

J. F. CADELL.
SELECTIVE LOCKING KEY.

APPLICATION FILED MAY 20, 1907.

Patented Apr. 19, 1910.

955,134.

Fig. 4.

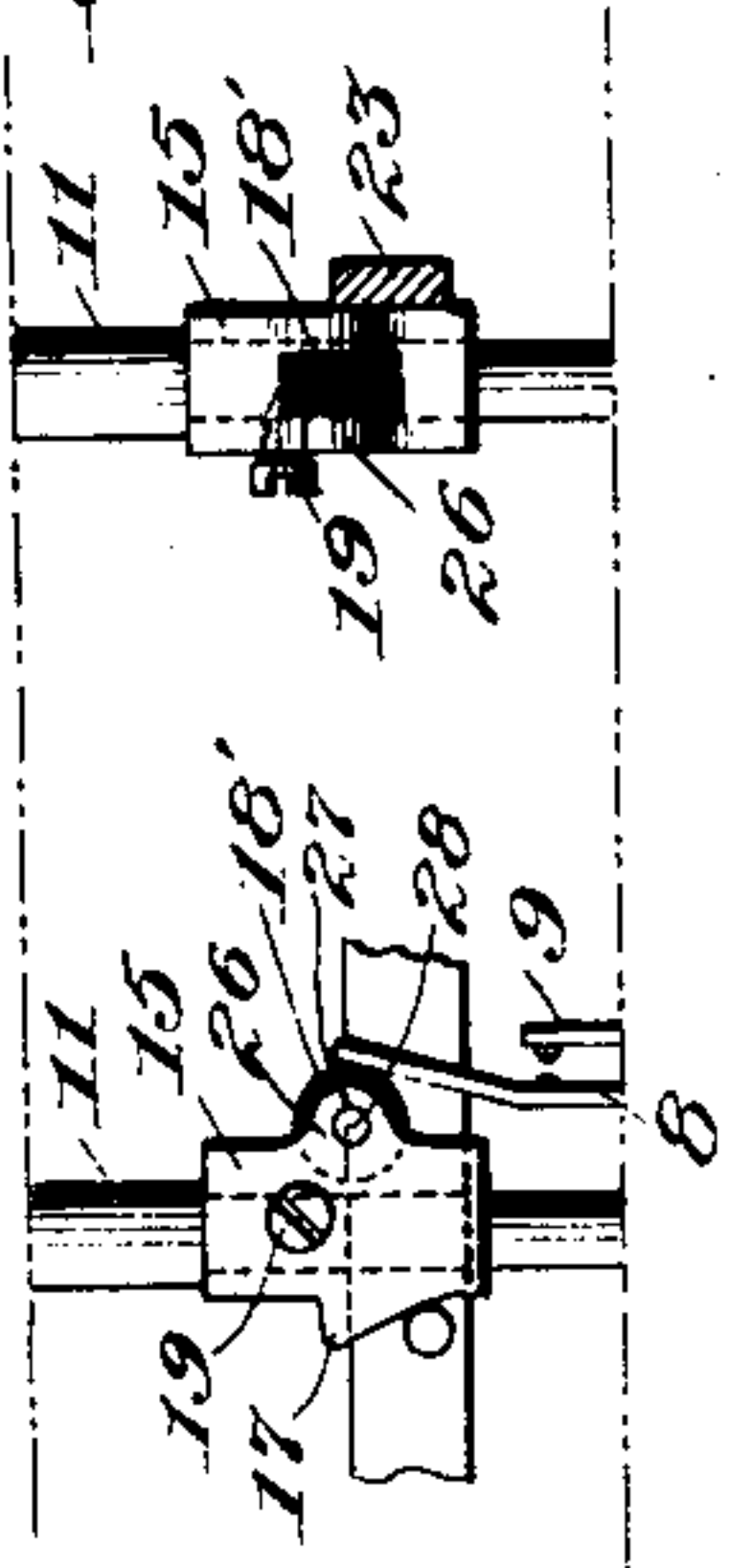


Fig. 3.

