Sept. 9, 1941. J. H. WHEELOCK 2,255,201

CODE SETTING DEVICE FOR SIGNAL SYSTEMS

Filed April 8, 1938 3 Sheets-Sheet 1

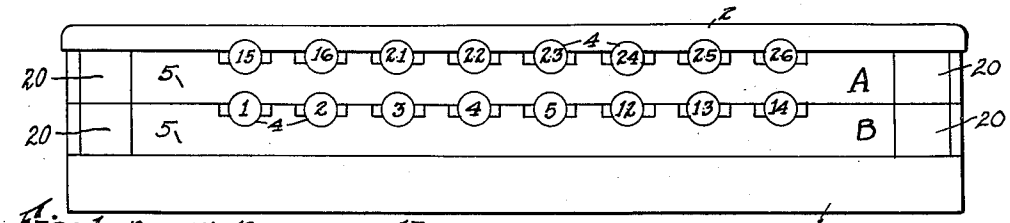


Fig. 1.

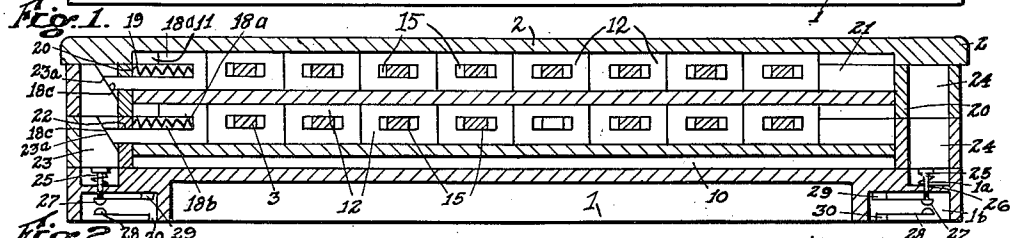


Fig. 2.

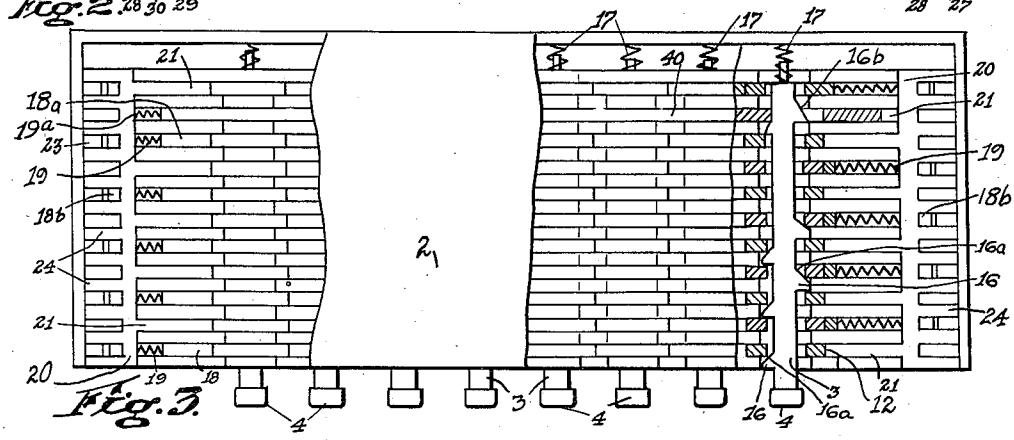


Fig. 3.

