barrel to prevent rotation of said sleeve and barrel and each comprising a neck having a depending flange, a plurality of tumbler means slidably guided in said barrel for lifting said driving means subsequent to slight rotation of said barrel relative to said casing to position said necks in the corresponding narrow openings of said slots and said driving means out of said barrel to dispose said flanges on the exterior surface of said shank and between said barrel and sleeve to permit rotation of said shank relative to said sleeve, and a connection for said barrel and sleeve to move corresponding ends of said corresponding narrow openings towards said necks to permit spaced sides of said last mentioned narrow openings to straddle said necks whereby spaced portions of said sleeve overlap said flanges to prevent removal of said driving

means from said sleeve, said ends constituting means cooperating with said necks to limit rotational displacement of said sleeve relative to said casing when said flanges are out of said barrel and interposed between said shank and sleeve.

39. In a lock, a casing, a key receiving barrel rotatably supported by said casing and comprising a reduced shank, a sleeve rotatably mounted on said barrel and defining with said shank a gap, a loose connection for rotatably driving said sleeve on said barrel, said sleeve having a circumferentially arranged slot comprising an expanded opening and oppositely extending reduced openings, tumbler means slidably guided in said barrel, and spring controlled driving means slidably guided in said casing and projectable into said expanded opening and shank to prevent rotation of said sleeve and barrel, said driving means comprising neck means and flange means, said barrel adapted to be slightly rotated relative to said sleeve to place said driving means under stress, said tumbler means adapted to be actuated to raise said driving means out of said shank to position said flange means in said gap for slidably interlocking a portion of said sleeve adjacent one of said reduced openings with a portion of said driving means to permit said barrel to be rotated relative to said sleeve when said driving means is out of said shank and cause said connection to rotate said sleeve upon rotation of said barrel, and means to limit unitary rotational displacement of said sleeve and barrel.

40. In a lock, a casing comprising a shell and a drill resisting bushing mounted on said shell, a key receiving barrel comprising a shank and a drill resisting collar mounted on said shank, a sleeve mounted on said barrel and including a plurality of spaced slots each having an expanded opening and oppositely extending narrowed openings, a ring rotatably mounted on said barrel in front of said sleeve to guard the latter, slidable spring controlled driving means movably guided in said casing and adapted to be received by said expanded openings and shank to prevent rotation of said sleeve and barrel, and tumbler means for actuating said driving means.

41. In a lock, a casing, a key receiving barrel, a longitudinally split rotatable sleeve having a plurality of circumferentially disposed and spaced slots each comprising an expanded opening and communicating and laterally extending reduced openings, driving means slidably guided in said casing, tumbler means slidably guided in said barrel, said driving means having portions for interlocking with said sleeve adjacent corresponding reduced openings of said sleeve to prevent removal of said driving means from said sleeve, a connection for rotating said sleeve with said barrel at least in one direction relative to said casing during interlocking relation of said driving means and sleeve, and means to prevent further rotation of said sleeve relative to said casing in said direction to preclude rotation of said barrel in a similar direction.

42. In a cylinder lock, a casing, key receiving rotatable means rotatably guided by said casing and including an expanded opening and oppositely arranged and spaced reduced openings, a driver slidably guided in said casing and comprising a reduced depending part, tumbler means slidably guided in said rotatable means for elevating said driver above said rotatable means upon insertion of a key properly mated with said

tumbler means to rotate said rotatable means to permit the latter to rotate relative to said casing, and spring means for moving said driver into said expanded opening to lock said rotatable means against appreciable rotation relative to said casing, said rotatable means adapted to be slightly rotated in the locked relation thereof relative to said casing to slightly offset the longitudinal axis of said depending part in respect to the longitudinal axis of said tumbler means, said tumbler means in the offset relation thereof in respect to said depending part adapted to be elevated to raise said driving means and dispose said depending part into one of said reduced openings, said reduced openings each having means severally cooperating with said depending part when the latter is arranged therein to prevent rotation of said rotatable means relative to said casing.