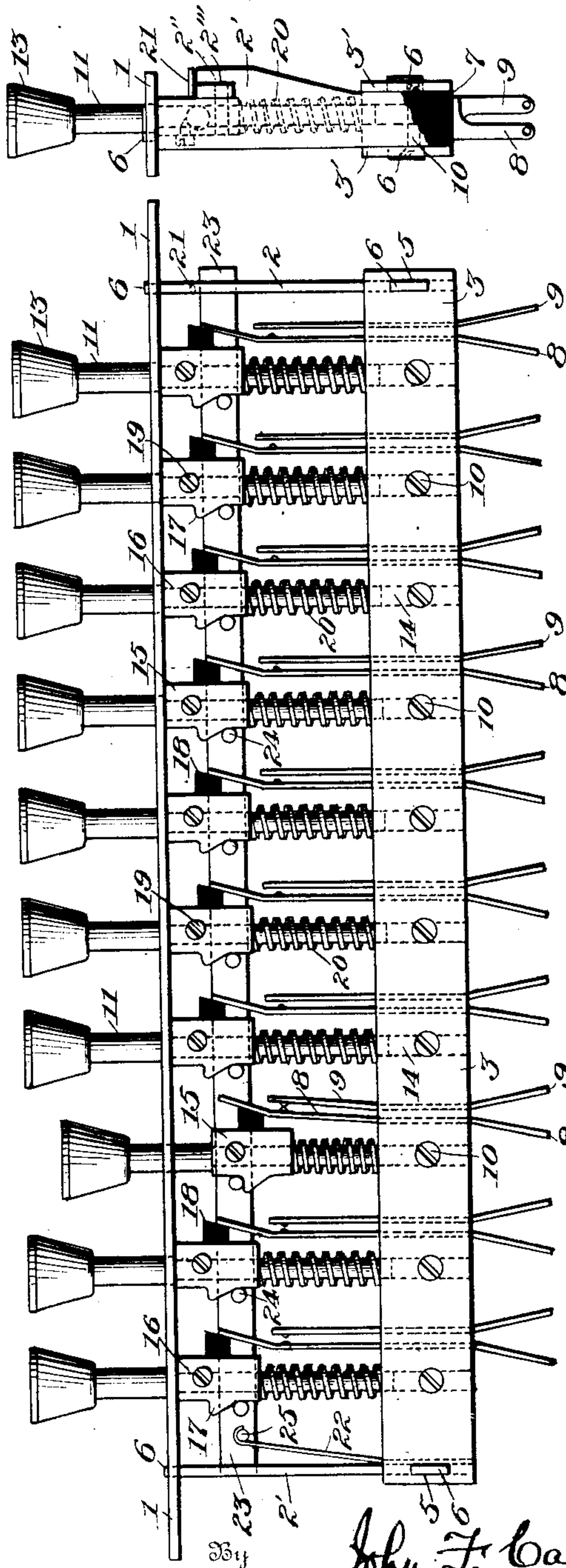
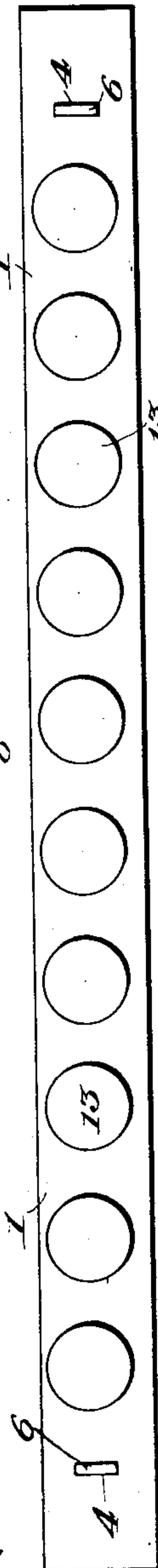


Fig. 2.

Fig. 1.

Inventor

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UNITED STATES PATENT OFFICE.

JOHN F. CADELL, OF BALTIMORE, MARYLAND, ASSIGNOR, BY MESNE ASSIGNMENTS,
TO THE NORTH ELECTRIC COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF
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SELECTIVE LOCKING-KEY.

955,134.

Specification of Letters Patent.

Patented Apr. 19, 1910.

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To all whom it may concern:

Be it known that I, JOHN F. CADELL, a citizen of the United States, residing at Baltimore, in the State of Maryland, have
5 invented certain new and useful Improvements in Selective Locking-Keys, of which the following is a specification, reference being had therein to the accompanying drawing.

10 My invention relates to selective locking keys for use in telephone circuits, and it consists in the combinations and arrangements herein described and claimed.

The principal object of my invention is to
15 provide a set of indicating keys having few operating parts and of simple construction, with means for locking a key in its depressed position to maintain a contact closed, and for simultaneously releasing another key
20 of the set, which has been similarly locked, to open its contact.

