LE GRAND C. BUSH.

INTERLOCKING DOOR SYSTEM.

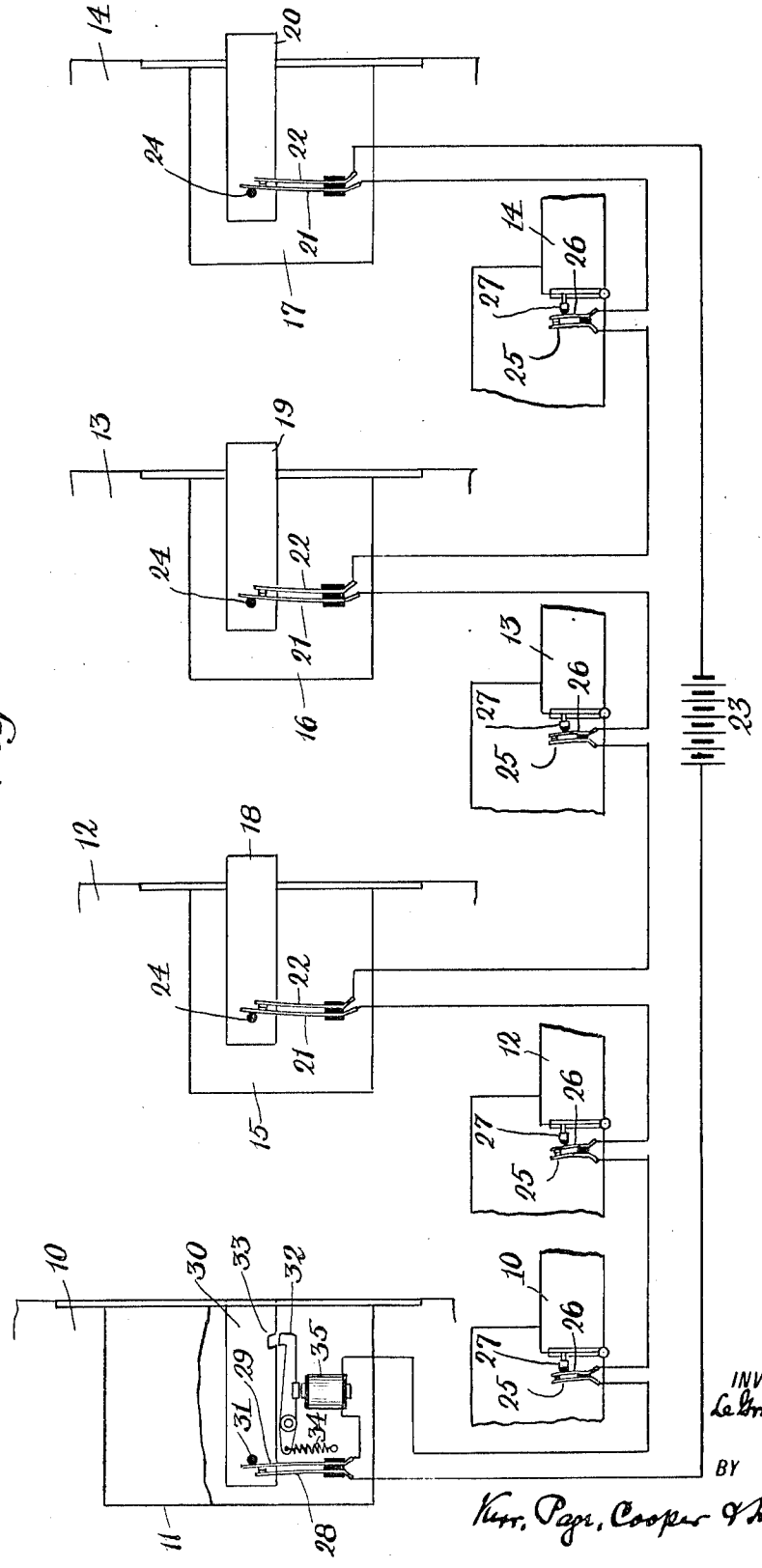
APPLICATION FILED SEPT. 29, 1917.

1,270,264.

Patented June 25, 1918.

2 SHEETS—SHEET 1.

Fig. 1.



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2 SHEETS—SHEET 2.

Fig. 2.

