

Feb. 28, 1933.

G. MILLER

1,899,445

TELEPHONE LOCK

Filed May 24, 1932

2 Sheets-Sheet 1

*Fig. 1.*

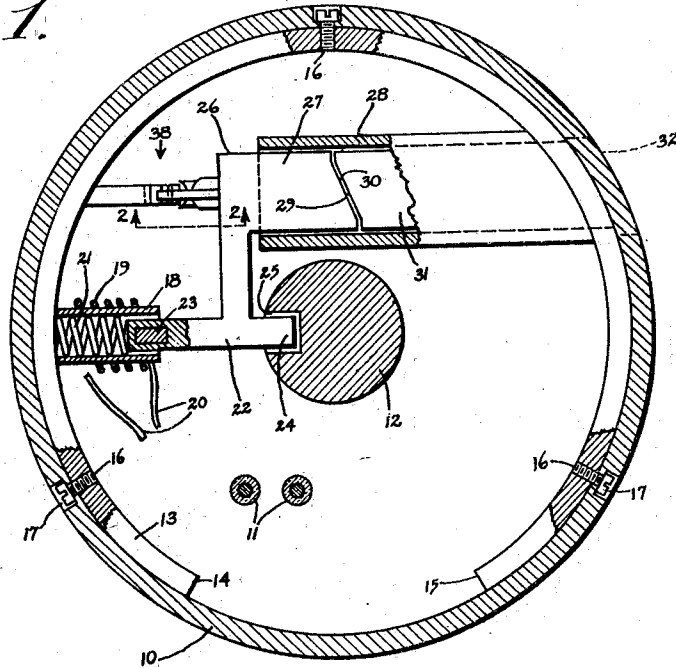


*Fig. 2.*

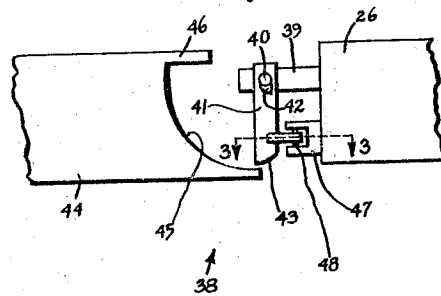
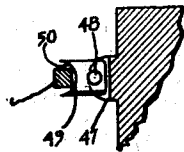