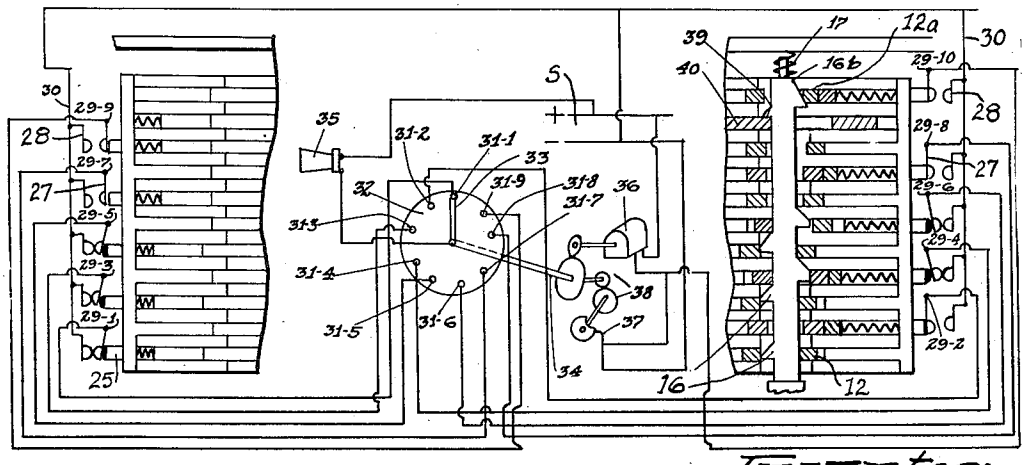


Fig. 4.

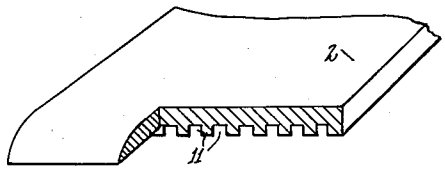
Inventor:
John H. Wheelock
By Owen W. Kennedy
Attorney

Sept. 9, 1941. J. H. WHEELOCK 2,255,201

CODE SETTING DEVICE FOR SIGNAL SYSTEMS

Filed April 8, 1938 3 Sheets-Sheet 2

Fig. 8.



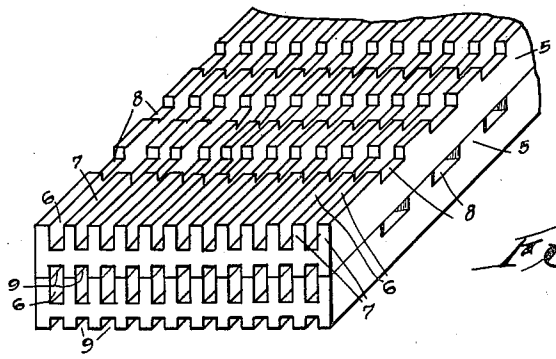


Fig. 5.

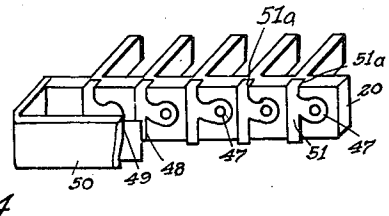


Fig. 14.

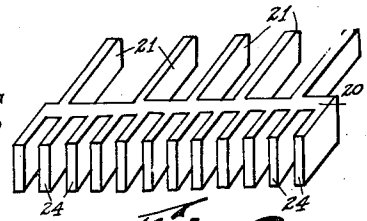


Fig. 6.

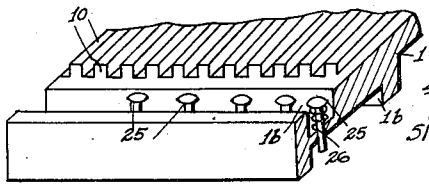


Fig. 7.

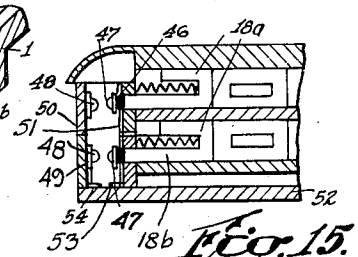


Fig. 15.

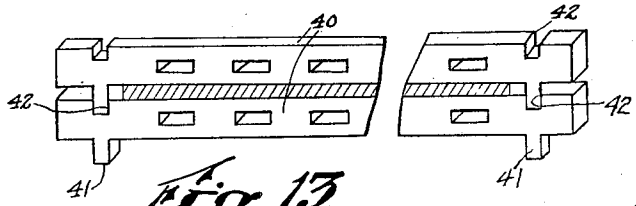


Fig. 13.

INVENTOR:
John H. Wheelock
By Owen N. Kennedy
Attorney

Sept. 9, 1941. J. H. WHEELOCK 2,255,201

CODE SETTING DEVICE FOR SIGNAL SYSTEMS

Filed April 8, 1938 3 Sheets-Sheet 3

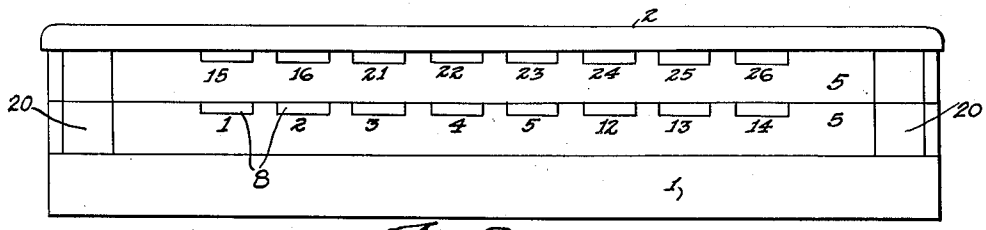


Fig. 9.