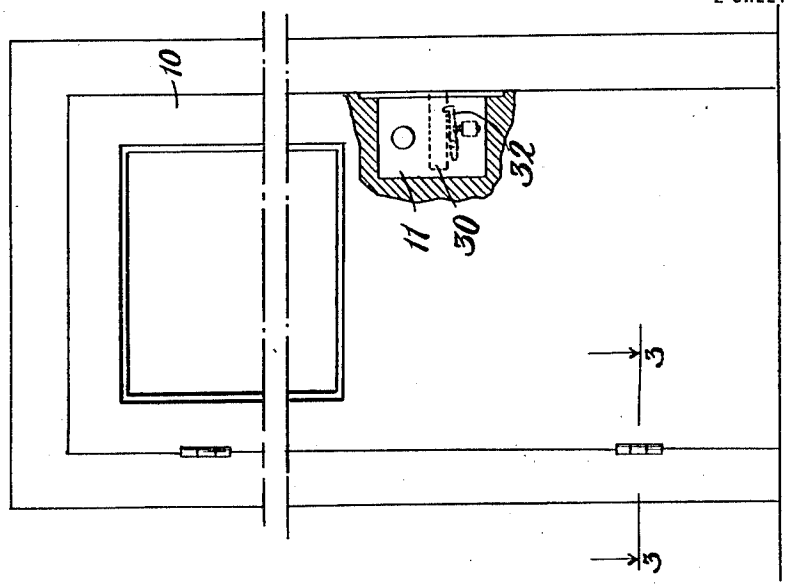


Fig. 4.

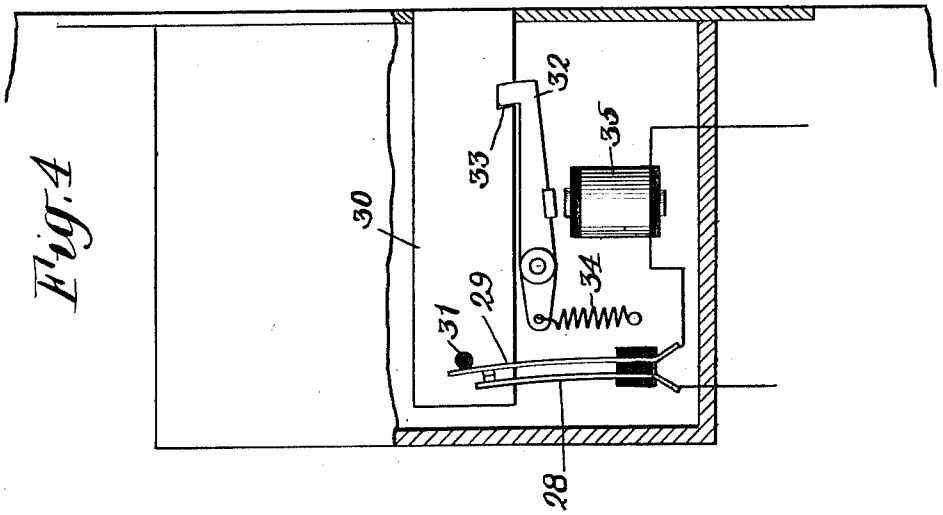
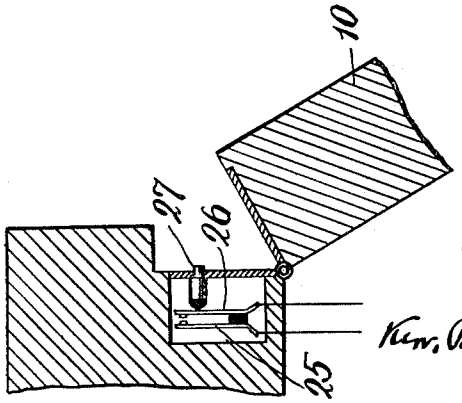


Fig. 3.



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LE GRAND C. BUSH, OF BINGHAMTON, NEW YORK, ASSIGNOR TO INTERNATIONAL TIME RECORDING COMPANY OF NEW YORK, OF ENDICOTT, NEW YORK, A CORPORATION OF NEW YORK.

INTERLOCKING DOOR SYSTEM.

1,270,264. Specification of Letters Patent. Patented June 25, 1918.

Application filed September 29, 1917. Serial No. 193,904.

