

N. H. HOLLAND.  
SWITCH KEY.

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931,202.

Patented Aug. 17, 1909.

Fig. 1

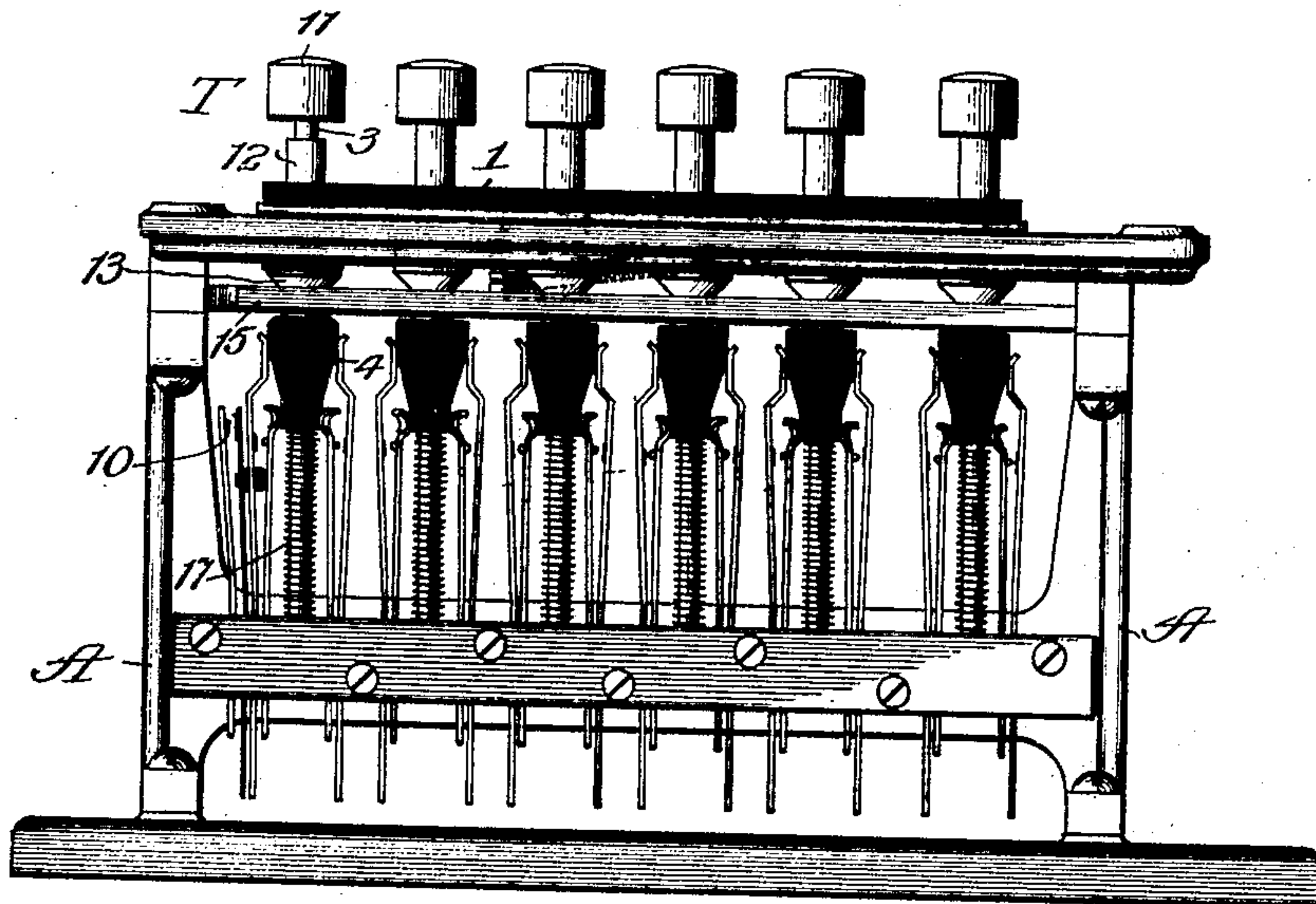
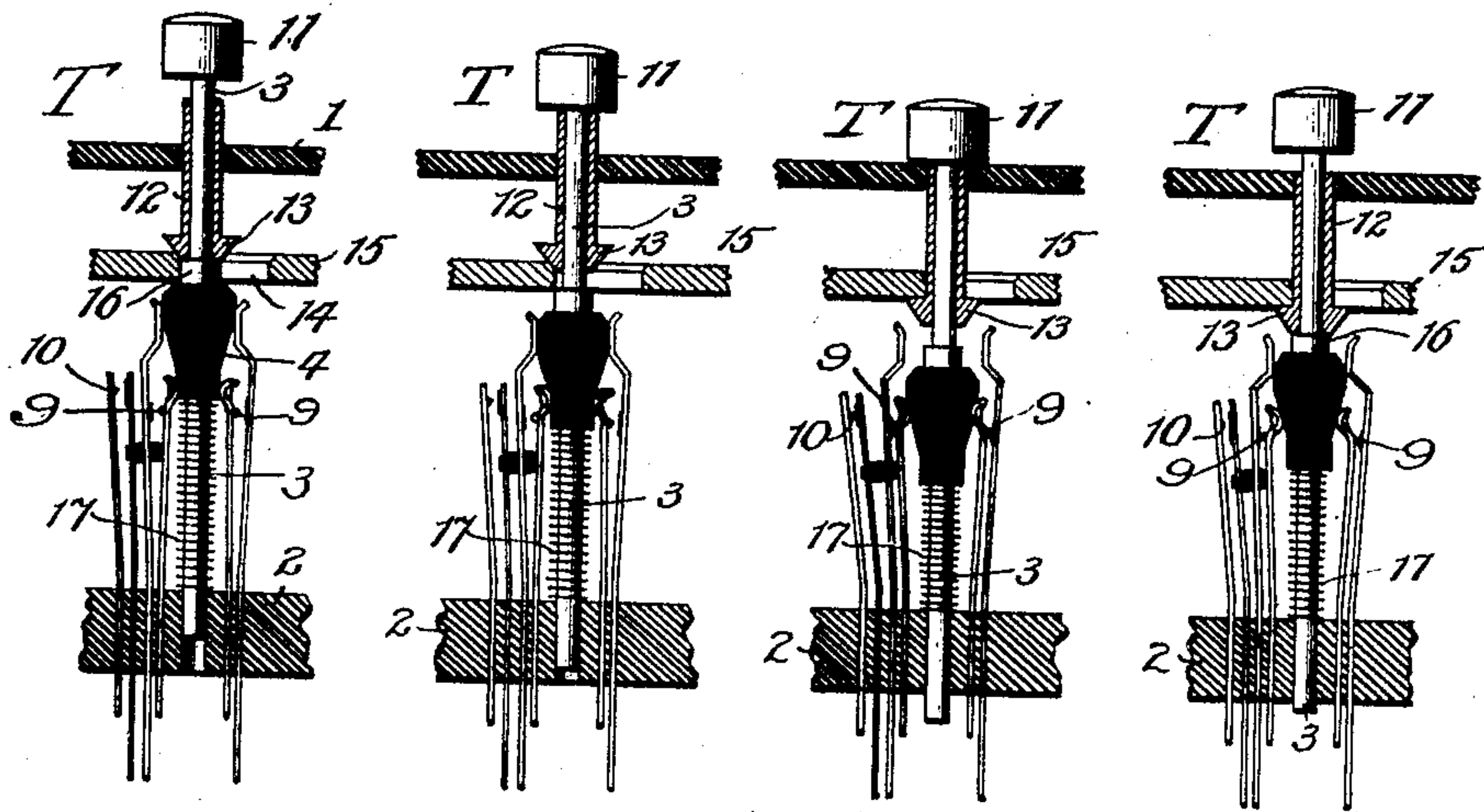


Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.



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# UNITED STATES PATENT OFFICE.

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## SWITCH-KEY.

No. 931,202.

Specification of Letters Patent.

Patented Aug. 17, 1909.

Application filed November 23, 1907. Serial No. 403,509.

*To all whom it may concern:*

Be it known that I, NEWMAN H. HOLLAND, citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Switch-Keys, of which the following is a full, clear, concise, and exact description.

My invention relates to switch keys of the type in which contacts associated with the key are adapted to be operated by a plunger in the locked down position of the key, and in which other contacts associated with the key are adapted to be operated by the depression of the plunger beyond the normal locked position of the key.

The object of my invention is to provide a structure in which these last mentioned contacts, which I designate way-down contacts, must necessarily be closed before said key can be locked in its depressed position.

My invention consists of a plunger having a plurality of contacts associated therewith and provided with means for engaging with a locking plate when said plunger is depressed sufficiently to operate one or more way-down contacts, said means subsequently permitting sufficient retraction of the plunger, when pressure is removed from the operating push button, to free said way-down contacts from the action of the plunger while maintaining the plunger locked in position to maintain the operated condition of other of said contacts.

The preferred embodiment of my invention comprises a contact operating plunger and a sleeve on the stem of the plunger between the plunger and the operating push button, said sleeve having a limited longitudinal movement on the stem and being provided with a collar adapted to engage beneath a locking plate when the push button is depressed.

My invention may be more readily understood by reference to the accompanying drawing, which shows my invention as embodied in switching mechanism comprising a series of keys adapted for use in connection with an intercommunicating telephone system of the type in which a trunk line is multiplied with two or more stations of the intercommunicating system, the trunk key of said device being provided with the features constituting my invention.

Referring to the drawings, Figure 1 is a

side elevation of the device; Fig. 2 is a detail side elevation, partly in section, of the key constituting my invention, showing the same in its normal unoperated position; Figs. 3, 4 and 5 are similar views showing the position the parts successively assume as the key is depressed to close the contacts.

Similar characters of reference designate similar parts wherever shown.

In Fig. 1 is shown a group of associated keys, one of which, key T, differs from the remaining keys, which are of a well known type, in that it is provided with the novel features comprising my invention.