43. In a cylinder lock, a casing, a key receiving plug rotatable within said casing and comprising a sleeve having a plurality of spaced and circumferentially arranged slots each including an expanded opening and communicating narrowed openings extending in opposite directions, a plurality of tumblers slidably guided in said plug, and mushroom driver means slidably carried in said casing and normally in alignment with said tumblers and guided in said expanded openings and having portions adapted to rotatably receive parts of said sleeve adjacent corresponding narrowed openings of said slots to interlock therewith, said sleeve in the interlocked relation thereof with said driver means adapted to be rotated relative to said casing, a connection for bodily rotating said plug and sleeve when the latter is rotatably received by said driver means, and means to prevent unitary rotation of said plug and sleeve during the interlocked relation of said driver means with said sleeve.

44. In a cylinder lock, a casing, a key receiving plug comprising a barrel having a shank rotatable within said casing and comprising a sleeve having a plurality of spaced and circumferentially arranged slots each including an expanded opening and oppositely extending narrowed openings, a plurality of tumblers slidably guided in said shank, a plurality of drivers slidably carried in said casing and normally in longitudinal alignment with said tumblers when said drivers extend into said expanded openings and shank to prevent rotation of said barrel and sleeve, and spring means to hold said drivers in contact with said tumblers, said drivers having depending parts, said drivers having intervening means slidably guided in said shank and adapted to be interposed between said shank and sleeve in the longitudinally offset relation of said tumblers and drivers to prevent removal of said drivers from said plug, corresponding narrowed openings of said slots having sides for straddling said depending parts to permit said sleeve to rotate relative to said drivers when said intervening means is interposed between said shank and sleeve, said depending parts cooperating with corresponding narrowed openings of said slots to limit rotation of said barrel and sleeve in respect to said casing in the longitudinally offset relation of said tumblers and drivers.

45. In a cylinder lock, a casing, a key receiving barrel having a shank, a member carried by said barrel and provided with a curved slot having an expanded opening and oppositely extending narrow openings, driving means normally in alignment with said tumbler means and projectable into said expanded opening and shank to prevent

rotation of said barrel and member and slidably guided in said casing and having means to closely straddle a part of said member adjacent one of said narrow openings to prevent removal of said driving means from said member in the offset relation thereof with said tumbler means, and tumbler means slidably guided in said shank for actuating said driving means.

46. In a cylinder lock, a casing, a sleeve comprising a circumferentially disposed slot having an expanded opening and oppositely extending narrow openings, a barrel within said sleeve, driving means slidably guided in said casing and normally projectable into said expanded opening and barrel to prevent rotation of said sleeve and barrel and having means adapted to be removed from said barrel to interlock with a part of said sleeve adjacent one of said narrow openings when said barrel is rotated in one direction and adapted to interlock with another part of said sleeve adjacent an opposite narrow opening of said slot to prevent removal of said driving means from said sleeve if said barrel be rotated in a counter direction, and tumbler means slidably guided in said barrel for actuating said driving means.

47. In a cylinder lock, a casing, a plug rotatable within said casing and comprising a slot having a central enlarged opening and communicating oppositely extending narrow openings, tumbler means slidably guided in said plug, driving means slidably carried in said casing, and spring means for normally holding said driving means in said expanded opening in the aligned relation of said tumbler and driving means to lock said plug against rotation, said plug adapted to be rotated slightly in one direction to offset said tumbler means in respect to said driving means in the locked relation of said driving means and plug to place said driving means under stress, said tumbler means in the stressed relation of said driving means adapted to elevate the latter to permit a part of said plug adjacent one of said narrow openings to rotatably interlock with a part of said driving means to prevent removal of the latter from said plug, said plug in the interlocked relation thereof with said driving means adapted to further rotate in said direction relative to said casing whereby said interlocking relation of said plug and driving means is continued, one of said narrow openings having means cooperating with said driving means to limit rotational displacement of said plug in said direction during said interlocked relation.

48. In a cylinder lock, a casing, a plug rotatable within said casing and comprising a barrel having a reduced shank, a sleeve surrounding said barrel and provided with a plurality of slots each having an enlarged opening and communicating and oppositely extending circumferentially arranged narrowed openings, tumbler means slidably guided in said barrel, driving means slidably carried in said casing and including lower portions projectable into said enlarged openings and shank to lock said sleeve and barrel against rotation when said lower portions are aligned with said tumbler means, said plug adapted to be slightly rotated clockwise or counter-clockwise to place said lower portions under stress and offset in respect to said tumbler means, said lower portions each comprising a depending portion and a flange, said tumblers in the offset relation thereof with said driving means adapted to actuate said driving means to position said flanges severally out of said shank and between said barrel and sleeve whereby parts of said sleeve adjacent cor-

responding narrowed openings of said slots straddle said depending portions to permit rotational displacement of said shank relative to said casing when said flanges are interposed between said barrel and sleeve, means to rotate said sleeve upon rotation of said shank, and means to limit unitary rotational displacement of said shank and sleeve.

