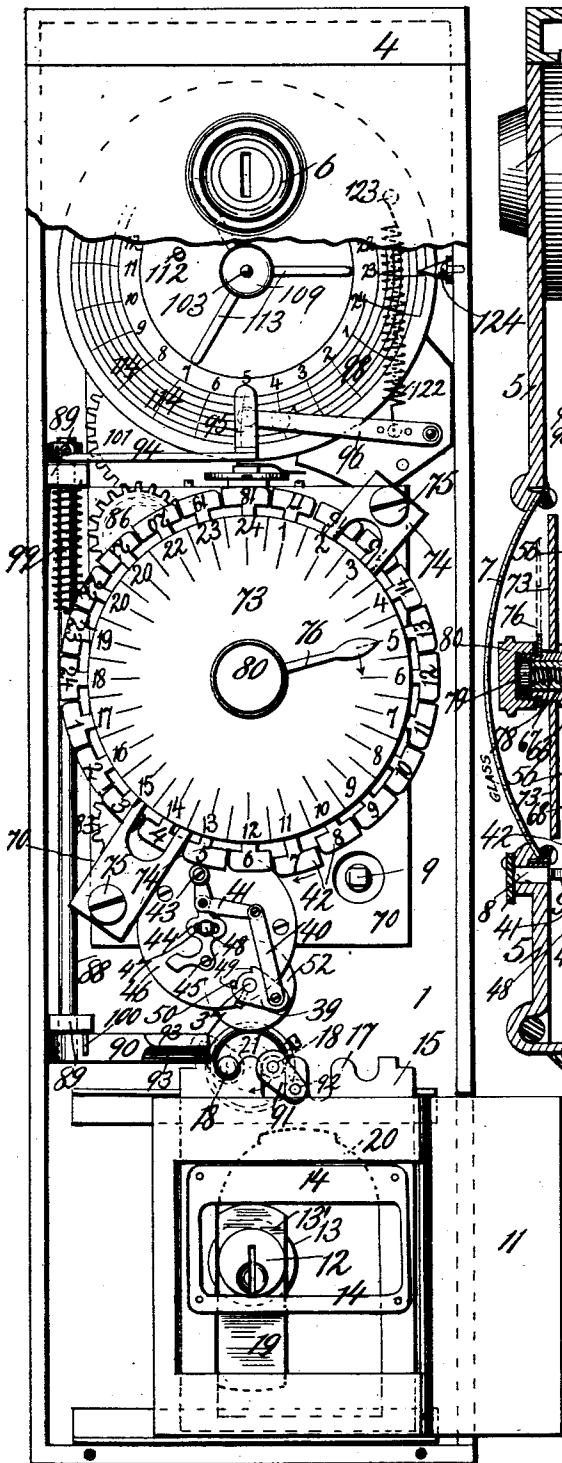


E. S. PHELPS.

TIME LOCK.

No. 520,332.

Patented May 22, 1894.



Attest:
J. H. Schott
Alfred T. Gage.

Fig. 1.

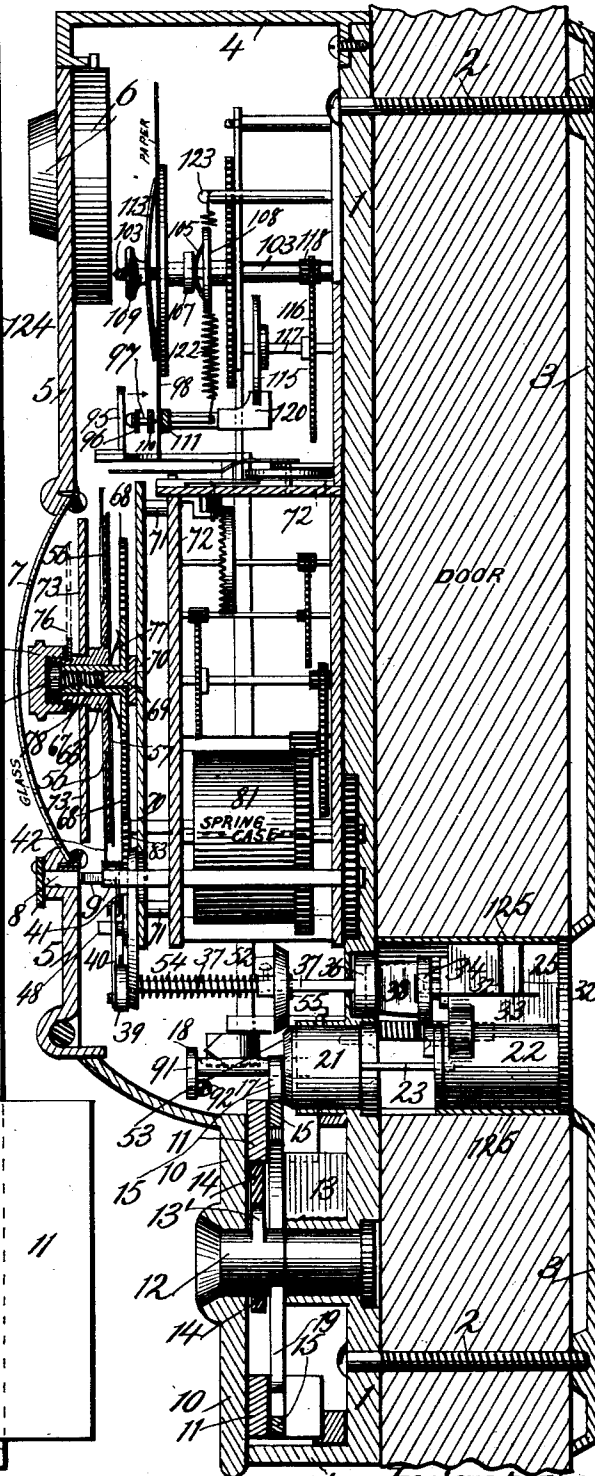


Fig. 2. 4 Inventor:
E. S. Phelps
By H. E. Anderson, Atty.

(No Model.)

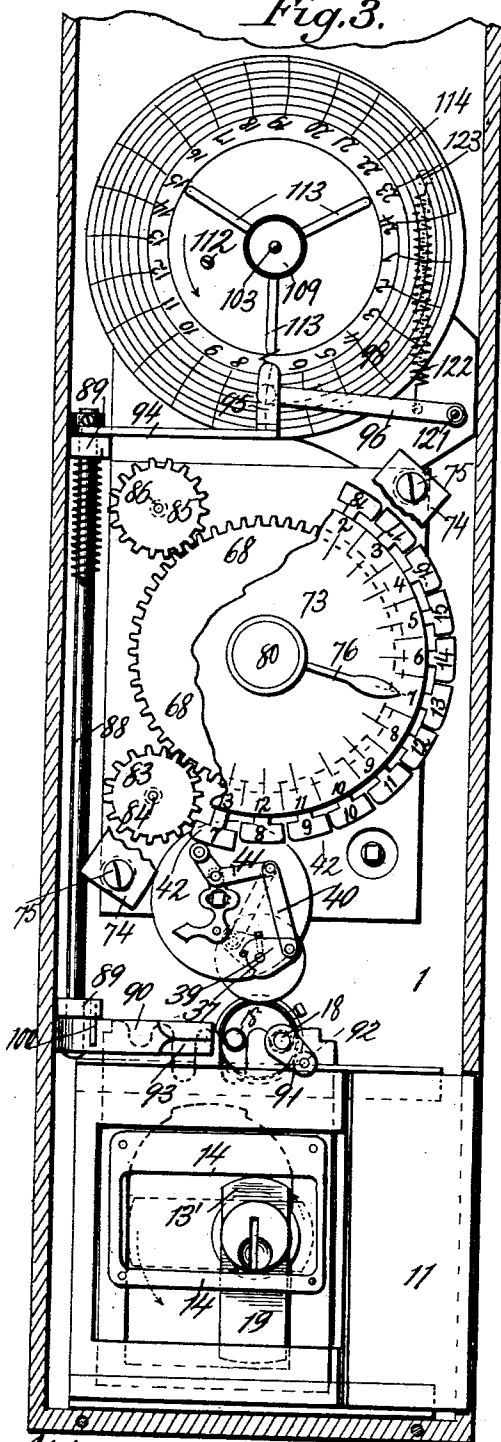
E. S. PHELPS.
TIME LOCK.

