

Aug. 14, 1934.

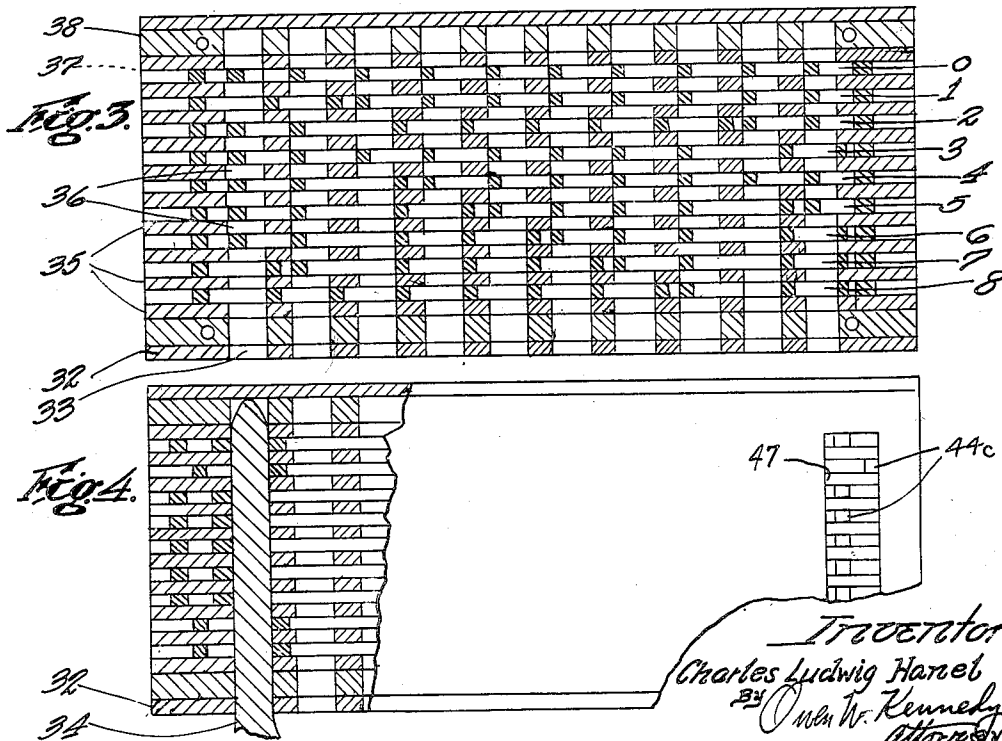
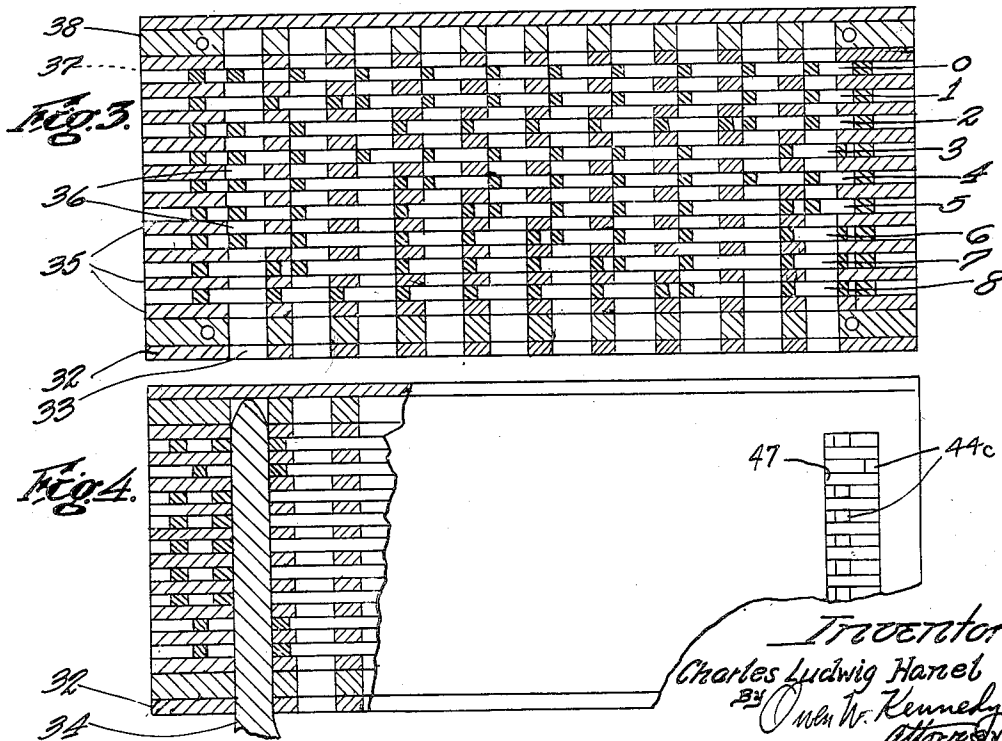