*Fig. 3.*



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2 Sheets-Sheet 2

*Fig. 4.*

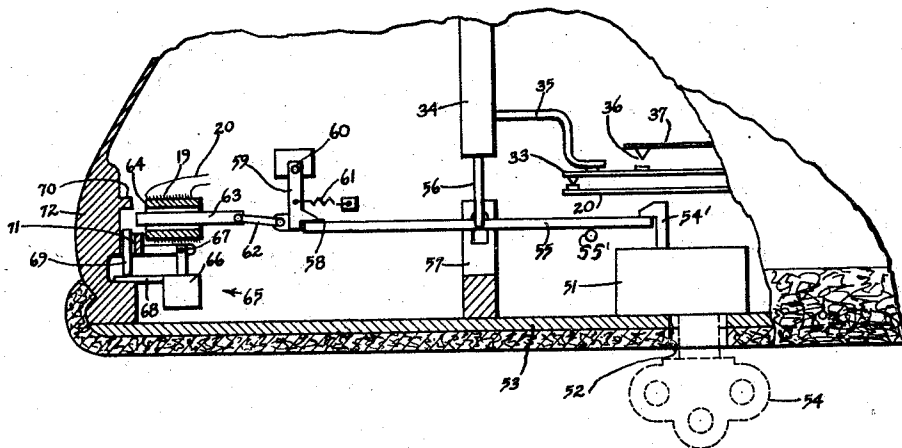


*Fig. 5.*

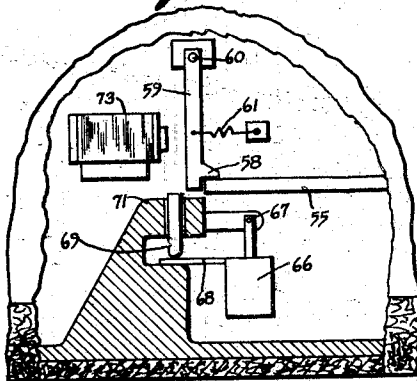


*Fig. 6.*

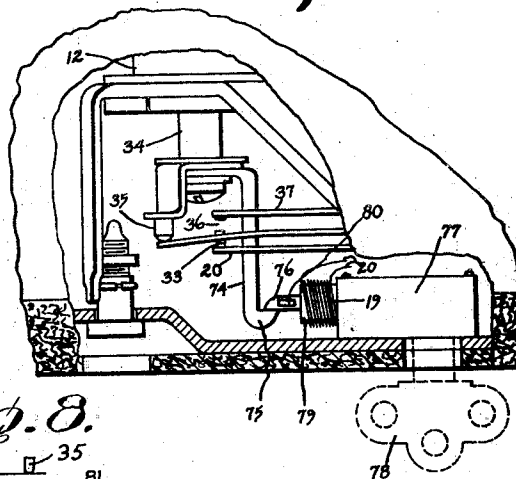


*Fig. 7.*

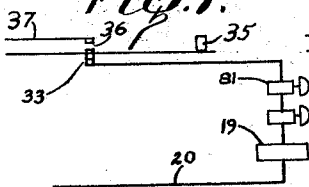
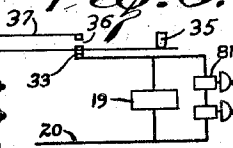


*Fig. 8.*



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## UNITED STATES PATENT OFFICE

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## TELEPHONE LOCK

Application filed May 24, 1932. Serial No. 613,246.

(GRANTED UNDER THE ACT OF MARCH 3, 1883, AS AMENDED APRIL 30, 1928; 370 O. G. 757)

This invention relates to locks or latches for telephone instruments and has for an object to provide an improved telephone lock which is suitable either for the conventional upright telephone or for the type commonly known as a hand set in which the transmitter and receiver are attached by a suitable handle.

Another object of this invention is to provide a telephone lock which may be made in several forms, each suitable either for the conventional telephone or the hand set type, which will prevent connection of the telephone instrument with the line by an unauthorized person.

A further object of this invention is to provide a telephone lock one form of which may be located within the base of the mounting where it is hidden from view and render difficult of access, and another form of which is locked in the upright or support mounted on the base.

A further object is to provide a telephone lock which will permit the telephone to be used to receive a call without the necessity of using a key on the lock but which will not permit the telephone to be used to place a call except with the use of a proper key which may be in the possession of an authorized user.

A further object of this invention is to provide a telephone lock which will be in combination with a bell ringing circuit of the instrument whereby the operation of the bell ringing circuit serves to place the instrument in unlocked condition for the purpose of receiving the call only, but which will not place it in unlocked condition for the purpose of placing a call.

Still a further object of this invention is to provide a telephone lock which may be unlocked by a solenoid or electromagnet which solenoid will be in combination with the bell ringing circuit of the instrument either in series or in parallel, whereby the passage of current through the bell ringing circuit will simultaneously operate the solenoid to unlock the telephone and permit the call to be received.

An additional object of this invention is

to provide a telephone lock which will be unlocked by the operation of the bell ringing circuit and which will automatically re-lock itself as soon as the current has ceased to pass through the bell ringing circuit, unless the instrument has been placed into use to receive the call, and which will automatically re-lock the instrument as soon as the received call is completed.

Another object of this invention is to provide a safety means for the lock, preventing tampering therewith and making it impossible to unlock the telephone by turning or knocking the instrument against one side.

In the drawings:

Fig. 1 is a sectional view showing one form of this telephone lock mounted in the column of a telephone instrument;

Fig. 2 is a fragmentary detail on line 2—2 of Fig. 1;

Fig. 3 is a section on line 3—3 of Fig. 2;

Fig. 4 is a fragmentary elevational view of the base of a telephone instrument partially in section showing another form of this invention;

Fig. 5 is a fragmentary elevational view partially in section of yet another form wherein an electro-magnet is used to release the locking lever;

Fig. 6 is a fragmentary elevational view partially in section of yet another form in which the solenoid is made part of the lock per se;

Fig. 7 is a diagrammatic view of the circuit through the locking electro-magnet or solenoid and through the bell ringing solenoids showing the same in series;

Fig. 8 is a view similar to Fig. 7 showing the circuits in parallel.