4 Sheets—Sheet 2.

No. 520,332.

Patented May 22, 1894.

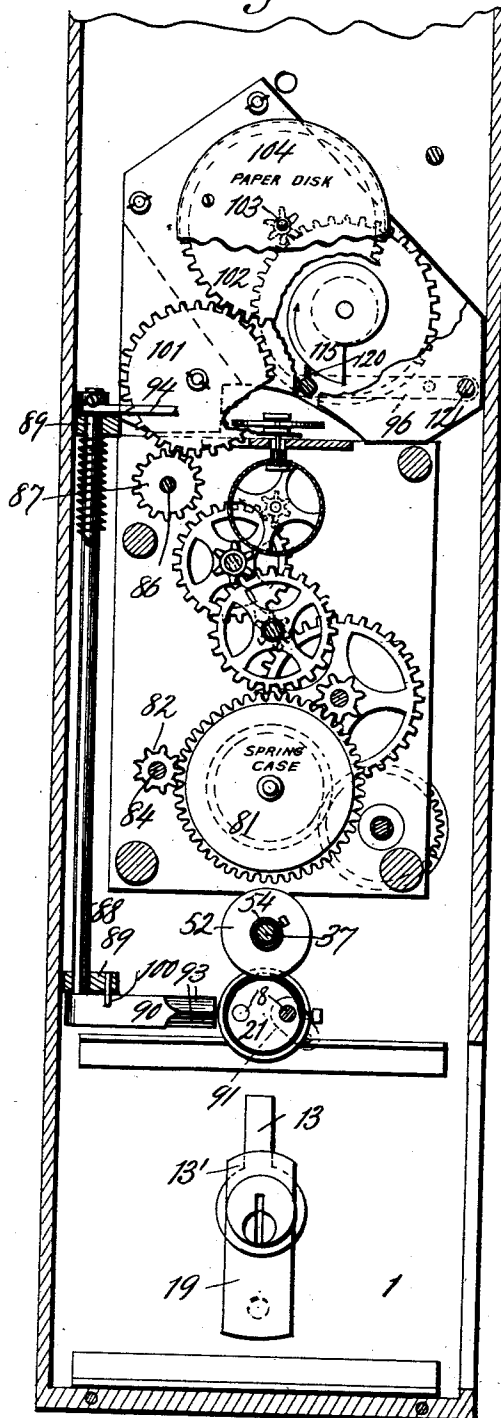
Fig. 3.



Attest:

J. H. Schott
Alfred T. Gage.

Fig. 4.



Inventor:

Edwin Sanford Phelps.
By H. B. Whitman, atty.

(No Model.)

4 Sheets—Sheet 3.

E. S. PHELPS.
TIME LOCK.

No. 520,332.

Patented May 22, 1894.

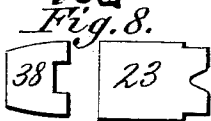
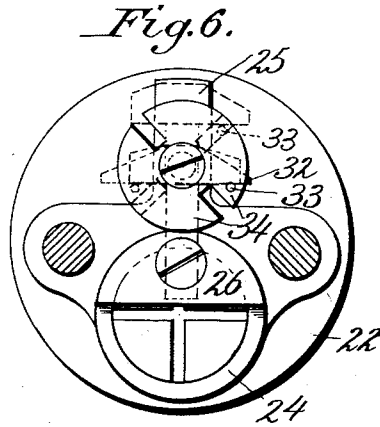
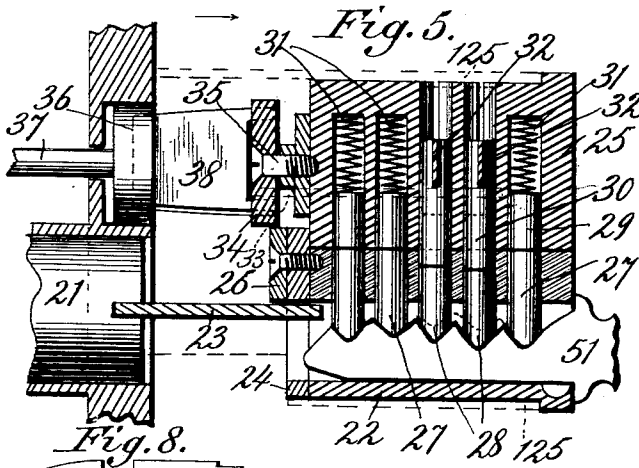


Fig. 7.

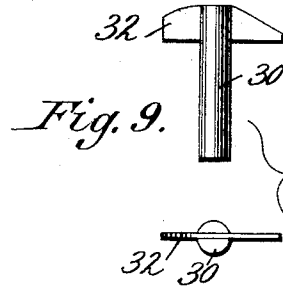
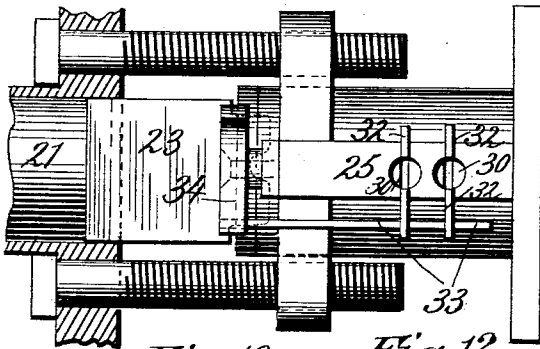
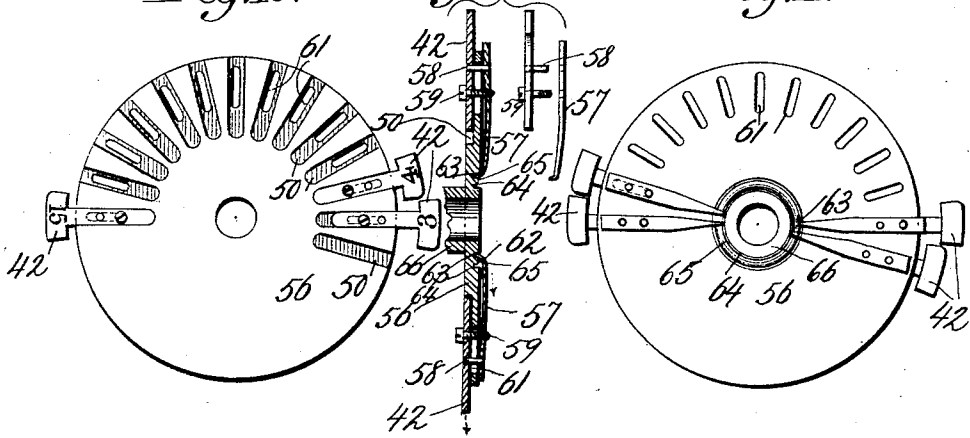


Fig. 10.

Fig. 12.

Fig. 11.



Attest:

W. H. Schott
Alfred T. Gage

Inventor
Edwin Sanford Phelps
by H. C. Henderson,
Att'y.

E. S. PHELPS.
TIME LOCK.

No. 520,332.

Patented May 22, 1894.

Fig. 14.

Fig. 13.

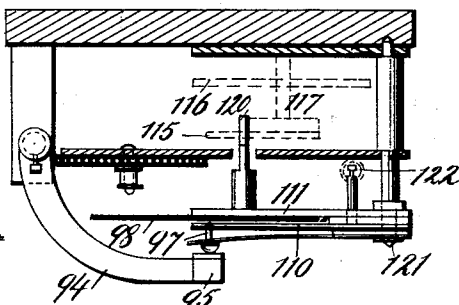
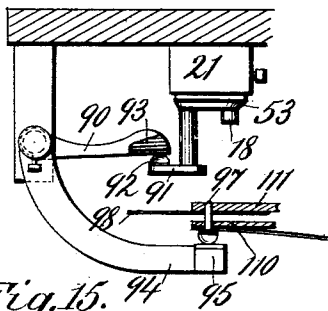


Fig. 15.

Fig. 17.