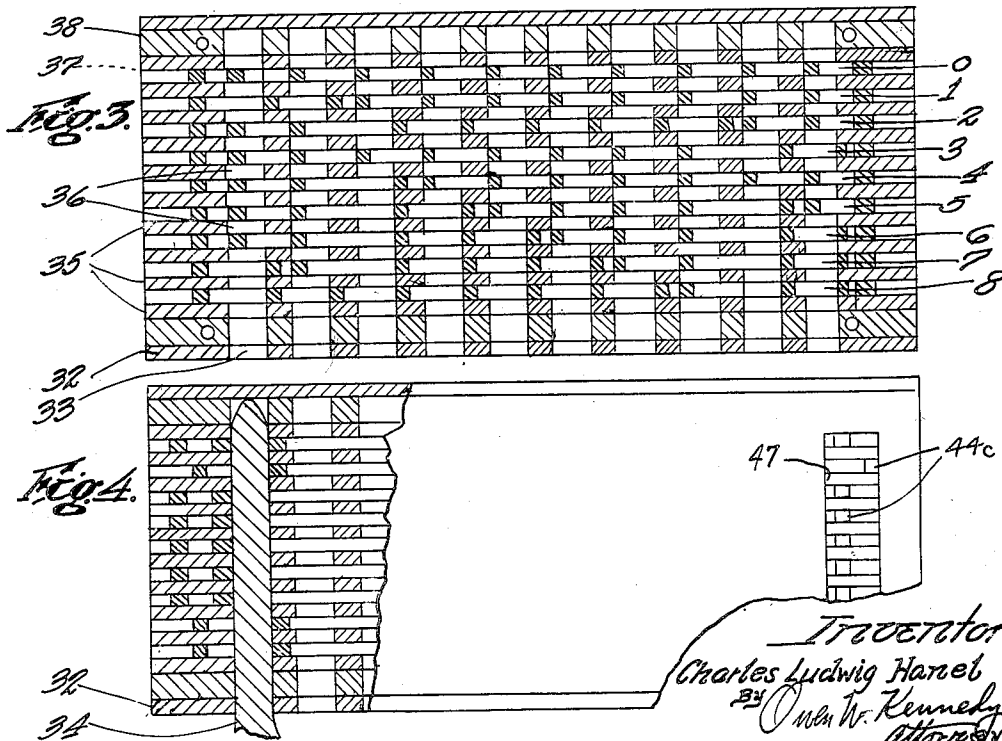
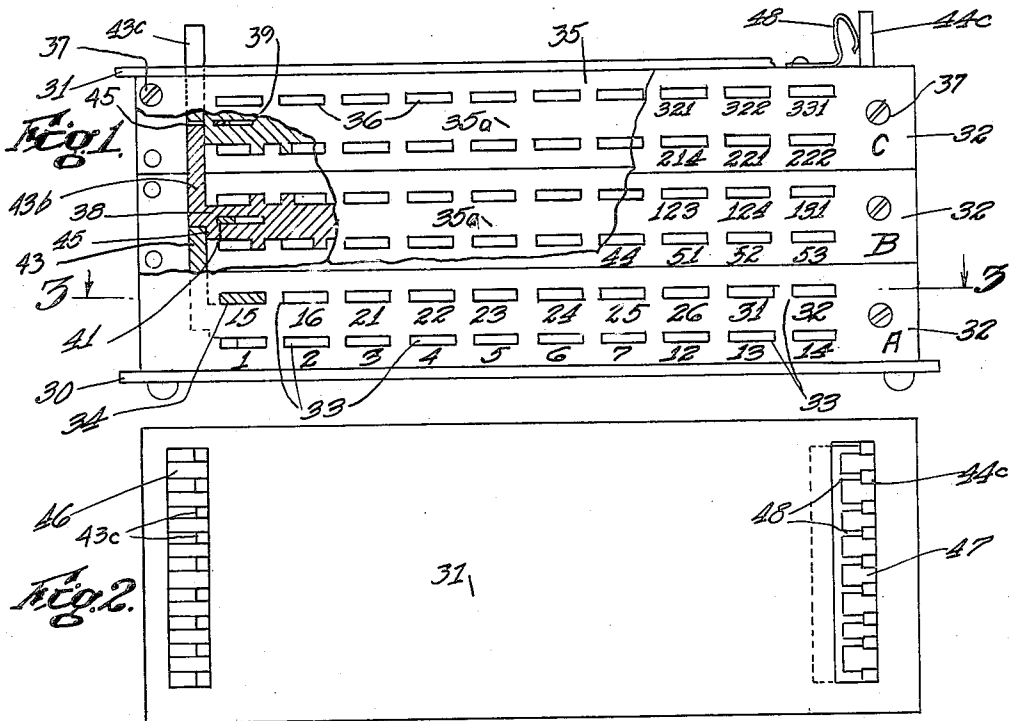
C. L. HANEL