A further object of my invention is to provide means for adjusting the position of the various key buttons relative to one
25 another. In the ordinary form of key set it often happens that when the various buttons have been screwed down tight on the plungers, the letters or indicating characters on the ends of the buttons are found to be
30 at various angles with respect to each other, thus presenting an unsightly appearance. My invention provides means for readily adjusting the angular position of any one of the plungers so as to bring the indicating
35 character into its normal, vertical, position parallel with the others of the set, while at the same time preventing the plungers from turning any further in their bearings.

A further object of my invention is to
40 provide a locking key set with a locking bar which can be readily and quickly removed or replaced without dismantling the set.

Other objects and advantages will appear in the detailed description of the device as
45 hereinafter set forth.

My invention is illustrated in the accompanying drawings in which—

Figure 1 is an elevational view showing one embodiment of my invention. Fig. 2 is
50 an end elevation, certain parts being broken away. Fig. 3 is a plan view. Fig. 4 is a fragmentary side view showing a modification of the cam member. Fig. 5 is an end view of the parts shown in Fig. 4, the locking rod being shown in section.

Referring to Figs. 1 and 2, 1 denotes the top member, 2 and 2' the end members and 3 and 3' the side members of a metal frame. The top members 1 and the two side members 3 and 3' have rectangular perforations 4 and
55 5, respectively, at each end, through which the ears 6 on the end members project, the ends of said ears being upset to rivet the parts together.

Between the side members there is placed
60 an insulating strip 7, and projecting through this insulating strip and carried thereby are the contact springs 8 with their respective anvils 9. Screws 10 pass through perforations in the members 3 and through the insulating strip 7 and engage corresponding
65 threaded openings in the other side members 3' to securely bind said parts together.

Each key in the set comprises a cylindrical plunger 11 having an enlarged upper end
70 to which is secured a button 13 of the usual form and which is designed to bear some character or figure on its face, the various characters of the set indicating their respective contacts. The upper enlarged part
75 of the plunger 11 passes through an opening in the upper plate 1 and the lower portion thereof enters an opening 14 in the insulating strip 7. The plunger is arranged to reciprocate in these openings, being limited
80 in its downward movement by the screw 10 as clearly shown in Fig. 2.

A rectangular block 15, having an opening 16 through which the plunger 11 is adapted to pass, is provided on one side with
85 an integral lug or stop 17, the upper edge of said lug constituting a shoulder while the lower side is beveled to form a cam surface for a purpose hereinafter set forth. On the opposite side of the block from the lug 12
90 is an insulating cam member 18, adapted to engage the spring 8, to force the spring against its anvil. A set screw 19 passes through a threaded opening in the block and is adapted to engage the plunger 11
95 whereby the block may be securely fastened to the latter. A coiled spring 20 surrounds the plunger and bears at its upper end on the block 15 and at its lower end on the insulating strip 7. This spring keeps the
100 plunger in its normally raised position with the upper end of the block 15 abutting against the top plate 1.

As shown in Fig. 2 the end members 2 and 2' have an extended side 2'' provided
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with a slot 2'''. The end member 2 is also provided with a pin 21 while the opposite end member 2' carries a leaf spring 22.

A locking rod 23 provided with stop pins 24 is adapted to reciprocate in the slots 2''' and one end of the leaf spring 22 is formed into a hook adapted to engage a pin 25 on the rod to normally keep the pins 24 in contact with the blocks 15.

The operation of the above described device will be readily understood. On the depression of one of the buttons, its plunger will descend until its lower end is stopped by the screw 10. The lower cam surface of the lug 17 engages the pin 24 and moves the rod 23 (to the left in Fig. 1) against the action of the spring 22. As soon as the pin 24 reaches the upper surface of the lug the rod springs back to its original position, the key being locked by the engagement of the rod with the shoulder of the lug. The insulating cam member 18 engages the bent upper end of the spring contact 8 and forces the latter against its anvil 9 to close the contact. If now a second key is depressed the rod 23 will be again moved until the pin 24 which engages the block 15 of the locked key is moved off the end of the engaging lug, thereby releasing the key and permitting it to assume its normal position under the action of the spring 20. When the pressure is relieved from the second key it will return until its lug is engaged by the stop pin 24 and the second key will now be locked in a manner similar to that already described.