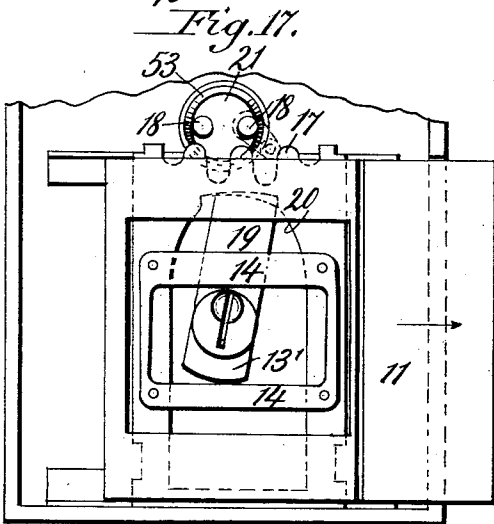
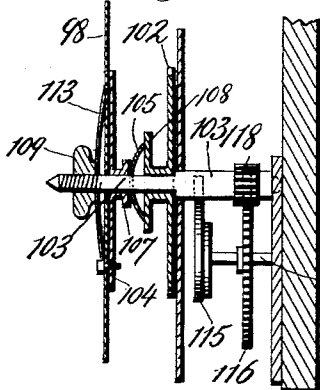
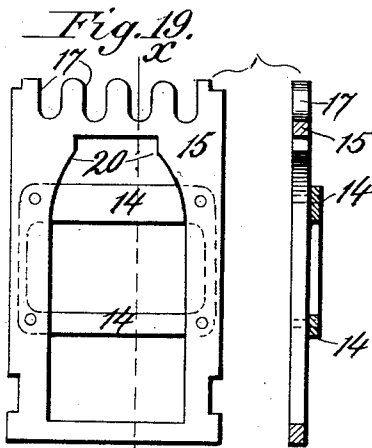
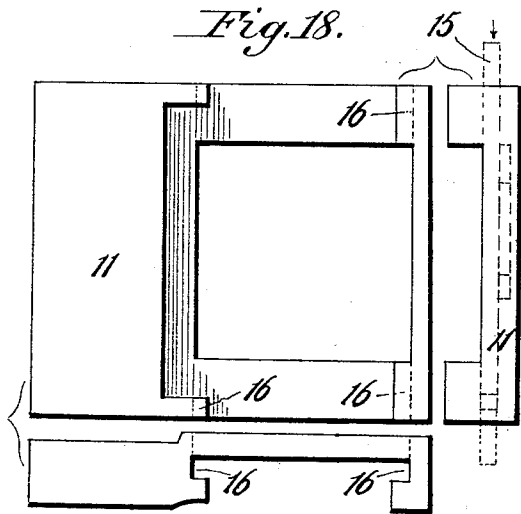


Fig. 18.

Fig. 19.



Attest:

H. H. Schott
Alfred T. Gage.

Edwin Sanford Phelps,
by H. P. Henderson, atty.

UNITED STATES PATENT OFFICE.

EDWIN SANFORD PHELPS, OF LEAVENWORTH, KANSAS.

TIME-LOCK.

SPECIFICATION forming part of Letters Patent No. 520,332, dated May 22, 1894.

Application filed November 29, 1893. Serial No. 492,372. (No model.)

To all whom it may concern:

Be it known that I, EDWIN SANFORD PHELPS, a citizen of the United States, residing at Leavenworth, in the county of Leavenworth and State of Kansas, have invented certain new and useful Improvements in Time-Locks; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

My invention relates to locks, and is particularly applicable to that class of locks in which the key mechanism is under the control of time mechanism, whereby portions of the lock can be so adjusted as to permit the unlocking of the door at only a predetermined time or during a predetermined period by the employment of a key that may be intrusted to a subordinate and yet permitting it to be unlocked at any period by another key which may be designated as a principal key and which will be in the keeping of the proprietor or trusted employé.

The invention has for its object certain constructions and arrangement of parts and combinations of features whereby greater security and a higher degree of perfection are obtained than heretofore and in which certain advantageous features of operation will ensue and in which the movements of the lock, whether in locking or unlocking, are shown or registered by means of a recording device under the influence of a time mechanism whereby the time when the lock is moved is recorded, the same being more particularly described and specified hereinafter and then sought to be clearly defined by the appended claims, reference being had to the accompanying drawings forming a part hereof, and in which—

Figure 1 is a front elevation of the lock with a portion of the inclosing casing broken away. Fig. 2 is a vertical central section through the lock, some parts being in full lines; Fig. 3 a front elevation of the lock, the front of the case being removed, and a portion of the dials being broken away, as well as a portion of the inclosing casing; Fig.

4 a front elevation with certain parts omitted and showing the clock mechanism and some other portions of the lock with parts broken away; Fig. 5 a vertical central section through the key mechanism; Fig. 6 an end view of the tumbler casing looking in the direction of the arrow on Fig. 5; Fig. 7 a plan view of the key mechanism and showing bolts or screws that may be employed to sustain the tumbler casing; Fig. 8 a detail of connecting plates 23 and 38 as illustrated in Fig. 5; Fig. 9 top and side views, of one of the tumblers that are connected with the time mechanism; Fig. 10 a top plan of the dial carrying extensible arms; Fig. 11 a bottom plan of the same; Fig. 12 a vertical central section through the dial carrying extensible fingers, and also a dial of the parts of one of the adjustable arms separated; Fig. 13 a detail plan of a portion of the marking device and recording mechanism with parts in section; Fig. 14 a detail plan of some of the parts illustrated in Fig. 13 and showing the connection between the marking device and the arm operated from the key mechanism for actuating the marking device, portions of the lock mechanism being omitted so as to make clearer the parts illustrated in Figs. 13 and 14; Fig. 15 a vertical section through a portion of the recording mechanism; Fig. 16 a detail of the frictional spring 105; Fig. 17 a front view of the locking bolt and its immediate connecting parts; Fig. 18 a detail of the locking bolt, showing a face, a plan and an end view of the same, and Fig. 19 a detail of the rack dog of the bolt, showing a face view and vertical section through the same on the line $x-x$. Figs. 5, 6, 7, 8, and 9 are on an enlarged scale.

In the drawings the numeral 1 designates a back plate which supports the operative parts of the lock and which is secured to the door by means of bolts 2 which after passing through the door may screw into bosses on a face plate 3 or escutcheon applied to the outside of the door. The back plate 1 also sustains the casing 4 which incloses the operative parts of the lock, which casing has a hinged face 5 provided with a suitable lock 6 for holding it closed and with a transparent face 7 through which the stationary dial and the hour hand may be viewed from the front of the casing, and with a cap covered aperture

8 for the insertion of a key to reach the winding stem 9 of the clock mechanism. The casing also has a lower hinged portion 10 which can be thrown open when access is desired to be had to the lower portion of the lock and which at other times is held closed by screws engaging the walls of the casing, or otherwise.

The numeral 11 designates the sliding bolt of the lock which may be operated at any time from inside the store or other room where the lock may be used by the insertion of a key into the hub 12 so as to act upon tumblers in the extension 13 and free the same from engagement with the hub so that the latter may be turned. When the hub is turned in one direction an extension 13' thereon will be brought into engagement with a bar 14 which will depress a sliding dog 15 which moves in a suitable way or recess 16 formed in the sliding bolt 11 (Fig. 18) so as to release a rack 17 formed at the top of the dog from engaging with rotatable studs or pintles 18 and thus leave the sliding bolt free to be moved in or out by the key previously described. After the extension 13' has depressed the dog (see Fig. 17) as specified a longer extension 19 on the same hub 12 and which works in a cam way 20 in the dog will bear against the dog and push it and the sliding bolt in one direction as indicated in Fig. 17 of the drawings, which, if in the direction indicated by the arrows in Fig. 17 will carry the bolt into locking position. On turning the hub in the opposite direction the extension 19 will bear against the dog in the direction which will draw back the bolt and thus unlock the door, the hub in its rotation bringing the extension 13' against the bar 14 so as to lift the dog 15 and bring its rack into engagement with the studs or pintles 18, this upward lifting of the dog taking place after the bolt has been drawn in, and leaving the parts in position to be operated from the outside of the door by rotation of the studs or pintles 18.

This construction is not novel and has been in use for some time and therefore need not be more particularly illustrated or described but as it is used in connection with my invention it has been thought best to illustrate and describe it so far as has been done.