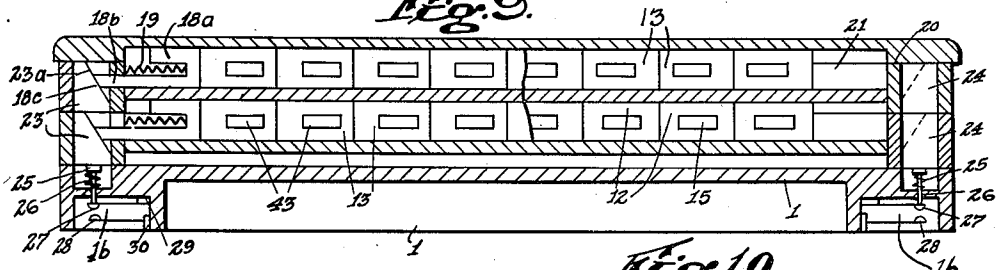


Fig. 10.

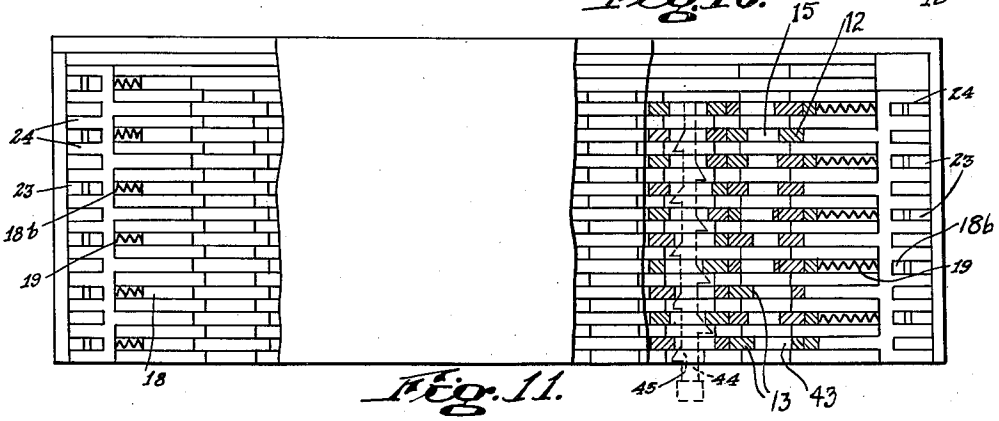


Fig. 11.

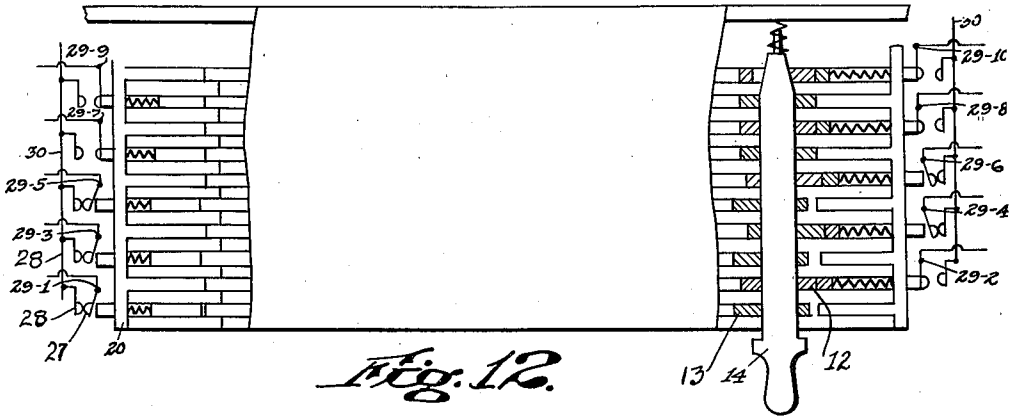


Fig. 12.

