(No Model.) 3 Sheets—Sheet 1.

J. U. MACKENZIE.

ELECTRICAL SIGNALING APPARATUS.

No. 304,209. Patented Aug. 26, 1884.

Fig. 1.

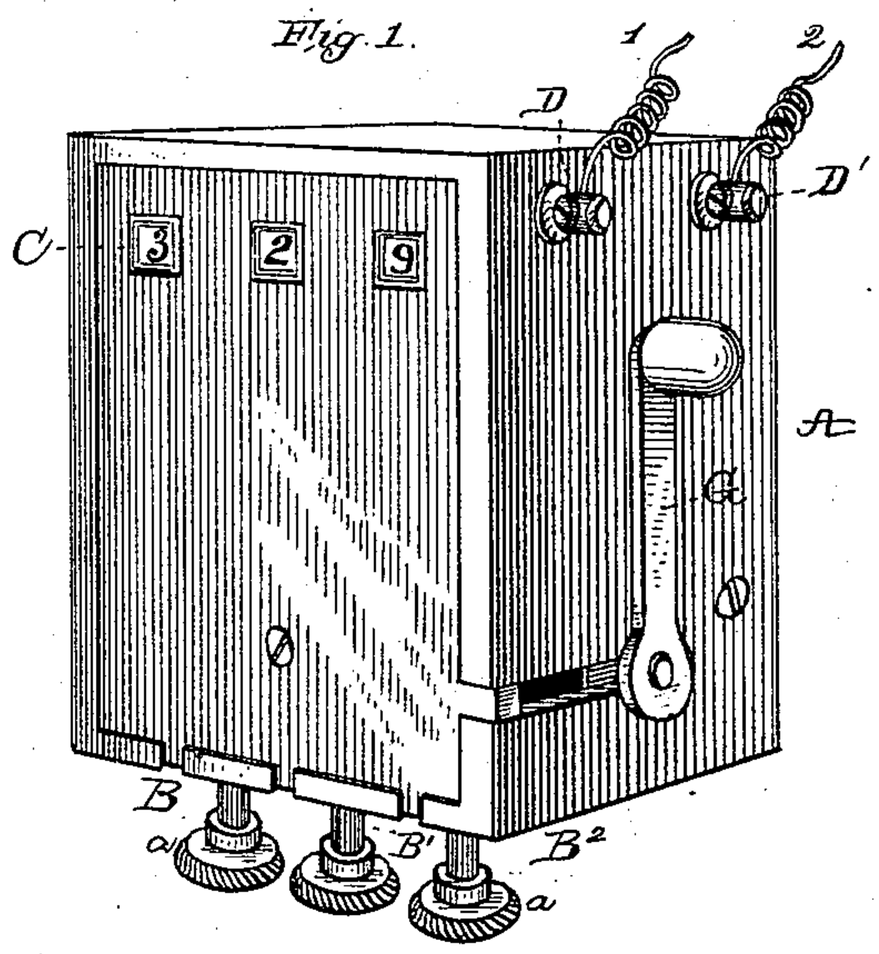
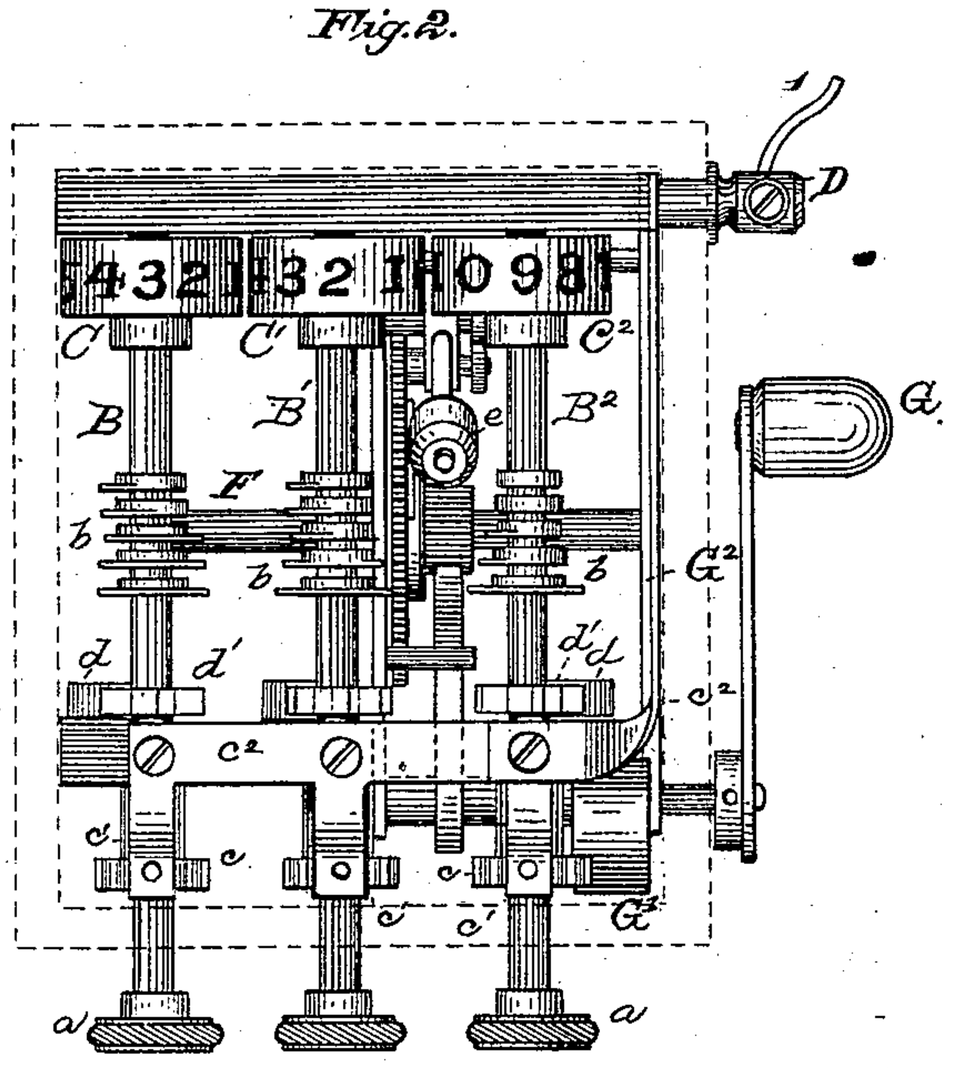