To all whom it may concern:

Be it known that I, LE GRAND C. BUSH, a citizen of the United States, residing at Binghamton, in the county of Broome and State of New York, have invented certain new and useful Improvements in Interlocking Door Systems, of which the following is a full, clear, and exact description.

In stores, factories, offices, and other buildings having more than one door it sometimes happens that the person who locks the doors at night forgets or overlooks one or more of the doors and thus leaves the premises open to unauthorized persons by way of the unlocked door. Usually, however, there is at least one door (for convenience hereinafter termed the main door) which is certain to be locked. I have therefore been led to devise my present invention, which has for its chief object to provide a system whereby a certain door, preferably the main door, cannot be locked unless the other doors in the system are locked first. Then if when he leaves the building at night the person who has the responsibility of locking up the premises finds that he cannot lock the main door he knows at once that he has left one or more of the other doors unlocked. Preferably the lock on the main door is of the recording type, which records at least the time it is locked if not also a letter, number, or other character identifying the particular key used. In such case it becomes practically certain that the doors will all be locked, since failure to lock the main door would be evidenced by the blank on the record. Another object is to provide a simple system for the purpose, which will not be liable to be deranged and which can be applied to existing doors at reasonable cost. To these and other ends the invention consists in the novel features and combinations hereinafter described.

A convenient and effective embodiment of the invention is illustrated, somewhat diagrammatically, in the accompanying drawing, in which—

Figure 1 is a diagram illustrating a complete system, composed, in the present instance, of a main door and three others, say two side doors and a back door.

Fig. 2 is a front view of the main door, with a portion broken away to show the main lock.

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

Fig. 4 is a detail view of the latching mechanism for the bolt of the lock on the main door.

In the specific system illustrated the main door 10 is equipped with a lock of the recording type, indicated diagrammatically at 11. The other or subordinate doors, 12, 13, 14, have plain locks 15, 16, 17, having bolts 18, 19, 20, respectively. Each of the locks 15, 16, 17 is equipped with a pair of contact springs 21, 22, in circuit with the battery or other source of current 23. When the bolts of these subordinate locks are retracted, so that their doors can be opened, the contacts mentioned are separated, but means are provided, for example the insulated studs 24 on the aforesaid bolts, which serve to close the contacts when the bolts are advanced, as shown in Fig. 1. It will therefore be seen that the circuit is open if any bolt is not advanced to locking position; the studs and contacts being relatively so located that the closing of the contacts occurs just as the bolt reaches its advanced position.

All the doors, including the main door, are provided with contacts, in series with the contacts 21, 23, and separated when the doors are open or only slightly ajar. That is, they are closed only when the doors are closed. These contacts, indicated by 25, 26, are preferably located in the door frames and are actuated by sliding pins 27 projecting into position to be engaged and pushed inwardly by the hinged edge of the door when the latter is closed, thereby closing the contacts as shown in Fig. 1.

The main lock is also provided with a pair of contacts 28, 29, in series with contacts 21, 22, 25, 26, and arranged so as to be closed when the bolt 30 of the lock 11 is in retracted position, for example by an insulated stud 31 on the bolt.

In connection with the lock 11 means are provided to positively hold the bolt in retracted position so long as the interlocking circuit is open. For this purpose a swinging latch 32 is employed to engage a notch or recess 33 in the bolt, being swung into engagement therewith by a spring 34. In

the circuit with the aforesaid contacts is an electromagnet 35, of which the latch 32 is the armature. When the magnet is energized the latch is drawn down and is thereby withdrawn from the engagement with the bolt.

From the foregoing it will be seen that if any of the doors 12, 13, 14, are unlocked, the magnet 35 is deënergized and the bolt 30 of the lock on the main door is held in retracted position by the latch 32. But when the doors 12, 13, 14 are closed and locked the magnet circuit is closed, the magnet is energized, and the latch is disengaged from the bolt. The main door can then be locked. It will also be observed that the bolt of the lock on the main door cannot be advanced if the latter door is not also closed, since otherwise the magnet circuit would be open at the main door contacts 25, 26, thereby keeping the magnet deënergized and the bolt 30 latched until the main door is itself closed. Hence none of the other doors can be left unlocked if the main door is locked.