Inventor:
John H. Wheelock
By Owen W. Kennedy
Attorney

Patented Sept. 9, 1941

2,255,201

UNITED STATES PATENT OFFICE

2,255,201

CODE SETTING DEVICE FOR SIGNAL SYSTEMS

John H. Wheelock, Fitzwilliam, N. H., assignor to Signal Engineering & Manufacturing Company, New York, N. Y., a corporation of Massachusetts

Application April 8, 1938, Serial No. 200,943

6 Claims. (Cl. 177—380)

The present invention relates to electrical signaling apparatus and systems of the type commonly employed for controlling, from a given point, the operation of various kinds of signal devices for sounding or displaying a multiplicity of different signals, all in accordance with a predetermined code.

Ordinarily, a signal system, of the above described type, comprises in addition to the signals themselves, a code determining or setting device cooperating with a code sending device, the function of the code setting device being to enable the operator to manually determine or set the code signal desired, whereupon the code sending device operates under the control of the setting device to automatically sound the selected predetermined signal sequence. In code setting devices, as heretofore constructed, the code determination has been obtained either by arranging electrical contacts in different code sequences, as shown in Burdick Patent No. 1,823,585, or by providing dissimilar mechanically operated code determining elements arranged in groups in accordance with the code sequences, as shown in Hanel Patent No. 1,969,978. While the code setting devices of the types shown by the aforementioned patents are satisfactory from an operating standpoint, the manufacture of such devices in quantity presents certain inherent difficulties, owing to the multiplicity of combinations that are required for the code determining contacts, or elements, as the case may be.

According to the present invention, there is provided an improved code setting device characterized by the utilization of substantially identical code composing elements that may be manufactured cheaply in large quantities and readily assembled by means of unit blocks in such manner as to set up the desired code combinations, in response to the operation of code setting members. The device of the present invention is further characterized by its certainty of operation and the fact that it is entirely free from electrical troubles, due to the purely mechanical relation that exists between the code composing elements and their associated code setting members. The above and other advantageous features of the invention will hereinafter more fully appear from the following description with reference to the accompanying drawings, in which:

Fig. 1 is a view in front elevation of a code setting device embodying the invention.

Fig. 2 is a vertical sectional view of the device of Fig. 1, with the section taken along one of the rows of code composing elements.

Fig. 3 is a plan view of the device of Fig. 1, with the cover removed and a portion of the device in section.

Fig. 4 is a fragmentary view similar to Fig. 3, showing the operation of a code setting key and electrical connections between the code setting device and a code sending device.

Figs. 5 to 8, inclusive, are perspective views of various parts entering into the assembly of a unit.

Figs. 9 and 10 are views similar to Figs. 1 and 2, showing a different arrangement of elements.

Figs. 11 and 12 are views illustrating the functioning of the elements of Figs. 9 and 10.

Fig. 13 is a perspective view of the latching plates.

Figs. 14 and 15 are fragmentary views, illustrating a modified contact arrangement.

Like reference characters refer to like parts in the different figures.

Referring first to Fig. 1, the code setting device comprises a base 1 and a top section 2, between which are assembled a number of code setting units A and B arranged in stack relation, the units being similar in construction and each being adapted to determine a different group of code settings, as will hereinafter appear. Each unit A or B provides a series of code setting members or keys 3, terminating in buttons 4 bearing different code designations, as shown in Fig. 1. These code setting members 3 are longitudinally movable in each unit, the buttons 4 projecting sufficiently and being separated from each other, so as to be readily operated individually by a finger, see Fig. 3.

As best shown in Fig. 5, each unit A or B consists of a block 5, preferably composed of readily moldable material and providing a series of channels 6 extending lengthwise of the upper surface of the block. The partitions 7 between the channels 6 provide a series of alined notches 8, with the axis of each series of notches 8 extending at right angles to the channels 6. The under surface of each block 5 provides a series of channels 9 parallel to the upper channels 6, but only half as deep, for a purpose which will hereinafter appear. The base 1 provides ribs 10 to fit the channels 9 of the lowermost block 5 and the top 2 provides channels 11, half as deep as the channels 6 of the uppermost block, as shown in Figs. 5 and 7.