Figs. 1, 2 and 3 show one form of this invention wherein 10 indicates the cylindrical column or support forming part of the conventional telephone instrument, or forming the support between the base and the receptacle for the transmitter and receiver of the hand set. The wires leading to the transmitter and receiver are shown at 11, while the plunger between the receiver support and the switch is shown at 12. An incomplete ring 13 having its ends at 14 and 15 is provided

of such a diameter that it just fits within the cylindrical column 10, the ends 14 and 15 being sufficiently separated so that it may be inserted or removed while the wires 11 and 12 are in place. The ring 13 is held in operative position by a plurality of screws 16 countersunk as at 17 in the sides of the column 10. If desired, the heads of screws 16 may be then covered, as with solder, and the covering may be then painted so as to be inconspicuous in the side of column 10. Projecting from one side of the ring 13 is a solenoid shell 18 having a solenoid 19 thereabout operated by the conductors 20. A spring 21 placed within the shell 18 and pressing against the ring 13 as a base serves to normally hold a plunger 22 at the limit of its movement in the shell 18. The plunger 22 has a soft iron armature or core 23 therein which will serve, when a current is conducted by the wires 20 through the solenoid 19, to pull the plunger 22 within the shell 18.

The plunger 22 will be made of brass, aluminum or other non-magnetic material except for the core 23. The plunger 22 is shaped generally as shown and has a locking arm 24 which is adapted to be received within a recess 25 in the switch plunger 12 so that when the spring 21 is expanded to its limit, the locking arm 24 is received within the recess 25. Recess 25 is of such a size that it will just easily admit the locking arm 24 and when the locking arm is in place in the recess 25, the switch plunger 12 cannot be raised sufficiently to operate the telephone switch, thus preventing the instrument from being used. When the spring 21 has been compressed by the solenoid 19 drawing the armature 23 therein, the locking arm 24 is withdrawn beyond the edge of the recess 25, then permitting the plunger switch 12 to be raised in the conventional manner and complete the telephone circuit.

Projecting from one side of the plunger 22 is a bell crank 26 having an arm 27 receivable within the end of a lock cylinder shell 28, the lock cylinder shell 28 being mounted on ring 13. The end of the bell crank arm 27 is cam shaped as shown at 29 and cooperates with a complementary cam 30 on the end of a cylinder lock 31. The cylinder lock 31 is supported in shell 28 and a key may be inserted in the end thereof through the opening 32 formed in the side of the column 10 so that when the key is operated, the lock 31 is rotated causing the cam 30 to press the arm 27 away from it, pressing plunger 22 against spring 21 withdrawing the locking plunger 24 from recess 25, thus unlocking the switch plunger 12.

In operation, the cylinder lock 31 may be of any conventional type, either of the form that permits its key to be withdrawn only when in locked position, or of the form that permits its key to be withdrawn in either

locked or unlocked position. If of the latter form, the telephone may be left unlocked for extended periods at the will of the owner of the key, while if of the former type, the telephone may be unlocked only while the key is in position. When the telephone is in locked position, it is very undesirable that it be necessary to first secure an operator's key to be able to receive a message when the telephone is rung from the central station, and this invention eliminates the necessity of using a key when the telephone is rung. When the telephone is rung from the central station, the bell ringing circuit passes through the electrical conductor 20 having a switch 33 which is operated by a bolt 34 secured to the body of the switch plunger 12. When the receiver is picked up, the plunger 12 is raised by an appropriate spring, not shown, in the conventional manner, raising the bolt 34 and the switch operating finger 35 permitting the switch 33 to break the circuit to the conductor 20 and closing the circuit through the switch 36 to the talking circuit 37. The conductor 20 leads to the bell ringing solenoids 81 and to the lock operating solenoid 19 either in series as shown in Fig. 7, or in parallel as shown in Fig. 8. While the current is passing through the conductors 20, as will be indicated by the ringing of the telephone bell, the solenoid 19 will hold the locking plunger 24 in unlocked position thus permitting the switch plunger 12 to be raised to operate the switch 36 through the locking circuit 37 to wires 11 and permitting the telephone to be used to receive a call. When the call is completed, it is customary to replace the receiver on its movable support pressing the plunger 12 down and allowing the spring 21 to place the locking plunger 24 in locked position. It is then impossible to use the instrument to place a call except by unlocking the same with the use of the key in the lock 31. As is well known, it is necessary to move the switch plunger 12 up and down to recall the operator at the central station after a call is completed, thus serving to insure that the telephone instrument will be locked when a call is completed.