The studs or pintles 18 project from a rotatable hub or spindle 21 which is connected with the rotatable key hub 22 preferably by means of a connecting plate or key 23 which for convenience may fit at one end in a slot made in the hub 22 and at the other end in a slot made in the hub or spindle 21 so that the hubs may be separated when desired. The hub 22 has a ring 24 secured to its inner face so as to extend over the joint between the hub and the tumbler socket-casing 25 in order to prevent the hub 22 from being drawn out, and a semi-circular plate 26 is secured to the ring 24 over the connecting key or plate 23 against which the flat face of the plate or key 23 may bear. These details however are not essential,

it only being necessary that the spindle or hub 21 and the hub 22 be joined so as to revolve together. By revolving the hub 22, the spindle or hub 21 will be rotated and it will carry the studs or pintles 18 so that by their engagement against the teeth of the rack 17 on the dog 15 the bolt 11 can be shot in and out by turning of the hub 22 with a key to be inserted from the outside of the door. The hub 22 has the sliding tumblers 27 and 28 and their mates 29 and 30 fit in suitable sockets in the socket-casing 25, the tumblers 29 being preferably under the influence of springs 31. These tumblers so far described operate in the ordinary way common to this form of key mechanism, and the tumblers 30 are formed with lateral projections 32 designed to be engaged by a periodically moved arm or finger so as to raise said tumblers under some circumstances at a predetermined time so as to allow all the tumblers at that time to be operated by a subordinate key, the tumblers however being capable of operation at all times by a different key to be designated as the principal key.

The arm or finger for periodically lifting the tumblers 30 is designated by the numeral 33 which is connected to a rotatable piece 34 that may be held to the socket-casing 25 by a pivot-pin or screw 35 on which the piece 34 is turned. This piece 34 is connected to the head 36 of a shaft or spindle 37, preferably by means of a connecting plate 38 which at one end may fit into a slot formed in the piece 34 and at the other end in the slot formed in the head 36 so that said several parts may be separated as desired, but the manner of connecting the shaft 37 and finger 33 is non-essential so long as they will be connected so as to move the finger 31 to lift the tumblers 30 when the shaft 37 is moved. The shaft 37 will be under the influence of time mechanism as hereinafter described so that the finger 33 may be moved at a predetermined time.

To the shaft or spindle 37, preferably at its inner end, there is attached a crank 39, preferably by a set screw as shown by dotted lines in Fig. 1 so that it can be adjusted thereon, and to this crank is connected a link 40, to the other end of which link there is connected one arm of a lever, preferably a bell-crank lever 41 the other arm of which is adapted to be acted on at predetermined periods by one or more extensible fingers 42 as hereinafter more particularly described.

The contact arm of the lever 41 is preferably provided with an anti-friction roller 43 which will be engaged by the fingers 42 when the latter are adjusted to contact therewith in their movements. I prefer to pivot the crank-lever 41 to a regulator 44 which may be a finger pivoted at 45 to a fixed plate 46 and formed with an opening 47 through which will project a set screw or nut 48 so that by loosening said screw or nut the finger may be turned on its pivot 45 and then be held to its

adjustment by tightening the screw or nut 48 thus changing the fulcrum of the lever 41. The purpose of this is to make adjustment of the lever 41 relatively to the fingers 42 so as to regulate the throw of the lever and compensate for variations that may rise from wear or from slight differences in construction or otherwise, and therefore while it is desirable to provide for such contingencies such features are not essential but desirable. Another advantage of this capability of adjustment is that it permits a change from even hours to fractions thereof in the time of opening the lock, as by adjusting the lever 41 so as to change the initial point of contact between its friction roller and the extensible fingers it will change the relative position between the hour hand and the point of contact of the friction roller with the extensible finger increasing or decreasing it as the lever is adjusted in one direction or the other, and thus changing the time when the friction roller may be acted on by the finger to permit the opening of the door by the subordinate key. Shoulders 49 may be formed on the crank 39 so as to come in contact with a pin 50 to limit the throw of the link 40 but the shoulders and pin may be entirely omitted and when omitted the crank can be freely turned into the position shown in dotted lines in Fig. 3 in changing from a right to a left hand lock. When any one of the fingers 42 is adjusted so as to contact with the friction roller of the lever 41 it will depress that end of the lever when in contact therewith and raise the other end so that through the link 40 and crank 39 the spindle or shaft 37 will be turned in a direction to lift the arm 33 which in turn will lift the tumblers 30 by reason of engagement with the projections 32 and when this is the case a subordinate key 51 (Fig. 5) is free to act on all the tumblers 27 and 28 so as to actuate the locking bolt 11 through the instrumentality of the previously described connections between said bolt and the key hub 22, the position of the lever 41 and the crank 39 at this period being that illustrated in Fig. 3 of the drawings, and the position of the same parts during the period when the subordinate key cannot operate the lock being shown in Fig. 1 of the drawings. It will thus be observed that the subordinate key which is intrusted to the keeping of the employé can operate to unlock the door only when the lever 41 is in the position which it bears when it lifts the arm 33 to raise the tumblers 30, and as the lever will be brought into this position by contact of one of the fingers 42 after its adjustment for contact and which will be adjusted to come in contact with the lever at a predetermined time, the subordinate key cannot operate until that time arrives. But on the other hand the bolt can be moved to unlock the door at any time by means of the principal key which will be in the custody of the proprietor or his confidential employé, said key being of such a

construction that it will act on all the tumblers of the lock so as to lift the tumblers 30 as well as the other tumblers in a position to permit unlocking, such key being the same in construction as key 51 except that the portion which is to lift the two sets of tumblers 28 and 30 is higher than in the subordinate key as indicated by dotted lines in Fig. 5 of the drawings. I prefer to connect the bell-crank lever 41 with the key mechanism in such manner that as the key is turned to lock the door, the friction roller end of the bell-crank lever will be thrown into a position that will permit the tumblers 30 to drop so that the subordinate key cannot unlock the door until one of the arms 42 is again brought into operative contact with the friction roller end of the lever. The construction is also such that when the bell-crank lever is moved into the position for unlocking the door, that is, the position which will elevate the tumblers 30, it will remain in that position until the door is locked by insertion of the key into the hub 22 from the outside of the door thus leaving the door free to be opened and closed as often as desired without the use of either key that belongs to the hub 22 and yet at the same time permitting the door to be locked at any time by either the principal or subordinate key inserted in the hub 22, the lever 41 however being brought into position to let the tumblers 30 drop the moment the door is locked through the hub 22 by either key and thus preventing it from being unlocked by the use of the subordinate key until some one of the fingers 42 be brought into operative contact with the lever 41, and yet allowing the door to be unlocked at any time by the use of the principal key. The preferred construction for this operation is a beveled friction wheel 52 attached to the shaft or spindle 37 so as to have frictional contact with the beveled face of the hub or spindle 21 whereby when the spindle or hub 21 is revolved in the operation of locking the door the frictional contact between it and the beveled wheel 52 will be sufficient to turn the shaft 37 so as to bring the lever 41 into the locking position illustrated in Fig. 1 of the drawings and thus prevent the unlocking of the door except by the principal key until a predetermined time arrives. The frictional contact between the beveled faces may be such that in unlocking the door with the principal key the lever 41 will be turned into its unlocking position, the frictional contact being such as to turn the friction wheel 52 to throw the lever 41 into its unlocking position when the main key is used for unlocking the door and in the other direction when the main key is used for locking the door so as to throw the lever 41 into its locking position.