In order to set up individual code determinations within each unit, code composing elements 12 and 13 are provided and assembled in the channels 6 of a block 5, either as shown in Fig. 2

or as in Fig. 10. Such assembly is in accordance with whether the code determinations are to be set up by different keys 3 cooperating with identical elements 12, as shown in Fig. 3, or by different arrangements of non-identical elements 12 and 13 cooperating with a single key 14, as shown in Fig. 12. Whether the elements 12, or the elements 13 are utilized, the construction and function of a block 5 is the same, and the blocks 5 of several units can be assembled in stack relation in the same manner.

When different keys 3 are utilized, as shown in Figs. 2 and 3, the elements 12 are identical in construction, with each element 12 providing a slot 15 symmetrical with respect to the central axis of the element. Each key 3 provides a number of projections 16 extending on opposite sides, in accordance with the code designation of the key 3, with each projection 16 providing an inclined face 16a. Thus, a key with the code designation "fourteen" has one projection 16 to the left and then a blank space, followed by four projections 16 alternately arranged right and left. The identical elements 12 and the different keys 3 can readily be assembled in the channels 6 and notches 8 of a block 5, with the slots 15 in alinement with the notches 8 and the projections 16 of the various keys 3 normally occupying the notches 8.

The several keys 3 of a unit are yieldingly maintained in the non-code determining position of Fig. 3 by springs 17, and it is evident that the slot 15 of each element 12 is of such length that its ends are nearer the central axis of a key 3 than the extremities of the projections 16 of a key. Consequently, depression of any key 3 will serve to engage the inclined faces 16a with the slot ends and shift the elements 12 to the right or to the left, or both, to compose the code in accordance with the arrangement of the code determining projections 16 on the depressed key.

It is evident from Fig. 2 that the elements 12, when assembled in the channels 6, project about one-third above the top of the block 5, so that when assembling a number of units to form a stack, the upper portions of the elements 12, as supported by any block 5, are received either in the shallow channels 9 of the block 5 next above in the stack, or in the channels 11 of the top 2. Due to the separation between the channels 6 and 9 of each block 5, the elements 12 are free to move in the channels 6 independently of the elements received in the channels 6 of the block next above or next below in the stack, and one way in which such movement of the elements 12 by the keys 3 may be utilized for the control of a code sending device, will next be described.

As best shown in Figs. 2 and 3, each row of code composing elements 12 has associated therewith a plunger 18 of U-shaped form, which is yieldingly maintained in contact with an element 12 at the end of a row, by means of a spring 19 located between the spaced legs of the plunger. The spring 19 bears against an end plate 20, closing the channels 6 at each end of a unit block 5, and each plate 20 provides a series of ribs 21, each of exactly the length of an element 12, see Fig. 6.

The plungers 18 are alternately arranged at the right-hand or the left-hand ends of successive rows of elements 12, in accordance with the direction of movement of the code composing elements 12 in a given row, when any element thereof is shifted by movement of a key 3, as previously described. Therefore, in any given row of elements 12, the spring 19 bearing on the end plate 20 causes its associated plunger 18 to yieldingly maintain all of the elements of that row in engagement with a rib 21 of the end plate 20 at the opposite end of the row. In an assembled unit, the plungers 18 and ribs 21 are arranged alternately throughout the block 5, and since each rib 21 has the exact length of an element 12, all of the elements in the block are normally maintained with their slots 15 in exact alinement with the axes of the several keys 3.

One leg 18a of each plunger 18 is shorter than an element 12, so as to permit movement of the plunger in the direction of an end plate 20, while the other leg 18b is longer and extends through an opening 22 in the end plate 20. The end of the longer leg 18b of the plunger provides an inclined surface 18c, which bears lightly on a similarly inclined surface 23a of an actuator 23, vertically movable between spaced ribs 24 of the end plate 20, extending oppositely to the ribs 21. The actuators 23 are arranged alternately at opposite ends of a block 5, just as are the plungers 18, and the actuators 23 of the lowermost unit in the stack are resiliently supported by a series of pins 25, each surrounded by a spring 26 received in a recess 1a of the base 1.