To prevent the possibility of an unauthorized person attempting to make use of the telephone to place a call without the use of the key, a lock guard shown generally at 38 is provided which prevents the locking plunger 24 from being withdrawn either through tilting the instrument at any angle or through hitting the instrument on the side in an attempt to displace the locking plunger 24 from the recess 25. The lock guard 38 includes a support 39 projecting from the bell crank 26 and having a pin 40 projecting therethrough. Pivotal support on the pin 40 is a depending swinging lever 41, either the support 39 or lever

41 being bifurcated, as may be desired, so that the lever 41 may not be displaced laterally from its pin 40. The swinging lever 41 receives the pin 40 through an opening 42 which is of such shape that it will pivot easily while the weight of the lever 41 is depending on the pin 40, but the bottom of the opening 42 is somewhat ragged, as shown, so that when the pressure of the pin 41 is exerted against the pin 40 in opposite direction, it tends to cause the swinging lever 41 to swing further from the position shown in Fig. 2 and to lock against returning thereto. Cooperating with the curved end 43 of the lever 41 is a stop 44 having its end curved eccentrically to the pin 40 as at 45 and leading to a stop finger 46. Projecting from the bell crank 26 directly below the support 39 is a bifurcated boss 47 having a pin support 48 through a side guard 49 which is curved as at 50 allowing the swinging lever 41 to be received within the curve 50.

In operation, the lever 41 will remain in upright position so long as the telephone is in similar upright position and not disturbed. If an attempt is made to cause the lock plunger 24 to be forced out of the recess 25, by either hitting the telephone instrument violently against the side or by tilting it over, the swinging lever 41 will turn about its pin 40 causing its curved end 43 to follow the curvature 45 to the stop finger 46. As will be observed, the curves 45 and 43 are such that any contact between the end 43 and curve 45 tends to cause the curved end 43 to travel further along the curve 45 to the stop finger 46, the curve 45 near stop finger 46 being further from the pin 40 than is the curve 45 near its other end. If desired, graphite or similar lubrication may be placed on the curve 45 to eliminate friction. If the telephone instrument is placed on its side in an attempt to cause the weight of the bell crank 26 to withdraw the plunger 24, the spring 21 will tend to slow up or hold the movement of the bell crank 26, while the lever 41 will swing about its pivot 40 and lock against the stop finger 46, the irregular shape of the aperture 42 cooperating with the pin 40 to assist in holding the pin 41 against the stop finger 46 so long as the weight of the bell crank 26 is exerted thereagainst.

In case the instrument is tilted in a different direction, the side guard 49 will be moved about its pivot 48 and the curve 50 thereon will steer the lever 41 in the direction of the stop finger 46 which motion will be completed by the cooperation of the curved end 43 and curve 45. Thus, no matter which direction the telephone instrument is tilted or struck, the swinging lever 41 will lock against the stop finger 46 before the plunger 24 can move sufficiently to leave the recess 25, thus

holding the same locked against such tampering.

In Fig. 4, the same invention has been applied in a different form. In this form the locking means is shown in the base of the telephone instrument and is suitable either for the conventional type of instrument or for the hand set or French type of telephone instrument. In this form, a lock 51 accessible through an opening 52 in the bottom 53 of the telephone instrument for operation by a key 54 has a lock bolt 54' cooperating with one end of a pivoted lever 55. The lever 55 is pivoted on an extension 56 of the bolt 34 secured to the bottom of switch plunger 12 and is guided between bifurcated guide 57, only one bifurcation being shown for convenience of illustration. The other end of lever 55 is received under the toe 58 of a depending lever 59 pivotally supported at 60, a spring 61 serving to hold the lever 59 and its toe 58 in position on the lever 55. A stop 55' limits the free movement of lever 55, causing it to enter under the toe of lock bolt 54'. As will be obvious, as long as lever 55 is held between the lock bolt 54' and the toe 58, the bolt 34 on the switch plunger is held down preventing the switch 36 of talking circuit 37 from being operated. If either end of the lever 55 is released, the talking switch 36 may then be operated. When the key 54 is operated, the lock bolt 54' will be withdrawn, releasing the lever 55 for operation of the telephone in the conventional manner. The lever 59 may be withdrawn by means of a link 62 connected to an armature 63 in the solenoid shell 64 of the solenoid 19 operated by the bell ringing current through the conductors 20 and switch 33.

To prevent unauthorized use of the telephone in this form, a lock guard shown at 65 may be used. In this form, a weight 66 pivoted at 67 has a finger 68 which raises a plunger 69 in the path of operation of the core 63, a stop limit 70 being provided to prevent the plunger 69 from being displaced from its guide 71 formed in the side 72 of the telephone instrument base. If the telephone be tilted in any direction or struck in an attempt to cause the toe 58 to be displaced from the lever 55, the weight 66 will pivot about its pivot 67 and raise the stop plunger 69 in the path of the core 63, holding it against release movement.