1,969,978

CODE SETTING DEVICE FOR SIGNAL SYSTEMS

Original Filed Dec. 4, 1929

4 Sheets-Sheet 1



Inventor:
Charles Ludwig Hanel
By *Oliver W. Kennedy*
Attorney

Aug. 14, 1934.

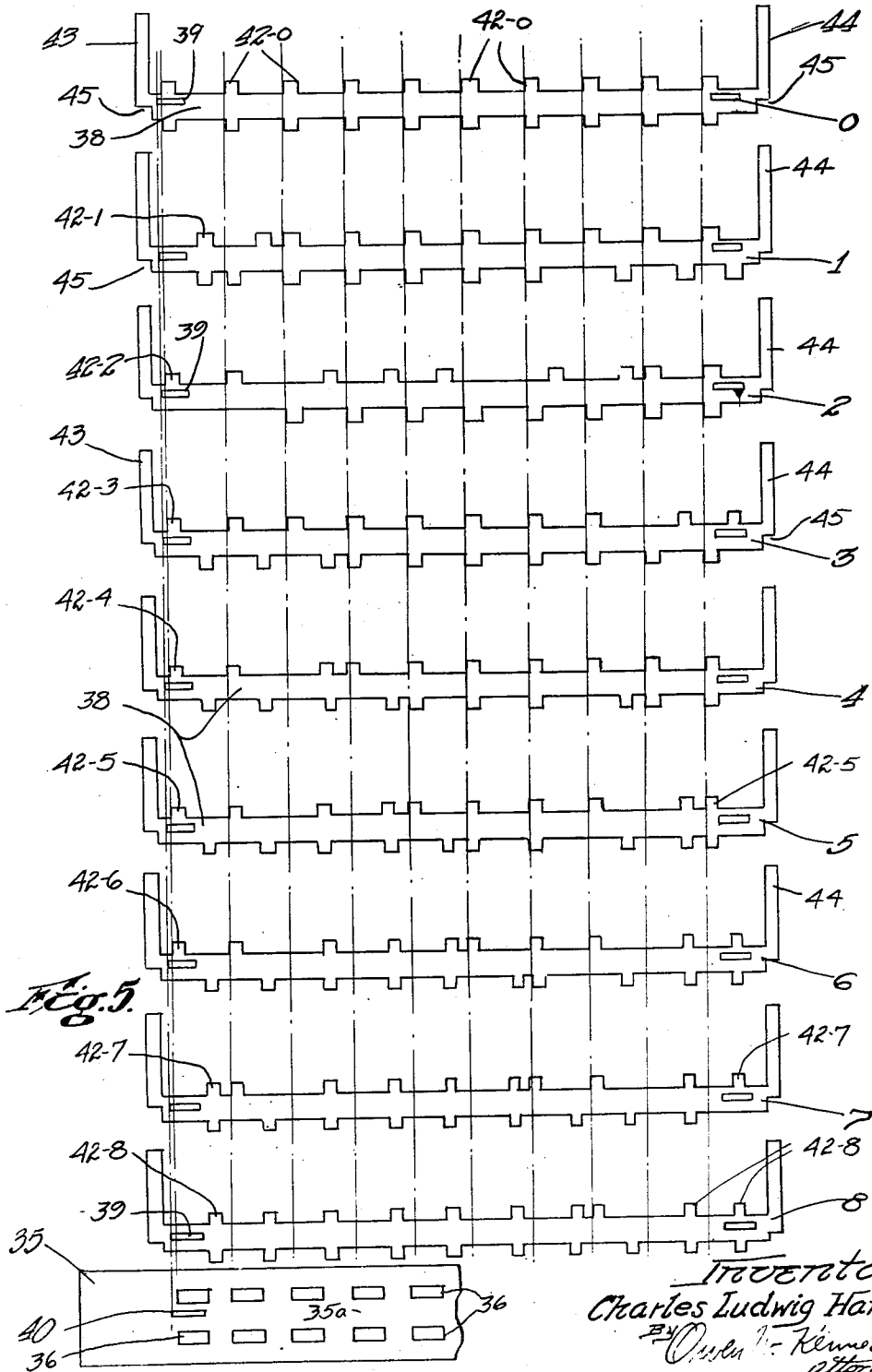
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4 Sheets-Sheet 2