The face plate 1 and the base plate 2 are mounted in the usual manner on a frame A. Said plates have alined holes in which is mounted a plunger 3, said plunger being provided intermediate its ends with the usual conical plunger head 4. Contact springs mounted in the base plate 2 are associated with the plunger head 4 in such relation as to be controlled thereby in opening or closing contacts 9, 10. Contact 10 is a way-down contact, that is, a contact adapted to be closed only when the plunger head 4 is depressed to its farthest limit, as shown in Fig. 4.

The plunger 3 is provided with the usual push button 11. A loose sleeve 12 surrounds the rod 3 between the push button 11 and the head 4. In the normal unoperated position of the key, as shown in Fig. 2, there is a space between the upper end of the sleeve and the push button 11, and a collar 16 integral with the rod 3 lies between the lower end of the sleeve 12 and the head 4.

The lower end of the sleeve is provided with a conical head 13, which normally rests above an opening 14 in a sliding locking plate 15. The plate 15 is spring-retracted in the usual manner.

The first position in the operation of the key is shown in Fig. 3, in which the plunger 3 is depressed to the point at which the push button 11 engages with the sleeve 12, the contacts controlled by the head 4 remaining open. Further depression of the push button 11 will carry with it sleeve 12, whereupon the conical end 13 will move the spring-retracted plate 15 and pass beneath the same, as shown in Fig. 4. In this position the way-down 10 and also the contacts 9 are closed.

If when the key is in the position shown



in Fig. 4 the downward pressure is removed from the push button 11, the key will then automatically assume the position shown in Fig. 5, the plunger 3 being forced upward by the coiled spring 17 until the collar 16 engages with the lower end of the sleeve 12. The conical end 13 of the sleeve being locked beneath the plate 15, the key is held in the position shown in Fig. 5 until it is released in the usual manner by the subsequent movement of the plate 15. In the position of the key shown in Fig. 5 the contacts 9 are closed, while the way-down contact 10 is open.

It is apparent that in the operation of the key it will be necessary for the key to assume the position shown in Fig. 4, and thereby to close the way-down contact 10 before the key can be placed in the locked position shown in Fig. 5. It is impossible to lock the key so that the contacts 9 are closed without having first caused a temporary closure of the contacts 10. I have, therefore, provided a structure in which a plunger when partially depressed will close a contact or contacts, and when still further depressed will close another contact, and in which the latter contact must have closed before the former contacts can be locked in their closed positions.

I claim:—

1. The combination with a plunger, of a way-down contact arranged to be operated by said plunger when the same is completely depressed, an additional contact or contacts arranged to be operated by said plunger when said plunger is partially depressed, and means for locking said plunger in said partially depressed position, said means being operative only after said plunger has been completely depressed.

2. The combination with a plunger, of a way-down contact arranged to be operated by said plunger when the same is completely depressed, an additional contact or contacts arranged to be operated by said plunger when said plunger is partially depressed, a movable plate, means associated with said plunger for engaging with said plate to lock said plunger in said partially depressed position, said means being operative only after said plunger has been completely depressed.

3. The combination with a spring-retracted plunger, of a way-down contact arranged to be operated by said plunger when the same is completely depressed, an additional contact or contacts arranged to be operated by said plunger when said plunger is partially depressed, a movable plate, and means mounted on said plunger, and having a limited longitudinal movement with relation thereto for engaging beneath said plate to lock the plunger in said partially depressed position.

4. The combination with a spring-retracted plunger provided with a push-button and an operating plunger head, a sleeve surrounding said plunger and having a limited longitudinal movement between said push-button and said plunger head, a conical portion upon said sleeve, a locking plate provided with an opening through which said plunger extends and through which said conical portion of the sleeve is adapted to be pushed in the depression of said plunger to engage beneath said plate, and a plurality of contacts adapted to be operated at different positions of depression of said plunger.

5. The combination with a spring-retracted plunger provided with a push-button and an operating plunger head, a collar carried by said plunger above said plunger head, a sleeve on said plunger, said sleeve and plunger having a relative longitudinal movement limited by said push button and said collar, a conical portion upon said sleeve, a locking plate provided with an opening through which said plunger extends and through which said conical portion of the sleeve is adapted to be pushed in the depression of said plunger to engage beneath said plate, and a plurality of contacts adapted to be operated at different positions of depression of said plunger.

6. A key comprising a plurality of contact devices, and means for successively operating two of the contact devices, and means for locking the operating means with one of said contact devices closed and the other open, the locking means being effective only after both contact devices have been closed.

7. A key comprising a plurality of contact devices, means for successively operating two of the contact devices, and means for locking the operating means with one of said contact devices closed and the other opened, the locking means including an element carried by the operating means and being movable longitudinally relative thereto.

8. The combination with a plunger, of a way-down contact arranged to be operated by said plunger when the same is completely depressed, an additional contact or contacts arranged to be operated by said plunger, and means for locking said plunger in a partially depressed position, said means being operative only after said plunger has been completely depressed.

In witness whereof, I, hereunto subscribe my name this 12th day of November A. D., 1907.

NEWMAN H. HOLLAND.

Witnesses:

RALPH G. JOHANSEN,  
ROY. T. ALLOWAY.