49. In a cylinder lock, a casing having a longitudinally disposed bore, a key receiving plug comprising a barrel rotatably guided within said bore, tumbler means disposed transversely of said plug and slidably guided in said barrel, driving means slidably guided in said casing and normally in longitudinal axial alignment with said tumbler means, and spring means to hold said driving means against said tumbler means, said plug having a sleeve comprising one or more circumferentially arranged slots each provided with an enlarged opening and oppositely extending narrow openings, said plug on slight rotation thereof adapted to shift said tumbler means out of longitudinal axial alignment with said driving means whereby said enlarged openings are slightly displaced to permit the walls thereof to be in engagement with said driving means to hold the latter under stress, said tumbler means adapted to raise said driving means when said walls are in engagement with said driving means to position the latter out of said barrel to be received in part within adjacent narrow openings of said slots whereby parts of said sleeve adjacent said adjacent narrow openings receiving said driving means are rotatably interlocked with said driving means to prevent removal of said driving means from said sleeve.

50. In a cylinder lock, a casing, a key receiving barrel rotatable within said casing, a sleeve mounted on said barrel and having a plurality of spaced and circumferentially arranged slots each comprising a centrally disposed expanded opening and laterally and oppositely extending narrow openings, a plurality of resiliently controlled drivers slidably guided in said casing and projectable into said expanded openings and barrel to prevent rotation of said sleeve and barrel and each driver of said plurality comprising a neck projectable into an adjacent narrow opening of said slots to permit rotation of said sleeve relative to said casing and each driver of said plurality comprising a flange depending from and laterally extending beyond a companion neck thereof and projectable outside of said barrel and underneath an adjacent narrow opening of said slots to prevent removal thereof from said sleeve, a plurality of tumblers slidably guided in said barrel, a driving connection between said barrel and sleeve to rotate said sleeve upon rotation of said barrel when said necks are within corresponding narrow openings of said slots, and means to limit rotation of said sleeve and barrel when the latter is rotated in one direction and when said necks are within said corresponding narrow openings.

51. In a pin tumbler lock, a casing having a bore, a key receiving barrel rotatably guided within said bore, a member within said bore and having slot means comprising expanded means and laterally extending constricted means, and pin tumblers comprising driving pins and tumbler pins, said driving pins being slidably guided in said casing and projectable into said expanded means and barrel to prevent rotation of said barrel and having reduced means, said tumbler pins being slidably guided in said barrel for elevating said driving pins to permit said constricted means to move towards and receive said reduced means

whereby said barrel may be rotated relative to said casing, and means to prevent rotation of said barrel relative to said casing when said reduced means is disposed within said constricted means.

5 52. In a pin tumbler lock, a casing having a bore, a key receiving barrel rotatably guided within said bore, a member interposed between said casing and barrel and having slot means comprising expanded means and laterally extending constricted means, and pin tumblers 10 comprising driver pins and tumbler pins, said driver pins being projectable into said expanded means and barrel and slidably guided in said casing and having reduced means and flange means and said tumbler pins being slidably guided 15 in said barrel for shifting said flange means and reduced means from said barrel whereby said reduced means is received by said constricted means to permit rotation of said barrel relative 20 to said casing and whereby said flange means is disposed slightly below and adjacent said constricted means to cooperate with said member to prevent withdrawal of said driver pins from said member.

25 53. In a pin tumbler lock, a casing having a bore, a key receiving barrel rotatably guided within said bore and having a reduced shank, a member spaced from said shank and interposed between said casing and barrel and having slot means comprising expanded means and laterally 30 extending constricted means, and pin tumblers comprising driver pins and tumbler pins, said driver pins being projectable into said expanded means and barrel and slidably guided in said casing and having reduced means and flange 35 means and said tumbler pins being slidably guided in said barrel for shifting said flange means and reduced means from said barrel whereby

said reduced means is received by said constricted means to permit rotation of said barrel relative to said casing and whereby said flange means is disposed between said member and shank and slightly below and adjacent said constricted means to cooperate with said member to prevent 5 withdrawal of said driver pins from said member.