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4 Sheets-Sheet 3

BACK	223	231	232	241	311	312	313	321	322	331	0
	132	133	141	142	211	212	213	214	221	222	16
											17
											18
											19
											20
											21
											22
											23
FRONT											
BACK	61	62	112	113	114	121	122	123	124	131	0
	33	34	35	41	42	43	44	51	52	53	9
											10
											11
											12
											13
											14
											15
FRONT											
BACK	15	16	21	22	23	24	25	26	31	32	0
	1	2	3	4	5	6	7	12	13	14	1
											2
											3
											4
											5
											6
											7
FRONT											8

Fig. 6.

Inventor:
Charles Ludwig Hanel
By *Orville W. Kennel*
Attorney

Aug. 14, 1934.

C. L. HANEL

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4 Sheets-Sheet 4

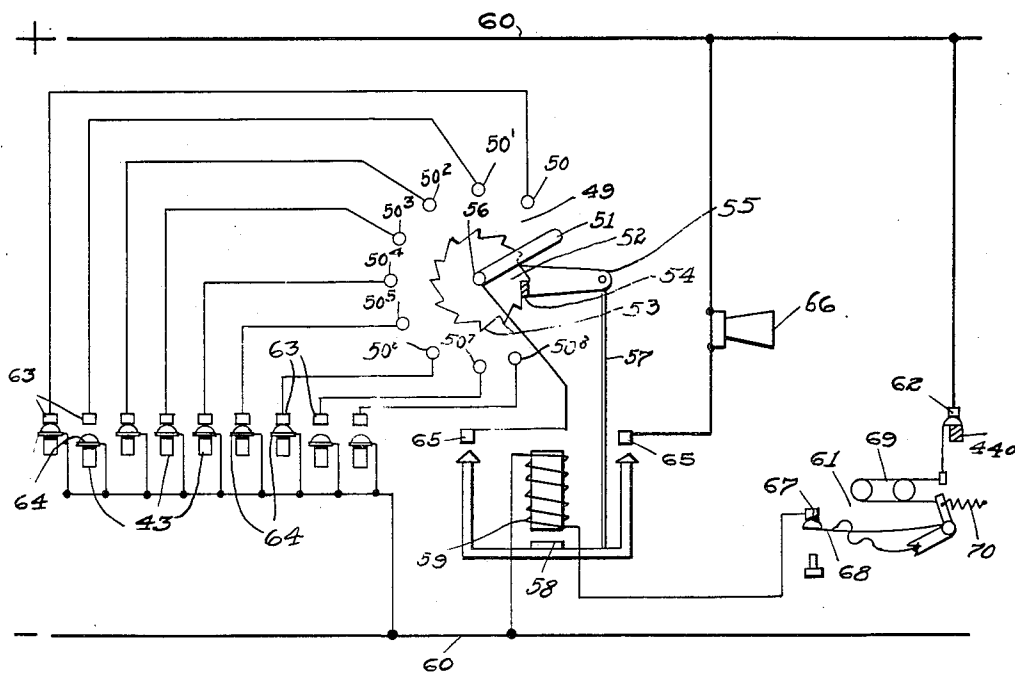


Fig. 7.

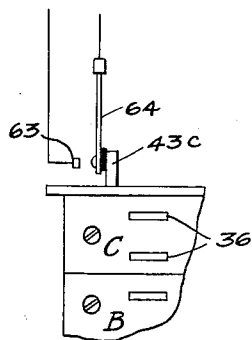


Fig. 8.

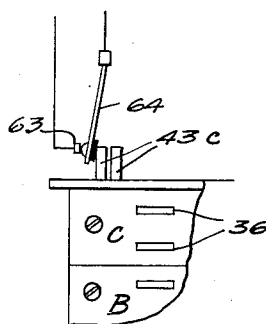


Fig. 9.