The pins 27 should be short enough to prevent them from closing the contacts 25, 26, unless the doors are closed far enough to permit the bolts to enter their sockets (not shown) in the door casings. Otherwise it might be possible to first close contacts 21—22 by advancing the bolts 18, 19, 20, and then close contacts 25—26 by closing the subordinate doors until the advanced bolts meet the door casings. Also, it should be possible to advance the bolt 30 on the main door far enough for the locking recess 33 to clear the latch 32 before the contacts 28—29 are separated. Otherwise the latch might swing up and enter the recess before the bolt had been advanced far enough to enter its socket. An equivalent method for the purpose, if for any reason it is desired to have the contacts 28—29 separate at the slightest forward movement of the bolt, is to construct the magnet so that it will have sufficient residual magnetism to hold the latch down for an instant after the contacts separate. The first method is preferable, and can be accomplished by simply placing the stud 31 in such position that it will bend both contacts slightly backward, as in Fig. 4, for example. The meeting faces of the recess and latch should be at such an angle to the path of the bolt that forward pressure on the latter cannot by any possibility cam the latch out of engagement. Preferably they may have at least a slight backward inclination, as indicated in Fig. 4, so that pressure on the bolt will have the contrary effect and tend to draw the latch into the recess. It will be readily understood that either set of contacts 21—22 or 25—26 may be omitted without totally destroying the utility of the system.

It is to be understood that the invention is not limited to the details herein specifically illustrated and described, and that the invention can be embodied in other forms without departure from its spirit.

I claim:

1. In an interlocking door-system for the purpose set forth, in combination, a plurality of doors, including a main door, bolts for locking the said doors, and electromagnetic mechanism associated with the main door and controlled by the other doors to permit advancement of the bolt of the main door only when the other doors are closed and their bolts advanced.

2. In an interlocking door-system for the purpose described, in combination, a main door having a recording lock and a plurality of subordinate doors having plain locks, an electromagnetic means for preventing locking-actuation of the recording lock if any subordinate door is open or unlocked.

3. In an interlocking door system for the purpose described, in combination, a main lock, means normally preventing but shiftable to permit locking actuation of the main lock, a plurality of subordinate locks, and electromagnetic mechanism controlled by locking actuation of all the subordinate locks to shift said means and thereby permit locking actuation of the main lock.

4. In an interlocking door-system, in combination, a main door provided with a lock having a bolt normally held against advancement, one or more subordinate doors, and electromagnetic means for releasing the bolt of the main-door lock only when each subordinate door is closed.

5. In an interlocking door-system, in combination, a main door and one or more subordinate doors, provided with locks, electromagnetic mechanism for preventing locking actuation of the main-door lock, and a circuit for said electromagnetic mechanism, under the control of the subordinate doors to release the main-door lock only when all the subordinate doors are closed and locked.

6. In an interlocking door system, in combination, a main door having a lock, one or more subordinate doors having locks, a source of current, a pair of normally open door-contacts for each door in series with the source of current and adapted to be closed by the closing of the respective door, a pair of normally separated lock-contacts for each subordinate lock, in series with the door-contacts and adapted to be closed by locking actuation of the lock of the respective subordinate door, a pair of normally closed contacts in series with the other contacts and adapted to be opened by locking actuation of the main-door lock, and electro-

magnetic mechanism in series with said door and lock contacts and normally preventing locking actuation of the main-door lock and adapted to release the latter upon completion of the said circuit by the closing of the said door and lock contacts.

7. In an interlocking door system, in combination, a main door having a lock provided with a bolt, a subordinate door having a lock provided with a bolt, a source of current, a pair of normally open door-contacts in series with said source and adapted to be closed by closing the main door, a pair of normally open door-contacts in series with the first pair and said source and adapted to be closed by closing the subordinate door, a pair of normally open lock-contacts in series with all the aforesaid door-contacts and said source and adapted to be closed by locking advancement of the bolt of the subordinate-door lock, a pair of normally closed contacts in series with all the aforesaid contacts and said source and adapted to be opened by locking advancement of the bolt of the main-door lock, a latch normally preventing locking advancement of the bolt of the main-door lock, and electromagnet in series with all the aforesaid contacts and said source adapted to disengage the said latch and permit advancement of the bolt of the main-door lock when energized by closing of the aforesaid normally open contacts.

In testimony whereof I hereunto affix my signature.

LE GRAND C. BUSH.