For the purpose of insuring sufficient frictional contact between the operative meeting faces of the beveled wheel 52 and beveled face 53 of the spindle or hub 21, I may employ a spiral or other spring 54 arranged so

as to exert a yielding pressure against the beveled wheel 52, feathered to the shaft 37 so as to rotate with the shaft and slide on the shaft in the direction of the spring and be checked in its movement in the opposite direction by a pin 55 or other suitable stop. But the friction-wheel may be held by a set screw (shown in dotted lines in Fig. 2) through its hub so as to permit it to be adjusted to effect the necessary frictional contact with the beveled face 53. I prefer to allow a very slight up and down and endwise movement to the shaft 37 which may be effected by fitting the shaft and its head loosely in their bearings so as to have a slight endwise movement as stated. This allows the disk 52 when it and the hub are in their normal position to stand a little lower than when it and the hub 21 are in operative contact, with a little space between them. When the hub 21 is turned and brought into operative contact with the disk 52, the latter and its shaft are slightly raised thereby and the spring 54 will exert a pressure to hold the disk and hub in frictional contact. This insures a better working of the parts. I prefer to have one of the beveled faces 52 or 53 so formed that the beveled faces will not be in contact at all points throughout their continuous faces and for that purpose I make the bevel of one of said parts, say the bevel 53 of the hub or spindle 21, deeper throughout one third, more or less, of its circumference as indicated in the several figures of the drawings so that at such point there will be no contact between the beveled faces 52 and 53 as indicated in Fig. 2 of the drawings. The object of this is to allow a slight rotation of the hub 21 in either direction without moving the beveled friction wheel 52. The reason of this is that it sometimes happens that in inserting the key into the hub 22 it is turned in both directions before the tumblers are freed or released and if the hub should be accidentally turned too far by the subordinate key in the wrong direction after the crank lever 41 has been moved into its unlocking position by one of the fingers 42 it might move the lever 41 into its locking position and thus prevent the locking or unlocking of the door by the subordinate key especially so if the tail end of the adjustable fingers 42 has just passed the friction roller end of the lever 41. To guard against this possibility a portion of the contiguous faces 52 and 53 are out of contact with each other but only a portion for the purpose stated and not so much thereof as to prevent the lever 41 being moved into its locking position in the operation of turning the hub 22 to shoot the bolt 11 to lock the door. It will be observed that under this construction when the lever 41 has been moved into its unlocking position by contact of one of the fingers 42 with it, it remains in that position until the door is locked from the outside and that it is not necessary to adjust all of the fingers or any more than one for the purpose of re-

taining the lever in its unlocking position, and it will also be observed that when the particular finger has passed by the lever that then the lever is capable of being turned into its locking position by the act of locking the door from its outside. On the other hand if it is desired to retain the lever in its locking position for any two or more consecutive hours and at the same time permit the door to be locked and again unlocked from the outside by either the principal or the subordinate key, it is only necessary to adjust or draw outward as many of the consecutive fingers as there are consecutive hours through which it is desired to render the lock capable of being locked and unlocked by either key. If it were necessary to have a series of consecutive fingers drawn out in order to hold the lever 41 in its unlocking position after passing the hour for opening the door it would be impossible to lock the door against opening with the subordinate key until after the entire number of consecutive hours had elapsed for the reason that the lever could not be moved into its locking position until after the fingers had passed so as to leave it free to turn and consequently the door could be unlocked by either the subordinate or principal key during that period while it might be desirable that it should be capable of being unlocked only by the principal key, and if the crank lever 41 should automatically assume its locking position upon the passage of the hour set for opening the door then it would be impossible to lock the door by the subordinate key for the reason that the tumblers would drop immediately upon the lever assuming its locking position and the subordinate key could not remove those tumblers. The advantage therefore will be appreciated of having a construction which will allow the door to be locked at any time after the passage of the opening hour so that when locked it can be opened only by the principal key and not by the subordinate key. This construction will also admit of the door being unlocked by the subordinate key at any predetermined hour by simply adjusting another finger corresponding to the second hour or third hour or other hour at which it may be desired to permit the unlocking of the door by the use of the subordinate key.

The fingers 42 which constitute the means for moving the crank lever 41 into the position that permits the use of the subordinate key to unlock the door form a part of a movable dial 56 which carries twenty-four of the fingers representing the twenty-four hours of the day, the tips of the fingers being numbered from one to twenty-four. These fingers are capable of sliding in and out from the periphery of the dial and are preferably secured to the dial by spring plates 57 secured to the fingers by means of a pin 58 and a screw 59, the shanks of the fingers lying in suitable recesses 50 formed in the face of the dial 56, and the pins 58 and screws 59 passing

through elongated slots 61 formed in the dial so that the fingers may have a back and forth play in the dial. The ends of the plate 57 are formed with a hook 62 which will enter a groove 63 in the base of the dial when the fingers are extended and will lie in a groove 64 in the dial when the fingers are pressed forward, the hook being such as to slip over the head 65 between the grooves 63 and 64 as the finger is moved inward and outward, and by this means each finger is held to its adjustment. By adjusting the screw 59 the tension of the plates 57 may be regulated. This dial has a hub 66 which fits over a sleeve 67 extending from a toothed hour wheel 68 which turns upon a post 69 extending from the face of a plate 70 which may be sustained by posts 71 connecting it to a front plate of a frame 72 in which is sustained the time or clock mechanism which operates the hour wheel and the movable dial. The hub 66 of the movable dial 56 extends through a stationary dial 73 marked with twenty-four divisions indicating the twenty-four hours of the day and which is held stationary by suitable means, for instance, by the ears 74 extending from the stationary dial and through which screws 75 will pass and enter the plate 70 so as to hold stationary the dial set in the plate. An hour hand 76 is secured to the hub of the movable dial 56 so as to be carried around the stationary dial by the travel of the movable dial. The movable dial 56 is moved preferably by frictional contact with a part of the hour wheel, and the preferred mode of effecting this contact is by the employment of a compressible spring 77 which is made to encircle the sleeve 67 and to have contact with the hour wheel and the movable dial so that the pressure of the spring between the said two parts will cause sufficient friction for the movable dial to revolve with the hour wheel and at the same time the hour hand and movable dial can be turned independently of the hour wheel in setting the hour hand and correspondingly adjusting the movable dial. A set screw 78 having a head 79 which bears upon a portion of the movable dial engages with the threads in the interior of the sleeve 67 and may be used to hold the hour wheel and the movable dial together. A thumb nut 80 may be screwed onto the end of the hub of the movable dial and by this thumb nut said dial and the hour hand can be rotated independent of the hour wheel.

The hour wheel and through it the movable dial and the hour hand, is operated through suitable time or clock mechanism of any approved well known pattern. That illustrated in the drawings is a well known form of "Seth Thomas" movement with changes which I will now describe.

To drive the hour wheel 68 I take the power direct from the spring barrel 81 (Fig. 4) through a pinion 82 and a toothed wheel 83 on the same shaft 84 and have the wheel 83 engage directly with the hour wheel 68. This change is a decided advantage for the reason

that in the lock the hour wheel has not only to operate the hour hand but also has to operate the movable dial carrying the fingers which control the unlocking of the door, and furthermore the hour wheel is also used for transmitting motion to certain registering or recording mechanism hereinafter particularly described, and therefore it is desirable to have the power applied as direct as possible to the hour wheel from the spring barrel or power imparting spring.

Another change is to have a toothed wheel 85 engage with the hour wheel 68, this wheel 85 being on the shaft 86 which also carries a toothed wheel 87 from which motion is transmitted through a suitable train of gear wheels hereinafter more particularly described for the purpose of operating the registering or recording mechanism to be described.