Each pin 25 extends through an opening in a partition separating the recess 1a from a second recess 1b, in which are located a series of pairs of contacts 27 and 28. The contacts 27 and 28 of each pair are normally spaced apart, with the insulated tip of a pin 25 bearing lightly on each contact 27, owing to the resilient support of the actuators 23 by the springs 26. Each of the contacts 27 provides a separate terminal 29, while the entire series of contacts 28 at each end of the block 5 are connected to a common bus bar 30. Thus, the terminals 29 and bus bars 30 are readily accessible within the recess 1b of the base 1, so that connections may be made conveniently to a code sending device, without affecting the one or more code setting units A and B assembled above the base 1.

Referring now to Fig. 4, the contact terminals 29—1 to 29—9, inclusive, are connected to the stationary contacts 31—1 to 31—9, inclusive, of a commutator 32, forming part of a code sending device which may be of any desired type, since it forms no part of the present invention. The terminals of bus bars 30 are connected to one side of a suitable power source S, as indicated, so that shifting of one or more plungers 18 by depressing a key 3, causes one or more of the commutator contacts 31 to be energized, in accordance with the code determination. The commutator 32 also provides an arm 33 mounted on a shaft 34 turnable so as to engage the commutator contacts 31, and since the arm 33 is connected to the other side of the source S through a suitable signal device 35, rotation of the commutator shaft will cause the signal 35 to be sounded, in accordance with the code, as determined by a depressed key 3.

While the commutator 32 only provides nine coding contacts 31—1 to 31—9, inclusive, each code setting unit provides a tenth row of elements 12a cooperating with a plunger 18, relatively movable contacts 27, 28 and terminal 29—10. The purpose of this terminal 29—10 is to start the operation of a suitable motor 36 for driving the commutator shaft 34, upon full depression of a key, with provision being made

for deenergizing the terminal 29—10, and not relying on the circuit therethrough, as soon as the motor starts. After this the motor turns the arm 33 through one or more complete revolutions as determined by a control switch 37, operated from the commutator shaft 34, through reduction gearing 38, so as to break the motor circuit after a number of signal sequences.

Referring again to Fig. 4, it is to be noted that the inclined face 16b of the last projection 16 on each key 3 is less steep than the other faces, thereby making it necessary to press the key 3 all the way in before the element 12a in the last row is shifted enough to cause its plunger 18 to energize the motor starting terminal 29—10. As a key 3 is pushed all the way in, as shown in Fig. 4, an inclined projection 39 near the end of the key shifts a slotted latch plate 40 extending substantially the length of a channel 6 which drops then into place behind the projection 39, under the urge of spring 19a, to prevent return of the key when it is released. The key 3 is shown in its latched position in Fig. 4, from which it is apparent that while certain code determining elements 12 of the first nine rows will be held in their shifted positions, in accordance with the disposition of the key projections 16, the element 12a in the last row will be released in the latched position of the depressed key, due to the low inclination of the face 16b. In other words, it is necessary to push a key 3 all the way in to give a starting impulse to the motor 36, with the starting circuit being interrupted upon return of the key to latched position in which the code determination is set and held. By this time, the motor circuit is maintained by closure of the switch 37.

Following the depression and latching of a key 3, the key remains in this position until the depression of a key in the same or in another unit of the device. With a key latched in the lower unit B as shown in Fig. 4, depression of a key in the upper unit will cause its inclined projection 39 to shift the upper latch plate 40, which movement is imparted to the latch plate immediately below. This has the effect of releasing a previously depressed key, so that there can be only one key depressed at a time. Furthermore, upon release of a key, the springs 19 return the plungers 18 and their corresponding elements 12 to their original positions. In order to provide for shifting of the lower latch plate 40 upon operation of a key in the upper section, or vice versa, the plates 40 are secured together by interlocking lugs 41 and notches 42, so they will move in unison, see Fig. 13. To permit this movement of the plates 40, the bottom of each channel 6 containing a plate 40 is cut away near its ends, as indicated at 6a in Fig. 13.

As previously pointed out, the unit block 5 is also adapted to receive code composing elements 13 that differ from the elements 12, in that each element 13 provides a slot 43 unsymmetrical with respect to the central axis of the element. The elements 12 and 13 are of exactly the same overall length, and it is to be noted that the length of each channel 6 is an integral multiple of the total length of a number of elements 12 and 13, see Fig. 10.