In the form shown in Fig. 5, the link 62 is dispensed with and an electro-magnet 73 operated in similar manner by the conductor 20 of the bell circuit serves to pivot the lever 59 and withdraw the toe 58 from above the lever 55.

In the form shown in Fig. 6, a leg 74 is secured to the bolt 34 and has a toe 75 which is receivable beneath the locking plunger 76 of the lock 77 operable by the key 78. A solenoid shell 79 is formed about the locking

plunger 76, the plunger 76 being of non-magnetic material except for the core 80, the solenoid 19 about the solenoid 79 being connected to the bell ringing conductors 20. In this form, the lock guard may be omitted its place being taken by providing a sufficiently strong spring in the lock 77 preventing the retraction of the lock plunger 76 except by the operation of the key 78 or the solenoid 19 on solenoid shell 79.

It will be understood that the term "solenoid" as used in the appended claims, also includes an electro-magnet, and further, that a combination operated lock is the equivalent of, and may be substituted for, the key operated lock.

It will also be understood that the above description and accompanying drawings comprehend only the general and preferred embodiment of my invention, and that various changes in construction, proportion and arrangement of parts may be made within the scope of the appended claims without sacrificing any of the advantages of my invention.

The invention described herein may be manufactured and used by or for the Government of the United States for governmental purposes without the payment of any royalty thereon.

I claim:

1. In combination with a telephone instrument having a bell circuit and a switch plunger operated by a receiver, a locking member adapted to cooperate with said switch plunger to prevent operation of said switch plunger, and means for withdrawing said locking member from cooperative position, said means including a solenoid in circuit with the telephone instrument bell circuit.

2. In combination with a telephone instrument having a bell circuit and a switch plunger operated by a receiver, a locking member adapted to cooperate with said switch plunger to prevent operation of said switch plunger, means for withdrawing said locking member from cooperative position, said means including a solenoid in circuit with the telephone instrument bell circuit and a key operable lock.

3. In combination with a telephone instrument having a bell circuit and a switch plunger operated by a receiver, a locking member adapted to cooperate with said switch plunger to prevent operation of said switch plunger, means for withdrawing said locking member from cooperative position, said means including a solenoid in circuit with the telephone instrument bell circuit and a key operable lock, and lock guard means preventing abnormal operation of said locking member.

4. In a telephone instrument in combination with a bell circuit and an attached transmitter and receiver, a mounting therefor having a switch by which telephonic connection may be had to a telephone line, an enlarged

base portion in the mounting, a lock contained within the enlarged base portion by which the switch may be locked against operation, a solenoid operated by the bell circuit to unlock the switch while the bell circuit is in operation and means for locking said switch responsive to the cessation of ringing current.

5. In a telephone instrument in combination with a bell circuit and a transmitter and receiver, a supporting member therefor containing a switch operating member by which telephonic connection may be had with the telephone line, a lock contained within the supporting member, an extension from the lock to engage the switch operating member, a bell circuit operated solenoid adapted to withdraw said lock extension from engagement with said switch operating member and means for replacing said lock extension in locking position responsive to the deenergization of said solenoid.

6. In a telephone instrument in combination with a bell circuit and a transmitter and receiver, a supporting member therefor containing a switch operating member by which telephonic connection may be had with the telephone line, a lock contained within the supporting member, an extension from the lock to engage the switch operating member, and means comprising an inertia member for preventing disengagement of the lock extension and the switch operating member when the telephone instrument is in abnormal position.

7. In a telephone instrument in combination with a bell circuit and a transmitter and receiver, a supporting member therefor containing a switch operating member by which telephonic connection may be had with the telephone line, a lock contained within the supporting member, an extension from the lock to engage the switch operating member, a bell circuit operated solenoid adapted to withdraw said lock extension from engagement with said switch operating member, and means comprising an inertia member for preventing disengagement of the lock extension and the switch operating member when the telephone instrument is in abnormal position.

8. In a telephone instrument in combination with a bell circuit and a transmitter and receiver, a supporting member therefor, a base plate in the supporting member, a switch in the supporting member by which telephonic connection may be had to a telephone line, a lock attached to the base plate of the supporting member, a locking plunger extending from said lock for locking the switch against operation, and a solenoid about said locking plunger, said solenoid being operable by said bell circuit to withdraw the locking plunger from the switch when the bell circuit is in operation.