The recording mechanism is designed to record the time when the door is locked and when it is unlocked, and the record is made every time that the key, whether it be the principal or the subordinate key, is operated to shoot the bolt 11 into either its unlocking or its locking position, and the dial which is employed to receive the record is so formed that it will indicate the hour or fraction of an hour when the lock was operated to unfasten the door and also to fasten it, the dial being operated in conjunction with the time mechanism and hour hand so as to indicate correctly the time when the door was locked and unlocked. In order to make the record, I employ a shaft 88 which may revolve in ears or bearings 89 and which carries at its lower end an arm 90 that projects into the path of travel of an arm 91 which is connected to the spindle or hub 21 in any suitable way but preferably by extending one of the studs or pintles 18 connected to the hub or spindle and having the arm 91 on the end of said extended pintle as illustrated clearly in Figs. 1 and 2 of the drawings I prefer to form a lug or extension 92 on the arm 91 so that said lug will constitute the contact point to engage the arm 90 in the rotation of the arm 91, the two faces of the arm 90 preferably being inclined or beveled as indicated at 93 so that the lug or stud 92 will glide smoothly over the arm 90 but in a manner to move said arm by the engagement of the lug therewith in whichever direction the arm 91 may be turned. The arm 90 is moved by the engagement of the arm 91 therewith and it turns the shaft 88 so as to swing an arm 94 carried by the upper end of the shaft 88, said arm preferably being secured to the shaft 88 by a set screw permitting its adjustment and having an extension 95 which will bear against a finger or arm 96 carrying a suitable impression making device which may be a punch or puncturing pin 97 which when pressed by the swinging of the arm 94 will punch or puncture a paper or other suitable dial 98. The arm or finger 96 is preferably a spring plate so that when the arm 94 is carried back to its normal posi-

tion the spring finger 96 will retract the punch or puncturing pin and thus leave the recording dial 98 free to continue its movement. The arm 94 may be retracted by a suitable spring, for instance by a spring 99 coiled around the shaft 88 as indicated in Fig. 3 of the drawings and a pin 100 extending from the lower ear 89 may be used for the purpose of limiting the movement of the arm 90. It will thus be seen that when the hub 22 is turned to unlock the door, the recording dial will be punctured and a record made of the fact that the door has been unlocked, and as the dial is divided into spaces corresponding to the twenty-four hours of the day it will show at what hour the door was unlocked, and the distance of the puncture between any two hours inscribed upon the dial will indicate the period between any two hours when the unlocking occurs. The time at which the door is locked will also be indicated in like manner upon the dial, as in the reverse movement of the hub 22 in locking the door it will cause the arm 91 to engage with the arm 90 and move the same so as to effect the record. In this way the proprietor by examining the dial can ascertain how many times the door has been locked and unlocked during the twenty-four hours and at what hour and thus be enabled to keep a check upon the employé and if necessary trace the person opening the door without authority or at irregular hours if any one should come into possession of a duplicate or principal key.

In order that the recording dial 98 may move in time with the hour hand 76, the toothed wheel 87 is made to engage a toothed wheel 101 which in turn engages a toothed wheel 102 on a shaft 103, with which wheel 102 the plate or disk 104 which carries the paper dial 98 is connected so as to turn therewith. I prefer to have the shaft 103 rotatable and the wheel 102 fitted to turn thereon and plate or disk 104 held to the shaft by frictional contact or otherwise to turn with it, the wheel 102 and disk or plate 104 being connected frictionally together so as to turn together and yet permit the plate or disk 104 carrying the recording dial 98 to be turned independently of the wheel 102 when so desired for the purpose of adjusting the dial 98 for the purpose of having the hour divisions thereof bear a certain relation to the hour hand 76 and to the corresponding hour numeral of the fingers 42 in order that there may be a correct record made on the dial of the time when the door is either locked or unlocked. For illustration it will be observed that the hour division 5 (Fig. 1) of the recording dial is opposite to the punching or puncturing device 97 while the hour hand 76 is opposite the hour numeral 5 of the stationary dial 73 so that if the door should be either locked or unlocked at the hour of 5 it would be indicated on the recording dial. It will also be observed that the finger 5 of the movable dial 56 is opposite to the friction roller end of the tumbler controlling lever 41 so that if this finger 5 were extended to depress the lever 41 to permit the subordinate key to be used at the hour of five and the key should be used at that hour the time of using it would be indicated on the recording dial 98. For further illustration, it will be observed that the finger 7 of the movable dial 56 is extended so that when in the rotation of the finger dial the finger 7 is brought opposite to the friction roll end of the lever 41 and depresses the same as indicated in Fig. 3 of the drawings so as to permit the use of the subordinate key, the use of the key at that hour to unlock the door will be indicated on the recording dial 98, as that dial has been moved two hour divisions, from 5 to 7, so that the hour division 7 of the recording dial is opposite the punch or puncturing device, and the hour hand 76 is now also opposite the hour division 7 of the stationary dial 73, and the record is made at the hour of seven on the recording dial. If the employé should not be prompt to open the door at seven o'clock sharp but should come some time thereafter, the time at which he should come and open the door would be indicated on the recording dial 98. For instance if he should come at 7.30 o'clock and open the door the punching or puncturing device would record on the recording dial midway in the space between the numerals 7 and 8 on the recording dial and thus indicate that the employé did not open the door until 7.30 o'clock, and any other hour or fraction of an hour would be likewise indicated upon the recording dial. The purpose of rendering the recording dial adjustable independently of the toothed wheel 102 is to enable the dial to be properly adjusted to correctly register when the lock is first placed in position on the door, and also to permit of its adjustment in the event of the lock being allowed to run down accidentally or otherwise at any time. The plate or disk 104 of the recording dial and the wheel 102 are connected together to operate as hereinbefore described by means of a spring 105 placed between the hubs 107 and 108 of the disk 104 and wheel 102 respectively, the hub 107 turning with the disk 104 on the shaft 103 and the hub 108 loosely on the shaft with the wheel 102. To the end of the shaft 103 is applied a thumb nut 109 so that by tightening or loosening that nut a spring 113 will be clamped more or less tightly on the paper dial 98 and thus hold it firmly in place on the plate or disk 104 and will also regulate the frictional contact between the wheel 102 and the disk 104 so that power will be transmitted from the wheel 102 to the disk 104 and from it to the shaft 103 and the parts connected with it. It is preferred to have that portion of the paper dial which is to receive the record to pass between the two plates 110 and 111 so that the plates will serve to keep the dial in shape and prevent it from possibly curling at its periphery or elsewhere and so that the plate 111 may

serve as a sort of die bed plate for the punching or puncturing device and the plate 110 serve as a stripper to free the paper dial from the punch.

5 The recording dial is divided into a series of divisions representing the seven days of the week and these divisions are formed of a series of involute curved lines 114, each line representing a space equal to the twenty-four
10 hours of the day so that one dial can be used for making the record of one week, each line of the involute curve representing one day of the week, and thus the record of each day of the week can be preserved and the week's record
15 filed away for future reference if needed. In order that the puncturing or punching device may be automatically adjusted to correctly record in each subdivision for the consecutive days of the week, I provide a device
20 for automatically moving the puncturing or punching device so that as each subdivision is ended or has completed its course of travel the puncturing or punching device will pass to the subdivision for the ensuing day and
25 so on through the successive days of the week. The device employed for this purpose is indicated by the numeral 115 and will be designated for convenience a snail and its periphery describes substantially an involute
30 of a circle, which bears such relation to the involute curves of the recording dial that while the snail is making one complete revolution the recording dial will make seven revolutions and the snail will travel each day
35 a distance bearing a definite relation to the length of the curve representing the day whose record is to be made so that the snail will act upon the punching or puncturing device to carry it from one curved line to the
40 other as one day succeeds another, the snail and gears for transmitting motion thereto being so proportioned as to effect that result. This snail derives its power from a toothed
45 wheel 116 on its shaft 117 which wheel derives motion from a pinion 118 on the shaft 103, said shaft receiving its power—*via*—spring 105 connected to the toothed wheel 102
50 as previously described. The periphery of this snail bears against a heel or extension 120 projecting from a portion of the puncturing or punching device, say from the plate 111, and the puncturing or punching device
55 together with the plates 111 and 110, which in the particular form illustrated constitute a portion of the puncturing device, is hinged or pivoted to a post 121. The snail is thus
60 caused to move the punching or puncturing device so that it will pass from the curved line representing one day on the recording dial to the curve line representing the succeeding day as each day is completed. A
65 spring 122 connects the punching or puncturing device with some suitable part as for instance with the post 123 so that when the punching or puncturing device has completed
its travel, for instance, after the seven days are completed and the snail has made a com-

plete revolution, it may be drawn back or retracted to its normal or starting point and thus be in position to begin another week's
70 travel and record.

The arrangement of the parts 39, 40 and 41 as shown in Fig. 3 is the arrangement when the lock is a right hand lock, that is, in which the key is turned to the right in throwing the
75 bolt into its locking position. When the lock is a left hand lock, that is, in which the key is turned to the left in throwing the bolt into its locking position, the parts 39 and 40 are
80 arranged as shown by dotted lines in Fig. 3 of the drawings. In a right hand lock the position of the pins or projections 32 on the tumblers 30 and of the finger or arm 33 will be
85 that shown in Figs. 2 and 5 of the drawings and in full and dotted lines on the right hand side of Fig. 6, while in the left hand lock the projections 32 of the tumblers and the finger
90 or arm 33 will be on the opposite side of the tumbler casing as shown by dotted lines on the left hand side of Fig. 6 of the drawings. The bolt 11 and the rack 14 and the opening
in the casing for the bolt to shoot through will also be reversed. These changes will
readily be perceived by the mechanic.