By reason of the unsymmetrical disposition of the slot 43 in each element 13, it is possible to set up code determinations when assembling the elements 13 in a block 5 by arranging the elements 13 with their offset slot ends to the right and to the left of the central axis of the alined key notches 8 of the block. Where no code determination is desired, an element 12 with a symmetrical slot 15 is employed, so that in setting up the number "fourteen," as before, only the first, third, fourth, fifth and sixth elements of a series are like the unsymmetrical slotted elements 13, while the remaining elements of the series are like the symmetrical slotted elements 12. Such an arrangement of composing elements is shown in the extreme right-hand series of elements in Fig. 11.

With a number of elements 12 and 13 arranged in a block 5, to obtain different code determinations, a single plain key 14 may be utilized to shift the elements in the different series. As shown in Fig. 12, this key 14 is substantially equal in width to the length of the symmetrical slots 15 of the elements 12, but when pushed into a series, the sides of the key 14 will engage the ends of the unsymmetrical slots 43 of the elements 13 and shift them to the right or to the left, as the case may be. In Fig. 9, the key 14 is not shown, but the unit blocks 5 are shown as providing numerals indicating the various code determinations associated with the corresponding key slots 5. That is to say, these numerals indicate the notches 8 in which the plain key 14 is to be inserted in order to set up a desired code determination.

In Fig. 12, the key 14 is shown as having been inserted into the alined slots of a series of elements 12 and 13, in order to set up the code designation "fourteen." Therefore, the plungers 18 of the first, third, fourth, fifth and sixth rows of elements, are shown as having been shifted to close the corresponding contacts 27 and 28, in order to cause transmission of signal impulses for the code designation "fourteen," in the same manner as previously described with reference to Fig. 4.

Should it be desired to utilize keys for all of the slots 5 of Fig. 9, instead of utilizing a single insertable key 14, a type of key 44, shown in dotted lines in Fig. 11, can be employed. These keys 44 are identical in form, and each provides a series of oppositely extending projections 45, corresponding in number to the number of rows of elements 12 and 13. Normally, all of the projections 45 are disposed in the notches 8 of the block, and when a key 44 is depressed, the projections 45 will engage only the ends of the unsymmetrical slots 43 of the elements 13, to shift them into code determining position.

Referring now to Figs. 14 and 15, there is shown a modified construction, in which each unit is provided with a series of pairs of relatively movable contacts that are actuated directly by the plungers 18, instead of utilizing nonconducting actuators to operate contacts mounted in the base 1. In this modified construction, the outer end of the longer leg 18b of each plunger 18 is insulated at 46, and normally bears lightly on a flexible contact 47. Each contact 47 is opposite to but separated from one of a series of spaced stationary contacts 48 mounted on a bus bar 49 carried by a bracket 50 secured to the end plate 20, and enclosing the several pairs of contacts 47 and 48.

As best shown in Fig. 14, each contact 47 projects from a strip 51 carried by the end plate 20, the strip 51 being bent around the edges of the plate to provide ears 51a that project slightly above the upper and lower plate surfaces. Consequently, when a unit, provided with a series of

contacts 47 and 48 at each end, is assembled upon a similar unit, the ears 51*a* and the bus bars 49, are in electrical contact throughout the stack. As best shown in Fig. 15, the base 52, for a stack of contact-carrying units, provides a series of spaced terminals 53 that are engaged by the ears 51*a* of the lowermost unit of the stack. The base 52 also provides a single terminal 54 for engaging the bus bar 49 of the lowermost unit, the bus bars of adjacent units being in engagement throughout the stack. With the base terminals 53 and 54 connected to a suitable code sending device, such as is shown in Fig. 4, it is obvious that the assembly of several units will establish corresponding connections of the contacts 47 and 48 throughout the stack of units to the commutator contacts of the sending device.

From the foregoing, it is apparent that by the present invention there is provided an improved code setting device characterized by its simplicity and reliability in operation. Obviously, the device is particularly adapted for quantity production, owing to the fact that the shiftable code composing elements are substantially identical, and it is unnecessary to stock large numbers of parts having different forms. In other words, the particular code numbers to be set up by the device are determined entirely by the form of the individual keys or by the manner of placing the code composing elements in a series, so that in assembling a device embodying the present invention, almost any code combination can be provided to meet a customer's requirements, without it being necessary to make up any special code composing elements.