Inventor:
Charles Ludwig Hanel
by *Owen W. Kennedy*
Attorney

UNITED STATES PATENT OFFICE

1,969,978

CODE SETTING DEVICE FOR SIGNAL SYSTEMS

Charles Ludwig Hanel, Jackson Heights, N. Y.,
 assignor to Signal Engineering & Manufacturing
 Company, New York, N. Y., a corporation
 of Massachusetts

Application December 4, 1929, Serial No. 411,641
 Renewed January 8, 1934

5 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 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 predetermined signal sequence. In code setting devices, as heretofore constructed, it has been customary to employ electrical contacts adapted to cooperate with plugs or keys to determine the code signal in accordance with the number and arrangement of electrical contacts made by operation of the plug or key. In the operation of such electrical code setting devices it has been found that, due to the multiplicity of contacts and the necessity of arranging them closely together for economy of space, electrical troubles frequently are met with, due to short circuiting of the contacts or faults caused by improper assembly of the large number of current carrying parts employed; and the object of the present invention is to provide an improved code setting device characterized by the substantial elimination of any electrical contacts or circuits.

The code setting device of the present invention is further characterized by its simplicity of construction and certainty of operation, the operation of the device for the purpose of determining a code signal being entirely mechanical in so far as the determination of the code signal is concerned, so that my improved device is entirely free from electrical troubles of the sort previously encountered.

The above and other advantageous features of my invention will hereinafter more fully appear with reference to the accompanying drawings, in which—

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

Fig. 2 is a plan view of the device shown in Fig. 1.

Fig. 3 is a horizontal sectional view along the line 3—3 of Fig. 1, with the code setting key removed.

Fig. 4 is a view similar to Fig. 3, showing the setting of a code signal.

Fig. 5 is a developed fragmentary view showing the cooperation of a series of code bars to determine a group of code signals.

Fig. 6 is a diagrammatic view showing the range of code signals adapted to be set by my improved device.

Fig. 7 is a diagrammatic view illustrating the cooperation of my code setting device with a code sending device of a particular type.

Fig. 8 is a fragmentary view illustrating the normal relation between a portion of the code setting device of Fig. 1 with the contacts shown in Fig. 7.

Fig. 9 is a view similar to Fig. 8, showing the establishment of a circuit to the code setting device by operation of the code setting device.

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

Referring first to Fig. 1, the code setting device comprises a base 30 and top plate 31 between which are assembled a number of different code setting units or stacks designated A, B and C, the units being similar in general construction and each being adapted to determine a different series of code signals as will hereinafter appear. Each unit A, B and C comprises a front key plate 32 providing a plurality of spaced slots 33 any one of which is adapted to receive a code setting key 34 as shown in Fig. 4, each key slot 33 being given a different code numeral, as shown in Fig. 1. Since the code setting units A, B and C are generally similar in construction only one need be described in detail and the construction of the lowermost unit A will next be considered.

As best shown in Fig. 3 the code setting unit A comprises a number of parallel code determining bars designated 0, 1, 2, 3, 4, 5, 6, 7 and 8 respectively, these bars all being generally similar in form, although differing in the arrangement of other code determining bars as will hereinafter appear. These code bars 0 to 8 inclusive are slidable between guide plates 35 which provide slots 36 that are in alinement with the slots 33 provided in the front key plate 32, the guide plates 35 being held together with the key plate 32 by screws 37 threaded into a back plate 38. As best shown in Fig. 5 each of the code determining bars 0 to 8 inclusive provides a body portion 38 which is of substantially the same width as the portion 35a of a guide plate 35 between the slots 36, see Fig. 1. The body portion 38 of each code bar provides a guide slot 39 near each end thereof and when the code determining

bars 0 to 8 inclusive are assembled in the unit between the guide plates 35, the guide slots 39 line up with slots 40 provided at opposite ends of each guide plate 35 between the outermost pairs of key slots 36, the relation of the slots 39 and 40 being indicated clearly in Fig. 5.

The aligned guide slots 39 and 40 of the code bars and plates 35 are adapted to receive rods 41, see Fig. 1, which are about one-half the width of the slots 39 in the code bars; consequently each code bar 0 to 8 inclusive is adapted to be shifted longitudinally between the guide plates while maintaining the body portion 38 thereof in exact parallelism with the portions 35a of the guide bars 35 between the slots 36. For the purpose of shifting each code bar 0 to 8 inclusive between the guide plates 35, each code bar provides on opposite sides of its body portion 38 a series of code determining lugs 42, the lugs 42 being disposed in definite relation with respect to the key receiving slots 33 of the front key plate 32 and the aligned slots 36 of the guide plates 35 so that the insertion of the key 34 in a given key slot 33 will result in the shifting of certain code bars in a manner to be hereinafter described. The code determining bars 0 to 8 inclusive also each provides at its ends upwardly extending operating portions 43 and 44 which project above the unit at each end and before proceeding with a detailed description of the code determining lugs 42 there will first be described the manner in which the operating portions 43 and 44 of the code bars of one unit cooperate with the code bars of the other units of the stack in the completed code setting device.