In Figs. 4 and 5 there is shown a modification of the insulating cam member 18. In this case the block 15 has a pair of laterally projecting ears 26 having perforations 27 in which is secured a pintle 28 bearing an insulating cam roller 18'. The latter form of cam member has this advantage over that shown in Fig. 1 in that there is a rolling contact instead of a sliding contact, thus avoiding wear and cutting due to friction.

I desire to call particular attention to the fact that the use of the block 15 has a number of important advantages. It will be noted that by merely loosening the set screw 19 any button may be rotated and the indicating character on the face of said button thereby adjusted. Moreover, the buttons can be perfectly alined so that one will not project out farther from the frame than another, since the loosening of the set screw 19 will permit the plunger to be raised or lowered as desired. The set screw 19 may be screwed down hard on the plunger to limit the movement of the latter when actuated by the spring 20 as heretofore described. An inspection of Fig. 5 will show that the block 15 has one face abutting against one side of the locking bar 23. This prevents any tendency of the plunger to rotate in

its bearing after it has been once firmly secured to the block.

In assembling the parts after the frame has been put together the plungers 11 are passed through the openings in the upper plate, and then through the blocks 15. The springs 20 are put in place and the blocks 15 are firmly secured to the plunger rods. The end of the bar 23 is inserted in the slot 2''' underneath the pin 21 and the other end placed in its slot with the pin 25 under the hook of spring 22, as shown in Fig. 1. In withdrawing the bar of course this operation is reversed. When the bar is withdrawn it will be observed that the key set may be used as a non-locking set where any one of a number of circuits is designed to be closed momentarily and to be opened on the release of the button.

It will be observed that this key set can be used in circuits in which a master contact is closed on the depression of any one of the keys, by arranging such a contact adjacent to the end of the locking bar 23 toward the left of Fig. 1. The depression of any one of the keys will then force the locking bar to close this master contact when a pin 24 is near the outer edge of its lug 17. After the pin 24 has ridden over the end of the lug 17 and engages the upper surface of the lug the locking bar 23 will be retracted far enough to open the master contact while still keeping closed the contact between the spring 8 and the anvil 9.

Other modifications will be apparent on inspection of the device. I therefore do not wish to limit myself to the construction herein specifically described but desire to claim all such modifications as fairly fall within the scope and spirit of the invention. Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. In a selective locking key, a frame, a series of spring actuated plungers adapted to reciprocate in said frame, a cam member with a flat back on each plunger, contacts adapted to be closed upon engagement with said cam members, and means for locking a plunger in depressed position, said means engaging the backs of all the plunger cams to keep them from rotating.

2. In a selective locking key, a frame, a series of adjustable spring actuated plungers adapted to reciprocate in said frame, and having adjustable cam members serving as guides, spring contacts adapted to be closed upon engagement with said cam members, and means for locking a plunger in its depressed position, said means operating to release one plunger when a second plunger is depressed, and also cooperating with the cam guide to keep the plungers from rotating.

3. In a selective locking key, a frame, a series of spring actuated cylindrical plungers

gers carried by said frame, means permitting rotative and axial adjustment of the plungers, contacts adapted to be closed upon engagement with said cam members, means
5 for locking a plunger in its depressed position, said means operating to release the first plunger when a second plunger is depressed and to lock the latter.

4. In a selective locking key, a frame comprising a top member provided with openings, end members and side members, a perforated insulating strip between said side members, a series of spring actuated plungers adapted to reciprocate through the
15 openings in said top plate and the perforations in said insulating strip, means permitting the axial and rotative adjustment of said plungers, cam members carried by said plungers, contacts adapted to be closed upon
20 engagement with said cam members, means for locking a plunger in its depressed position, said means operating to release the first plunger when a second plunger is depressed and to lock the latter.

5. In a selective key set, a frame comprising a top member provided with openings, end members and side members, a perforated insulating strip between said side members, a series of spring actuated plungers adapted
30 to reciprocate through the openings in said top plate and the perforations in said insulating strip, a rectangular block secured to each plunger and movable with respect thereto to permit axial and rotative adjustment of said plunger, a cam member carried
35 by said block, and contact springs adapted to be actuated by said cam member.

6. In a selective key set, a frame comprising a top member provided with openings,
40 end members and side members, a perforated insulating strip between said side members, a series of spring actuated plungers adapted to reciprocate through the openings in said top plate and the perforations in said insulating strip, a rectangular block associated
45 with each plunger, provided with an opening through which said plunger is adapted to pass, locking means permitting the rotative and axial adjustment of said plunger
50 with respect to said block, means carried by said block on one side thereof for engaging a contact spring, a stop carried on the other side of said block, and a universal locking bar provided with a pin adapted to engage
55 said stop to lock said plunger in its depressed position.