In the assembly of a complete unit, the elements 12 or 13 are arranged in the channels 6 of a unit block 5, with a plunger 18 and its spring 19 at one end of each row. The end plates 20 are then secured to the ends of a block 5, with the ribs 21 received in alternate slots 6 and with the ends of the plunger legs 18*b* received in the plate openings 22. Therefore, each complete unit, when assembled, provides no current conducting parts, and its relation to the associated code sending device is established by merely placing the unit in position on the base 1, with the actuators 23 bearing on the pins 25 that serve to operate the base contacts 27 and 28, in response to shifting of any of the plungers 18.

I claim:

1. A code setting device comprising code composing elements of identical shape and size, each element having a slot therein which is offset with respect to a center line, other composing elements of the same shape and size as said first-named elements, each element having a slot therein which is symmetrical with respect to a center line, means for mounting said composing elements, one behind the other in a series with their peripheries in alinement for independent shifting movement, whereby a common alined slot is formed with the offset slot ends of said first-named elements projecting into the common slot from either side of the slot axis, and a code setting member movable in the common slot and having shifting portions for said composing elements equidistant from the axis of said common slot, whereby upon movement of said code setting member in said common slot, said off-set element will be shifted to compose the code, in cooperation with said symmetrical slot elements which remain stationary.

2. A code setting device comprising code composing elements of identical shape and size, each element having a slot therein which is off-set with respect to a center line, other composing elements of the same shape and size as said first-named elements, each element having a slot therein which is symmetrical with respect to a center line, means for mounting said composing elements, one behind the other in a series, with their peripheries in alinement for independent shifting movement, whereby a common alined slot is formed with the off-set slot ends of said first-named elements projecting into the common slot from either side of the slot axis, and a code setting member movable in the common slot and having shifting portions for said composing elements equidistant from the axis of said common slot, whereby upon movement of said code setting member in said common slot, the said composing elements having their slot ends projecting into the common slot, will be engaged by said setting member and shifted, while said symmetrical slot elements remain stationary to compose the code.

3. A code setting device comprising code composing elements of identical shape and size, each element having a slot therein which is off-set with respect to a center line, other composing elements of the same shape and size as said first-named elements, each element having a slot therein which is symmetrical with respect to a center line, means for mounting said composing elements in horizontal rows one behind the other, in different series, with their peripheries in alinement, whereby a number of common alined slots are formed, with the slot ends of said first-named elements in each series projecting into the common slot of the series, and a code setting member movable in the common slot of a series and having shifting portions for said composing elements equidistant from the axis of said common slot, whereby upon movement of said setting member in said common slot, the off-set slot elements of that series will be engaged by said setting member and shifted in opposite directions in the different rows of elements, to compose the code, in cooperation with said symmetrical slot elements which remain stationary.

4. A code setting device comprising a unitary block providing spaced parallel channels, notches in the partitions between said channels, with said notches alined along axes at right angles to said channels, code composing elements of equal length received in said channels and each having a slot in alinement with the slots of other elements along the axis of a series of said notches, a code setting member extending through a series of block notches and composing element slots, and means comprising cooperating surfaces on said composing elements and on said setting member for shifting certain of said composing elements in said block channels into an arrangement signifying a code, in response to axial movement of said setting member through the series of slots in said composing elements.

5. A code setting device comprising unitary blocks each providing spaced parallel channels on opposite sides thereof, notches in the partitions between the channels on one side of the block alined on axes at right angles to said channels, with the channels of different blocks in register when said blocks are assembled one upon the other, code composing elements disposed in the registering channels on opposite sides of adjacent blocks, and each having a slot in aline-

ment with the slots of other elements along the axis of a series of said notches, a code setting member extending through a series of block notches and element slots, and means comprising cooperating surfaces on said composing elements and setting member for shifting certain of said composing elements in the channels of the blocks above and below the alined notches, in response to axial movement of said setting member through a series of composing element slots.

6. In a code setting device, a stacked assembly of unitary blocks, each providing spaced parallel channels on opposite sides thereof, with the channels on one side of greater depth than on the other, notches in the partitions between the deeper channels on one side of each block, alined with respect to axes at right angles to said channels, with the channels of different depths in register when said blocks are assembled in a stack, and code composing elements assembled in the registering channels of adjacent blocks, with each composing element having a slot in alinement with the slots of other composing elements in adjacent block channels along the axis of a series of said block notches.

JOHN H. WHEELOCK.