I may provide the plate 104 with a pin or
95 screw 112 which will pass through the paper dial 98 and prevent the paper dial from rising or separating from the plate. It will also serve as an index or guide in placing the paper dial
in position, which is placed so that the twenty-fourth hour or numeral 24 will be directly under
100 the point of the punch 97 at the minute when the swinging arm 96 returns to its inner or initial position after having completed its
outward travel or movement, which return
105 movement occurs at midnight or twenty-four o'clock on each Friday night, the parts being arranged to effect that operation, and the involute lines reading from the inner one
110 outwardly in the order of Saturday, Sunday, Monday, Tuesday, Wednesday, Thursday and Friday with the morning register of Saturday in the a. m. portion of the inner or minor line. The paper dial is replaced with a fresh one
every Saturday after the store is opened.

115 As an aid in setting the recording dial, I may employ a pointer 124 placed either on the casing as illustrated in full lines in Fig. 1 or on the swinging arm 96 as indicated by
120 dotted lines in the same figure.

The key hub 22 and its extension 25 as well as the connecting plates 23 and 38 are enclosed in a shell 125 which will extend from
the front of the hub 22 to the back plate 1 of the casing 4 as indicated in Fig. 2 of the
125 drawings.

I have shown and described with particularity the construction and arrangement of the several parts entering into the formation of the lock but it is obvious that changes can
130 be made therein without departing from the essential features of my invention and I therefore do not confine myself to exact details where alterations are embraced within

the spirit of the invention. I have also for convenience, and as the preferred form, illustrated sliding tumblers as constituting a portion of the key mechanism but I do not restrict myself to that form as it is obvious that other well known forms can be employed and as the same will occur to the mechanic skilled in the art and as my invention does not lie in this particular form I have selected what I consider to be the best form for an illustration of the invention.

The operation of the lock will be obvious from the description already given, but it may be added that with the extensible arm bearing the numeral 7 drawn out as illustrated in Fig. 1 of the drawings, the lock is set to permit the door to be unlocked at seven o'clock in the morning and when that arm in the revolution of its dial is brought to the position shown in Fig. 3 of the drawings it has acted upon the lever 41 so as to depress the same to lift the tumblers 30 so as to permit the subordinate key to be used for unlocking the door. If it should be desired to set the lock so as to permit the door to be unlocked at twelve o'clock noon, the extensible arm bearing the numeral 12 will be drawn out so as to act upon the lever 41 in the manner described, and so on by drawing out the extensible arms corresponding to the hour that the lock is to be set for opening the door, the lock can be set for opening it at any predetermined hour; and by drawing out any desired consecutive number of the arms, the door can during those hours be locked and unlocked by the use of the subordinate key. On the other hand if it is desired to set the lock so that it can be unlocked only at a certain predetermined hour by the subordinate key and if locked at any time after that hour not to be capable of being unlocked by the subordinate key until the same hour recurs again, only one of the extensible arms is extended. By extending any desired number of the arms at intervals, the lock will be set so as to be capable of being unlocked by the subordinate key only at those predetermined hours and not at other hours. I have illustrated the extensible arms as covering the period of one hour each but it is obvious that by dividing them up into smaller parts they can be made to operate during the fractions of an hour the same as the hour periods. It will also be observed that when the hour division 5 of the recording dial is opposite to the puncturing device or punch 97 the hour hand 5 is opposite the hour division 5 of the stationary dial and the finger 5 of the movable dial is opposite the roller end of the lever 41 as indicated in Fig. 1, and that when the period of two hours has passed, said parts are opposite to the hour division 7 as illustrated in Fig. 3 of the drawings, and so the parts will progress from hour to hour as the hours of the day elapse. If conditions should arise making it desirable to keep the store closed against employes for one or more days, for instance in the event of death, holiday or

other cause, it is only necessary to push in all the extensible fingers or arms so that none of them will contact with the lever 41, and the lock will be under the control of the proprietor, or principal key exclusively, and cannot be opened by the subordinate key until the proprietor makes the adjustment of the fingers to permit the use of the subordinate key.

Lock 6 hereinbefore referred to may be a tumbler lock of any approved form but will preferably be of such construction as to be opened only by means of the principal key employed by the proprietor for operating the main lock, so that only the proprietor can open the front face 5 to have access to the interior of the main lock. It will also be perceived from the foregoing description that whenever the lock is operated to either lock or unlock the door, the fact is registered by the recording device and that by reason of the record receiving means being actuated by the time mechanism the hour or fraction of the hour when the bolt is operated is indicated upon the register. This is the case whether the principal or the subordinate key is used for operating the lock, and whether the extensible fingers be set so as to permit the subordinate key to be used only at a predetermined period or periods, or whether they all be extended so that the lock can be operated at any time by either the subordinate or the principal key, or whether they all be pushed in so that the lock can be operated only by the principal key. Under any of the conditions stated, the recording device serves to register both the locking and the unlocking of the door and also the time of such operation. This is an important feature of the invention as by such means a check is always had upon the opening of the door, and the time when the store has been entered and how long the person entering remains in the store can be determined by an examination of the recording means showing when the door was unlocked in entering and locked on retiring.

Having described my invention and set forth its merits, what I claim is—

1. In a locking device, the combination with a key mechanism, and a movable dial having extensible arms, of means intermediate of said key mechanism and extensible arms adapted to be actuated by one or more of said extensible arms to adjust the key mechanism to permit it to be operated by a key, said adjusting means being in operative connection with the key when in the lock to adapt it to be moved by the key to place it in position to be acted on by one or more of said extensible arms, substantially as and for the purposes described.

2. In a locking device, the combination with a key mechanism, and a movable dial having extensible arms, of means intermediate of said key mechanism and extensible arms adapted to be actuated by one or more of

said extensible arms to adjust the key mechanism to permit it to be operated by a key, and means for moving said adjusting means at will to bring it into position to be actuated by one or more of said extensible arms, substantially as and for the purposes described.

3. In a locking device, the combination with a key mechanism, and a movable dial having extensible arms, of a lever arranged to be actuated from one or more of said extensible arms, a friction wheel or disk having connection with said lever and with a portion of the key mechanism, the connection between said lever and key mechanism being such as to permit adjustment of the lever that it may be operated from one or more of said extensible arms, and a beveled member intermediate of said beveled wheel or disk and another portion of the key mechanism and adapted to be actuated by a key to impart movement to said disk or wheel by frictional engagement of the beveled member therewith to move said lever into position to be actuated from one or more of said extensible arms, substantially as and for the purposes described.

4. In a locking device, the combination with a key mechanism, and a movable dial having extensible arms, of a lever arranged to be actuated from one or more of said extensible arms, a friction wheel or disk having connection with said lever and with a portion of the key mechanism, and a beveled member intermediate of said wheel or disk and another portion of the key mechanism and adapted to be actuated by a key to impart movement to said disk or wheel by engagement of the beveled member therewith to move said lever into position to be actuated from one or more of said extensible arms, the construction of said beveled wheel or disk and said beveled member being such that there may be a partial movement of one of said parts before moving said lever into position to be actuated from said extensible arms, substantially as and for the purposes described.

5. In a locking device, the combination with a key mechanism and the movable dial having extensible arms, of a lever intermediate of said key mechanism and extensible arms and adapted to be actuated by one or more of said arms to adjust the key mechanism to permit it to be operated by a key, and an adjustable fulcrum for said lever, substantially as and for the purposes described.

6. In a locking device, the combination with a key mechanism, and means adapted to be actuated from one or more extensible arms to adjust the key mechanism to permit it to be operated by a key, of a movable dial provided with a series of arms adapted to be brought into position to actuate said means to adjust the key mechanism, the arms of said dial being adjustable and provided with a spring engaging depressions in the dial in the different adjustments of the arms, and a ridge or projection on the plate over which said

springs will pass in the adjustment of the arms, substantially as and for the purposes described.