7. In a selective locking key, a frame comprising a top member having openings, end members and side members, a perforated
60 insulating strip between said side members, common securing means for said side members and said insulating strip, a series of plungers adapted to reciprocate through the openings in said top member and the perforations in said insulating strip, each plun-

ger comprising a cylindrical rod, said rod bearing a rectangular block provided with a set screw for permitting axial and rotative adjustment of said rod with respect to said block and having an insulating cam member
70 on one side thereof, and an integral laterally projecting lug on the other side thereof, a contact adapted to be closed by engagement with said insulating cam member, a universal locking bar having a pin adapted to
75 be engaged by the projecting lug to lock said plunger in its depressed position, said locking bar also thereupon operating to release a plunger previously depressed.

8. In a selective locking key, a frame
80 comprising a top member having a series of openings, slotted end members and side members, a pivoted insulating strip between said side members, common securing means for said side members and said insulating
85 strip, a universal locking bar adapted to reciprocate in the slots in said end members, plungers adapted to reciprocate through the openings in said top members and the perforations in said insulating member, and
90 means whereby on the depression of one of said plungers said locking bar operates to lock said plunger in its depressed position and to release a previously depressed plunger.

9. In a selective locking key, a frame comprising a top member having a series of openings, slotted end members and side members, a spring operated universal locking bar disposed in said slots and adapted
100 to reciprocate therein, plungers carried by said frame, each plunger being provided with a rectangular block disposed thereon, said block having a laterally extending lug provided with a lower cam surface and an
105 upper surface constituting a shoulder, pins carried by said locking bar adapted to be engaged by said lower cam surface of said lugs whereby on the depression of a plunger said locking bar will be moved against the
110 action of its spring, and said plunger will be locked on engagement of said pin with the upper surface of said lug, the movement of said lug effecting in the meantime the release of a previously depressed plunger.

10. In a selective locking key, a frame comprising a top member having a series of openings, slotted end members and side members, a perforated insulating strip between said side members, said side members
120 and said insulating strip being held by a common securing means, a spring actuated locking bar adapted to reciprocate in the slots in said end members and being provided with pins, a series of spring actuated
125 plungers adapted to reciprocate in the openings in said top member and in the perforations in said insulating strip, each plunger having disposed thereon a rectangular block provided with a set screw to permit axial
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and rotative adjustment of said plunger with respect to said block, an insulating cam member carried on one side of said block, contact springs adapted to be engaged by
 5 said insulating cam member, a laterally extending integral lug on the opposite side of said block, the upper face of said lug constituting a shoulder and the lower face of said lug constituting a cam surface
 10 adapted to engage a pin on said locking bar to move the latter against the action of its spring, said pin operating to lock said plunger in its depressed condition by the engagement with the upper surface of said lug,
 15 thereby maintaining the contact closed, the movement of said bar against its spring at the same time effecting the release of a previously depressed plunger.

11. In a selective locking key, a rectangular frame having a top and a bottom member and side members, a series of spring actuated plungers arranged for reciprocation in slots in said top and bottom members, contacts adapted to be closed by the depression
 20 of said plungers and means for securing said plungers in the frame with rotary and longitudinal adjustments and also for permitting the withdrawal or the insertion of any one or all of said plungers without dis-
 30 mantling the frame.

12. In a selective locking key, a rectangular frame having a top and a bottom mem-

ber and side members, a series of spring actuated plungers arranged for reciprocation in slots in said top and bottom members, contact springs, a locking bar, means detachably secured with rotary and axial adjustment to each of said plungers for operating said contact springs and said locking bar and for permitting the withdrawal
 40 of said plunger without dismantling the frame.

13. A locking key comprising the following instrumentalities: a frame having a flat top plate, spring pressed plungers working through said plate, with button heads
 45 above the same and shanks below; sets of contact springs associated with the respective shanks below the plate, and a locking bar extending along one side of the shanks, also below the plate and having a perpendicular stud extending across one side of each shank; the latter having a friction
 50 roller on one side to engage the contact springs when it is depressed, and a cam faced locking tooth on the other to engage the said stud.

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

JOHN F. CADELL.

Witnesses:

O. F. FRENCH,
 M. E. GILSON.