Referring again to Fig. 1 wherein the units A, B and C are assembled one upon the other, it will be noted at the left hand portion of this view, shown partly in section, that the operating portions 43 of the code bars of the unit A extend upwardly into the next unit B and are received in notches 45 provided at the ends of the code bars of the unit B, all of the code bars then being in alinement. Similarly the operating portions 43b of the code bars in the unit B project upwardly into the unit C and are received in notches 45 provided in the code bars of the uppermost unit C. Since the code setting device shown comprises only three units A, B and C, the code operating portions 43c of the unit C project above the unit C and are freely received in a slot 46 provided near the end of the top plate 31, as clearly shown in Fig. 2. Similarly the code operating portions 44c of the top unit C are freely received in a slot 47 provided at the opposite end of the top plate 31, it being understood that the code operating portions 44c are in alinement with the code operating portions 44b and 44 of the units A and B.

With the above described relation between the code setting bars of all three units A, B and C it is evident that when one bar or a number of bars of any of the units is moved by insertion of the key 34 into a given code slot 33 such movement or movements will be transmitted to the vertically aligned code setting bars of the other stacks and finally to the code operating portions 43c and 44c. Therefore to insure that all of the code setting bars of all three units A, B and C will always occupy the same relative positions when the key 34 is withdrawn, a plurality of spring fingers 48 are adapted to bear continuously on the code operating portions 44c, these fingers being secured to the top plate 31. The fingers 48 exert sufficient pressure to

maintain all of the code operating portions 44c in engagement with the right hand edge of the slot 47 in the top plate 31 so that with the key 34 withdrawn, all of the code determining bars of all of the units A, B and C are maintained in the same relative position with respect to the key slots 33 and the manner in which the insertion of the key 34 into any given slot 33 will shift certain code bars by cooperation with the code determining lugs 42 will next be described.

In Fig. 5, there is shown a developed view of the bars 0 to 8 inclusive, which comprises the lowermost code setting stack A, the bars being shown in their normal position with their code determining lugs 42 lined up with respect to the axes of the several slots 33 of the key plate 32 which is disposed in front of the bars. As indicated by the numerals below the slots 33, the lowermost unit A represents twenty different code settings that may be obtained by cooperation between the key 34 and the bars 0 to 8 inclusive. As previously stated, the code setting bars of all the units are all normally biased towards the right by the spring fingers 48 pressing on the operating portions 44c in which position the code determining lugs 42 project at the left into the key slots 33, so it is obvious that should the key 34 be inserted in any one of the slots 33, certain of the code setting bars will be shifted longitudinally from their normal positions in accordance with the disposition of the lugs 42 with reference to the particular slot 33 into which the key 34 may be inserted. Obviously this longitudinal shifting of certain bars will cause the code operating portions 43 and 44 to be moved accordingly, and the manner in which movement of the portions 43 or 44 determines the code will next be described.

Referring now to the code setting bar designated 0, it will be noted that this bar provides pairs of oppositely projecting lugs 42—0, which are all disposed on the left hand side of the key receiving slots 33, there being no other lugs on this particular bar. Consequently, when the key 34 is inserted into any one of the twenty slots 33 of the plate 32, the code bar 0 will be shifted to the left to move its code operating portions 43 and 44 out of alinement with the corresponding operating portions of the other bars 1 to 8 inclusive. In other words, the bar 0 is a common operating bar, and a similar bar is disposed in each of the other stacks B and C, as will be hereinafter described.

Assuming now that the key 34 is inserted into the slot designated "Fifteen", it will be seen that the bar 1 adjacent the bar 0 provides a lug 42—1 which does not project into this particular slot 33; consequently the bar 1 will not be shifted from its neutral position. It will also be seen that the next five bars designated 2, 3, 4, 5 and 6, provide lugs 42—2, 42—3, 42—4, 42—5 and 42—6 that project into the slot 33 in the same manner as does the lug 42—0, so that all five of these bars 2, 3, 4, 5 and 6 will be shifted to the left upon insertion of the key 34 to line them up with the bar 0. It is also evident that this movement will also cause the corresponding operating portions 43 of these five bars to line up with the operating portion 43 of the bar 0 so that the arrangement of the code operating portions 43 represent graphically the signal "Fifteen", or in other words 1—5. It will also be noted that the two remaining bars, designated 7 and 8, provide lugs 42—7 and 42—8 that do not project into the slot 33, designated

"Fifteen", so that insertion of the key 34 will not shift these bars from their neutral positions and they will remain aligned with bar 1.