7. In a locking device, the combination with a key mechanism, and means adapted to be actuated from one or more extensible arms to adjust the key mechanism to permit it to be operated by a key, of a movable dial provided with a series of arms adapted to be brought into position to actuate said means to adjust the key mechanism, the arms of said dial being adjustable and provided with a spring engaging the dial to hold the arms in their different adjustments, and means for regulating the tension of said springs, substantially as and for the purposes described.

8. In a locking device, the combination with a key mechanism, means adapted to be actuated from one or more extensible arms to adjust the key mechanism to permit it to be operated by a key, and suitable clock mechanism for moving said arms, of a dial carrying said arms and deriving motion from the clock mechanism, said dial having a frictional adjustment on its bearing to permit circular adjustment of the dial independent of the movement of the clock mechanism and without the necessity of disconnecting any part of the device, substantially as and for the purposes described.

9. In a locking device, the combination with a key mechanism, means adapted to be actuated from one or more extensible arms to adjust the key mechanism to permit it to be operated by a key, and suitable clock mechanism for moving said arms, of a dial carrying said arms and deriving motion from the clock mechanism, a spring connecting said dial with a portion of one of the wheels of the clock mechanism for the purpose of transmitting motion from said wheel to the dial through the instrumentality of said spring, said dial having a circular adjustment independent of said wheel, substantially as and for the purposes described.

10. In a locking device, the combination with a key mechanism, means adapted to be actuated from one or more extensible arms to adjust the key mechanism to permit it to be operated by a key, and suitable clock mechanism for moving said arms, of the wheel deriving motion from the clock mechanism and formed with a sleeve, a dial carrying said extensible arms and mounted on said sleeve to be circularly adjustable thereon, a spring connecting said dial and said wheel whereby the dial and wheel are caused to rotate together, and the screw connecting the sleeve of said wheel with a part of said dial, substantially as and for the purposes described.

11. In a locking device, the combination with a key mechanism, means adapted to be actuated from one or more extensible arms to adjust the key mechanism to permit it to be operated by a key, and suitable clock mechanism for moving said arms, of a dial carrying said arms, the wheel transmitting

motion to said dial, and means for transmitting motion from the spring barrel of the clock mechanism direct to said wheel through which motion is transmitted to the dial carrying the extensible arms, substantially as and for the purposes described.

12. In a locking device, the combination with a key mechanism, means adapted to be actuated from one or more extensible arms to adjust the key mechanism to permit it to be operated by a key, and suitable clock mechanism for moving said arms, of a dial carrying said arms, the wheel 68 transmitting motion to said dial, recording mechanism for making a record when the lock is operated to unlock the door, and the wheel 85 taking its motion direct from the wheel that drives the dial carrying the extensible fingers and transmitting it through a system of gears to the recording mechanism, substantially as and for the purposes described.

13. In a locking device, the combination with a key mechanism controlled in its operation by a time mechanism, of a recording dial moved in unison with the time mechanism, and marked with divisions of the day, means for imparting a rotatable movement to the dial about its axis and a marking device connected with the key mechanism and registering upon the recording dial the time when the key mechanism is actuated by the manipulation of means to operate the same, substantially as and for the purposes described.

14. In a locking device, the combination of a recorder, time mechanism for actuating the same, and means for registering on the recorder the movements of the lock in the operation of both locking and unlocking, substantially as and for the purposes described.

15. In a locking device, the combination with a key mechanism controlled in its operation by a time mechanism, of a recording dial moved in unison with the time mechanism, and formed with divisions corresponding to the days of the week, and a marking device operated from the key mechanism and registering upon the recording dial the time when the key mechanism is actuated by the manipulation of means to operate the same, said marking device and recording dial having their positions changed in relation to each other as the days of the week pass that the record of the succeeding days may be divisionally separated upon the dial, substantially as and for the purposes described.

16. In a locking device, the combination with a key mechanism controlled in its operation by a time mechanism, of a recording dial moved in unison with the time mechanism, a movable marking device to make a record on said dial, and a device actuated from the time mechanism and moving said marking device relatively to the dial to adapt it to make a record on the dial at different points corresponding to the different time periods at which the record is made, substantially as and for the purposes described.

17. In a locking device, the combination with a key mechanism controlled in its operation by a time mechanism, of a recording dial moved in unison with the time mechanism and divided into a series of divisions corresponding to involute curves, a marking device operated from the key mechanism and registering upon the recording dial the time when the key mechanism is manipulated, and a device having substantially the form of an involute of a circle and operated from the time mechanism to cause the marking device to record upon the involute divisions of the recording dial, substantially as and for the purposes described.

18. In a locking device, the combination with a key mechanism controlled in its operation by a time mechanism, of a recording dial moved in unison with the time mechanism, a marking device operated from the key mechanism and registering upon the recording dial the time when the key mechanism is manipulated, a device having substantially the form of an involute of a circle and operated from the time mechanism to act on said marking device to cause it to record upon the recording dial, and means for restoring said marking device to its initial position, substantially as and for the purposes described.

19. In a locking device, the combination with a key mechanism controlled in its operation by a time mechanism, of means to receive the record denoting the movement of the key mechanism to move the lock bolt, and a marking device connected with the key mechanism and adapted to make a record of the movement of the key mechanism in both locking and unlocking the bolt, substantially as and for the purposes described.

20. In a locking device, the combination with a key mechanism controlled in its operation by a time mechanism, of means to receive the record denoting the movement of the key mechanism to move the lock bolt, a marker to register the movement of the key mechanism, a shaft having an arm to move said marker and a power receiving arm or extension provided with beveled faces, an arm connected with a part of the key mechanism and adapted in the movement of the key mechanism to be brought against either beveled face of said arm or extension to move the marker in either the locking or unlocking of the lock bolt, and means for restoring said arm or extension to its normal position, substantially as and for the purposes described.

21. In a locking device, the combination of the key mechanism controlled in its operation by a time mechanism, a movable dial operated from the time mechanism and provided with a series of extensible arms adapted to be set to actuate a lever to permit the key mechanism to be manipulated, said extensible arms corresponding to time divisions of the day, a lever adapted to be actuated by said extensible arms to adjust the key mechanism for manipulation, a stationary dial inscribed with

divisions of the day, an indicating hand for said stationary dial and movable with the dial carrying the extensible arms, a recording dial operated by the time mechanism and provided with inscriptions corresponding to the time divisions of the stationary dial and the extensible arms, and a marking device operated from the key mechanism for recording upon the recording dial the time when the key mechanism is manipulated to move the lock bolt, the arrangement being such that the adjustable arms can be set to permit the key mechanism to be manipulated at a predetermined time and the recording dial will show the time of manipulation of the key mechanism to move the lock bolt whether it be at the predetermined time or at some period of time thereafter, substantially as and for the purposes described.

22. In a locking device, the combination with a time mechanism, of a recording mechanism comprising a power receiving and transmitting wheel operated from the time mechanism, and a recording dial operated from said wheel, and connected therewith by a frictional device permitting the adjustment of the recording dial without moving said wheel, substantially as and for the purposes described.

23. In a locking device, the combination with a time mechanism, of a recording mechanism comprising a power receiving and transmitting wheel operated from the time mechanism, a recording dial operated from said wheel, and a spring connection between said

wheel and dial whereby movement may be transmitted from the wheel to the dial through said spring, substantially as and for the purposes described.

24. In a locking device, the combination with a time mechanism, of a recording dial operated from said time mechanism and a spring for holding said dial in position, said spring permitting the removal of the dial that it may be replaced by another dial, substantially as and for the purposes described.

25. In a locking device, the combination with a time mechanism, of a recording dial of flexible material operated from said time mechanism, a marking device for making a record upon said dial, and a movable stripper for assisting in separating said dial and marking device, substantially as and for the purposes described.

26. In a locking device, the combination with a time mechanism, and the recording dial, of a marker to record upon said dial, a device to move said marker, and a wheel for transmitting motion derived from the time mechanism to said dial, said wheel having connection with the device that moves the marker for the purpose of actuating the same, substantially as and for the purposes described.

In testimony whereof I affix my signature in presence of two witnesses.

EDWIN SANFORD PHELPS.

Witnesses:

CHAS. W. THOMPSON,
L. R. TURNER.