54. In a pin tumbler lock, a casing, a key receiving barrel rotatable within said casing, said casing and barrel having alineable bores, a member 10 within said lock and having slot means comprising expanded slot means and constricted slot means, and pin tumblers in said lock slidably guided in said bores and extending through said bores and through said expanded slot means to 15 lock said casing, barrel, and member together, said pin tumblers each comprising a plurality of pins slidably guided in said bores, one of said pins having a reduced part capable of movement in said constricted slot means to prevent unlock- 20 ing rotation of said barrel.

55. In a pin tumbler lock, a casing, a key receiving barrel rotatable within said casing, said casing and barrel having alineable bores, a member 25 within said lock and having slot means comprising expanded slot means and constricted slot means, and pin tumblers in said lock slidably guided in said bores and extending through said bores and through said expanded slot means to 30 lock said casing, barrel, and member together, said pin tumblers each comprising a plurality of pins slidably guided in said bores, one of said pins having a reduced part capable of movement in said constricted slot means to prevent unlock- 35 ing rotation of said barrel, said last mentioned pin having means for interlocking with said member at said constricted slot means.

SAMUEL SEGAL.

CERTIFICATE OF CORRECTION.

Patent No. 2,111,098.

March 15, 1938.

SAMUEL SEGAL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 11, second column, line 73, claim 45, before "driving" insert the words and comma tumbler means,; page 12, first column, line 7, same claim 45, before "tumbler" insert said and before "slidably" insert being; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 26th day of April, A. D. 1938.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.

whereby said barrel may be rotated relative to said casing, and means to prevent rotation of said barrel relative to said casing when said reduced means is disposed within said constricted means.

5 52. In a pin tumbler lock, a casing having a bore, a key receiving barrel rotatably guided within said bore, a member interposed between said casing and barrel and having slot means comprising expanded means and laterally extending constricted means, and pin tumblers 10 comprising driver pins and tumbler pins, said driver pins being projectable into said expanded means and barrel and slidably guided in said casing and having reduced means and flange means and said tumbler pins being slidably guided 15 in said barrel for shifting said flange means and reduced means from said barrel whereby said reduced means is received by said constricted means to permit rotation of said barrel relative 20 to said casing and whereby said flange means is disposed slightly below and adjacent said constricted means to cooperate with said member to prevent withdrawal of said driver pins from said member.

25 53. In a pin tumbler lock, a casing having a bore, a key receiving barrel rotatably guided within said bore and having a reduced shank, a member spaced from said shank and interposed between said casing and barrel and having slot means comprising expanded means and laterally 30 extending constricted means, and pin tumblers comprising driver pins and tumbler pins, said driver pins being projectable into said expanded means and barrel and slidably guided in said casing and having reduced means and flange 35 means and said tumbler pins being slidably guided in said barrel for shifting said flange means and reduced means from said barrel whereby

said reduced means is received by said constricted means to permit rotation of said barrel relative to said casing and whereby said flange means is disposed between said member and shank and slightly below and adjacent said constricted means to cooperate with said member to prevent 5 withdrawal of said driver pins from said member.

54. In a pin tumbler lock, a casing, a key receiving barrel rotatable within said casing, said casing and barrel having alineable bores, a member 10 within said lock and having slot means comprising expanded slot means and constricted slot means, and pin tumblers in said lock slidably guided in said bores and extending through said bores and through said expanded slot means to 15 lock said casing, barrel, and member together, said pin tumblers each comprising a plurality of pins slidably guided in said bores, one of said pins having a reduced part capable of movement in said constricted slot means to prevent unlock- 20 ing rotation of said barrel.

55. In a pin tumbler lock, a casing, a key receiving barrel rotatable within said casing, said casing and barrel having alineable bores, a member 25 within said lock and having slot means comprising expanded slot means and constricted slot means, and pin tumblers in said lock slidably guided in said bores and extending through said bores and through said expanded slot means to 30 lock said casing, barrel, and member together, said pin tumblers each comprising a plurality of pins slidably guided in said bores, one of said pins having a reduced part capable of movement in said constricted slot means to prevent unlock- 35 ing rotation of said barrel, said last mentioned pin having means for interlocking with said member at said constricted slot means.

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