By further studying the arrangement of the code determining lugs 42 on the remainder of the bars 0 to 8 inclusive, with reference to the axes of the slots 33, it is possible to readily determine the manner in which insertion of the key 34 into any one of the slots will cause shifting of the bars and their operating portions 43 to determine the particular code signal indicated below the particular slot 33 into which the key 34 may be inserted. For example, when the key 34 is inserted into the slot 33 designated "Twenty-five", bars 0 and 1 are shifted, bar 2 is not shifted while the next five bars 3, 4, 5, 6 and 7 are shifted, so that the operating portions 43 of these bars graphically represent the signal 2—5. Similarly, when the key 34 is inserted into the slot bearing the designation "Seven", the first seven bars 0 to 6 inclusive, are all shifted, while the remaining bars 7 and 8 are not shifted, so that the operating portions of these bars graphically represent the numeral 7.

In Fig. 6 there is represented diagrammatically the arrangement of the lugs 42 on all of the bars in all three of the stacks A, B and C, whereby sixty different code signals may be set. It will be noted that each of these three groups of bars contains a common bar 0 since this bar is adapted to determine the first digit of any one of the code signals. The other bars are all different, however, and are numbered 1 to 23 inclusive, and it is readily possible by noting the relation between the vertical lines representing the lugs 38 in each case with reference to the central axis of a key opening to read the signal which will be set by insertion of the key 34 into any given slot 33. Obviously many other combinations of bars could be utilized to obtain other code designations without departing from the principle of operation of the code setting device.

As previously pointed out, the code setting device of the present invention is particularly characterized by its simplicity, and it is obvious from the foregoing description that the code determining bars can be stamped out of sheet metal very cheaply and with great accuracy, it being possible to use a common blank on which all of the lugs 42 are originally provided, thereby providing two lugs for each of the twenty slots. Then any particular bar can be formed by breaking off the lugs 42 which it is desired to eliminate in order to produce an arrangement of lugs corresponding to a given bar number which may then be stamped on the bar as indicated in Fig. 5. Obviously the operation of the device to determine the various code settings is entirely mechanical and no current is handled by the shiftable bars, it being more or less immaterial insofar as this invention is concerned as to the exact manner in which a particular arrangement of operating portions 43 and 44 are employed to control the operation of the code sending device which is employed in connection with my improved code setting device.

As an illustrative embodiment of the manner in which my improved code setter may be employed in connection with an electrically operated code sender, there is shown in Fig. 7 a diagrammatic arrangement for utilizing the position of the bars to sound a signal. In this

arrangement, a commutating device 49 is employed which comprises a number of contacts 50 arranged in circular form and adapted to be engaged by a rotatable contact arm 51. The arm 51 is adapted to be given a step-by-step movement over the contacts 39 by means of a ratchet wheel 52, the teeth 53 having the same angular displacement as the contacts 50. The ratchet teeth 53 are engaged by a pawl 54 carried by an arm 55 turnable about the shaft 56 on which the contact arm 51 is mounted. The pawl arm 55 is connected by a link 57 to the free end of a pivoted armature 58 under the control of a solenoid 59 and when the solenoid is energized, the pawl 54 will turn the ratchet wheel 52 and with it the contact arm 51 the displacement of one tooth 53. One terminal of the solenoid 59 is connected to the — side of a source 60 of electrical energy while the other terminal is adapted to be connected to the + side through an intermittent contact making device 61 and a switch 62, the operation of which will hereinafter appear.

The commutator contacts 50 are connected to a corresponding number of stationary contacts 63 arranged in a row, and each of these contacts 63 has cooperating therewith a resilient contact finger 64, the fingers 64 being connected in parallel circuit relation to the (—) side of the source of electrical energy 60. The resilient fingers 64 correspond in number to the operating portions 43 of a set of code determining bars, and, as shown in Fig. 8, the ends of the contact fingers 64, are located adjacent to the upwardly extending operating portions 43c of the code setting device shown in Fig. 1, when the latter is in a non-code determining position. In this position, the fingers 64 are insulated from the portions 43c, and are separated from the contacts 63, but when any given code bar is shifted, as shown in Fig. 9, by the insertion of the key, the corresponding contact finger 64 is flexed into engagement with the corresponding stationary contact 63, thereby energizing the corresponding commutator contact. Obviously, upon withdrawal of the key, the displaced code bar will return to its normal position shown in Fig. 8, thereby separating the contact finger 64 from the contact 63. Therefore, when the key 34 is inserted in the slot designated "Fifteen" as indicated in Fig. 4, the commutator contacts 50—0, 50—2, 50—3, 50—4, 50—5 and 50—6 will be energized from the source 60. As shown in Fig. 7, the commutator arm 51 is adapted to be connected at its pivot to the + side of the source 60 through contacts 65 which are bridged by the armature 58 when the solenoid 59 is energized and a signal 66 is shown in circuit with the contacts 65 which will be sounded when the arm 51 engages contact 50—0. When the solenoid 59 steps the arm 51 to the next contact 50—1, there will be no sound of the signal, but the signal 66 will be sounded five times in succession as the arm 51 successively engages the commutator contacts 50—2, 50—3, 50—4, 50—5 and 50—6. As shown, the movement of the right hand operating portion 44—0 of the code determining bar 0 is utilized to control the initial energization of the operating solenoid 59 so that the code sending device will start operating as soon as the operator inserts the key 34 in any slot 33. It will be noted that the pawl 54 turns the selector arm 51 before the armature 58