9. In a telephone instrument in combina-

tion with a bell circuit and a transmitter and receiver, a supporting member therefor, a switch operating member at the supporting member by which telephonic connection may be had to a telephone line, a lock within the supporting member, an extension from said lock, yieldable means holding said lock extension in engagement with said switch operating member, and a solenoid about said lock extension for withdrawing said lock extension from operative engagement.

10. In a telephone instrument in combination with a bell circuit and a transmitter and receiver, a supporting member therefor, a switch operating member at the supporting member by which telephonic connection may be had to a telephone line, a lock within the supporting member, an extension from said lock, yieldable means holding said lock extension in engagement with said switch operating member, and a solenoid about said lock extension for withdrawing said lock extension from operative engagement, said solenoid being operable by said bell circuit.

11. In a telephone instrument in combination with a bell circuit and a transmitter and receiver, a supporting member therefor, a switch operating member at the supporting member by which telephonic connection may be had to a telephone line, a lock within the supporting member, an extension from said lock, yieldable means holding said lock extension in engagement with said switch operating member, and a solenoid about said lock extension for withdrawing said lock extension from operative engagement, and means holding said lock extension in operative engagement with the switch operating member when the telephone instrument is out of normal operating position.

12. In a telephone instrument in combination with a bell circuit and a transmitter and receiver, a supporting member therefor, a switch operating member at the supporting member by which telephonic connection may be had to a telephone line, a lock within the supporting member, an extension from said lock, yieldable means holding said lock extension in engagement with said switch operating member, a solenoid about said lock extension for withdrawing said lock extension from operative engagement, said solenoid being operable by said bell circuit, and means holding said lock extension in operative engagement with the switch operating member when the telephone instrument is out of normal operating position.

13. In a telephone instrument in combination with a bell circuit and an attached transmitter and receiver, a supporting member therefor, a switch within the supporting member, a base plate attached to the supporting member, a lock attached to the base plate and engaging the switch to prevent operation of the switch, and a bell circuit operated sole-

noid on said lock unlocking the same during operation of the bell circuit.

14. In a telephone instrument in combination with a bell circuit and a transmitter and receiver, a supporting member therefor, a switch operating member within the supporting member, a lock within the supporting member engaging the switch operating member to prevent movement thereof when the receiver is removed from the supporting member, and means comprising an inertia member for preventing disengagement of the lock and switch operating member when the telephone instrument is out of normal position.

15. In a telephone instrument, in combination with a bell circuit and a transmitter and receiver, a columnar supporting member therefor, a switch operating member extending through said columnar supporting member, means for locking said switch operating member against operation, and means for supporting said locking means in said columnar supporting member.

16. In a telephone instrument, in combination with a bell circuit and a transmitter and receiver, a columnar supporting member therefor, a switch operating member extending through said columnar supporting member, means for locking said switch operating member against operation, and means operated by said bell circuit while in operation for releasing said locking means.

17. In a telephone instrument, in combination with a bell circuit and a transmitter and receiver, a columnar supporting member therefor, a switch operating member extending through said columnar supporting member, means for locking said switch operating member against operation, means operated by said bell circuit while in operation for releasing said locking means, and means for supporting said locking and releasing means in said columnar supporting member, said supporting means comprising an incomplete ring member, a sleeve extending inwardly housing said locking means and a sleeve extending inwardly including said releasing means.

18. In a telephone instrument, in combination with a bell circuit and a transmitter and receiver, a columnar supporting member therefor, a switch operating member extending through said columnar supporting member, means for locking said switch operating member against operation, means operated by said bell circuit while in operation for releasing said locking means, means for supporting said locking and releasing means in said columnar supporting member, said supporting means comprising an incomplete ring member, a sleeve extending inwardly housing said locking means and a sleeve extending inwardly including said releasing means, a lock guard, and a lock guard support extending inwardly opposite said locking means preventing

locking of said locking means except when the telephone instrument is in normal position.

19. In a telephone instrument, means for locking said instrument against unauthorized use, and means comprising an inertia member for preventing the release of said locking means when said telephone is in abnormal position.

20. In a telephone instrument, means for locking said instrument again unauthorized use, and means for preventing the release of said locking means when said telephone is in abnormal position, said preventing means including a pendulum adapted to block the locking means except when in normal position.

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