closes the contacts 65 so that the signal circuit is made or broken at the contacts 65.

The particular construction of the code sending device shown in Fig. 7 forms no part of the present invention and is fully shown and described in my copending application Serial No. 417,469 filed December 30, 1929, jointly with John H. Wheelock. Therefore, only as much of the intermittent contact making device 61 will be described herein as may be necessary for a complete understanding of the present invention. As previously pointed out, one terminal of the operating solenoid 59 is connected to the device 61 through a contact 67 shown in engagement with a resilient pivoted contact arm 68. The arm 68 is biased towards the contact 67 by the pull of a filament 69 when the filament is cold so that when the switch 62 is closed by the operator inserting the key 34, the solenoid 59 will be energized to cause the contact arm 51 to be turned through the space of one tooth 52. Current flowing through the filament 69 will cause it to expand whereupon a spring 70 will spring the arm 68 out of engagement with contact 67, thereby deenergizing the solenoid 59. When this occurs, the armature 58 drops back to advance the pawl 54 another notch and also break the signal circuit at the contacts 65. Obviously, the expansion and contraction of the filament 69 will continue to cause stepping of the selector arm 51 around the contacts so long as the switch 62 is held closed by the key 34 and obviously other types of code sending devices could be employed in connection with the code setting device which forms the subject matter of the present invention.

I claim,

1. In a code setting device, a plurality of dissimilar code determining elements arranged in groups, code setting means for engaging and shifting one or more elements of any group into code determining position, a single set of contacts equal in number to the elements of one group, means controlled by the shifting of the elements of one group for actuating the corresponding contacts of the set and connections between the corresponding elements of the different groups whereby the shifting of an element in any one of the groups will cause the shifting of the corresponding elements in the other groups.

2. In a code setting device, a plurality of dissimilar code determining elements arranged in groups, code setting means for engaging and shifting one or more elements of any group into code determining position, a single set of contacts equal in number to the elements of one

group, means controlled by the individual elements of one group for actuating corresponding contacts of the set and connections between the corresponding elements of the different groups whereby the shifting of an element in any one of the groups will cause both the shifting of the corresponding elements in the other groups and actuation of the corresponding contact of the set.

3. In a code setting device, a plurality of dissimilar code determining elements arranged in groups, said elements being normally disposed in non-code determining position, code setting means for engaging and shifting one or more elements of any group into code determining position, a single set of contacts equal in number to the elements of one group, said contacts being normally in non-current conducting condition, means controlled by the shifting of the elements of one group for actuating corresponding contacts of the set into current conducting position and connections between the corresponding elements of the different groups, whereby shifting of an element in one of the groups will cause shifting of the corresponding elements in the other groups.

4. A code setting device comprising a stack of superposed units assembled one upon the other, each unit comprising a group of dissimilar code determining bars shiftable within the stack, with each bar also dissimilar with respect to bars of the other units of the stack, code setting means for engaging and shifting one or more bars of a given unit into code determining position and connections between the corresponding bars of the different units whereby the shifting of a bar in one of the units will cause the shifting of the corresponding bars in the other units.

5. A code setting device comprising a stack of superposed units assembled one upon the other, each unit comprising a group of dissimilar code determining bars shiftable within the stack, with each bar also dissimilar with respect to bars of the other units of the stack, a code setting member for engaging and shifting one or more bars of a given unit into code determining position and connections between the corresponding bars of the different units comprising terminal portions of the bars operatively engaged with terminal portions of the corresponding bars of units immediately above or below in the assembled stack, for imparting the shifting movement of a bar in any of the units to corresponding bars in the remaining units.

CHARLES LUDWIG HANEL.