Fig. 2.



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(No Model.) 3 Sheets—Sheet 2.

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ELECTRICAL SIGNALING APPARATUS.

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Fig. 3.

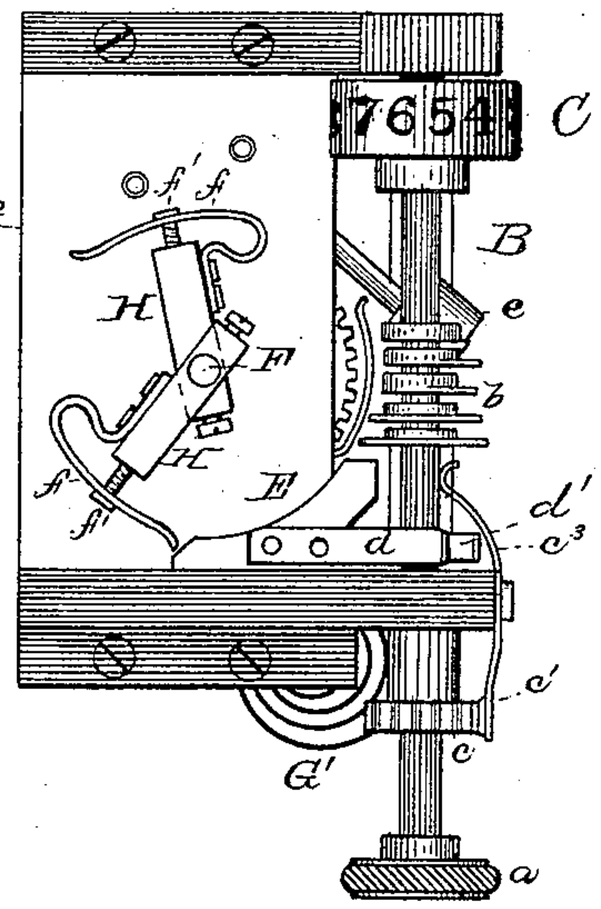

Fig. 5.

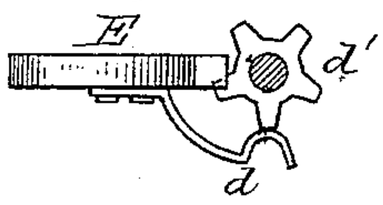

Fig. 6.

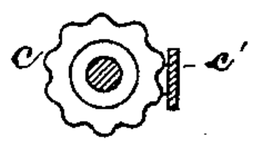

Fig. 4.

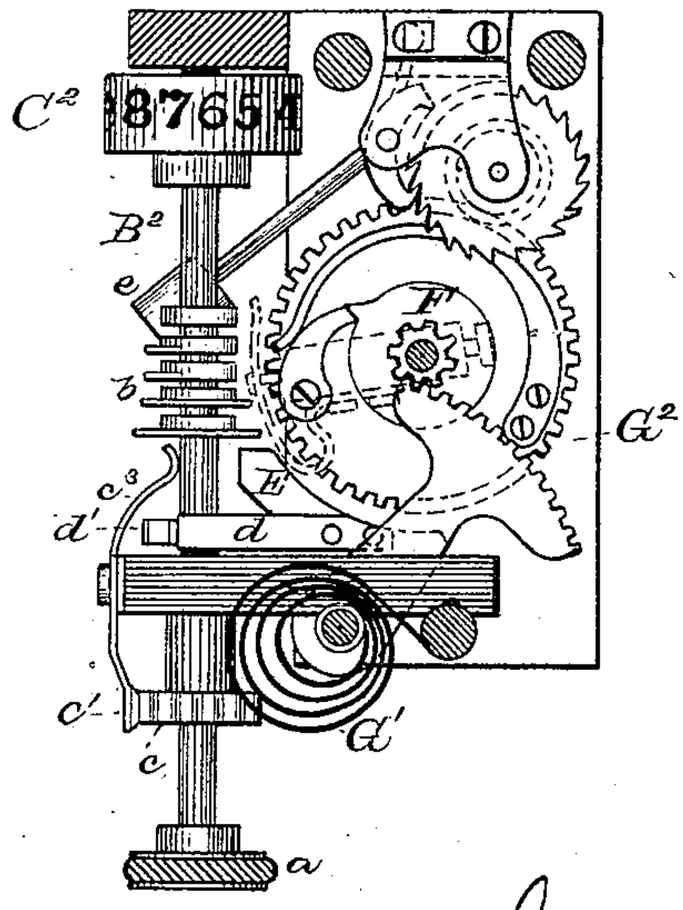

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Fig. 7.

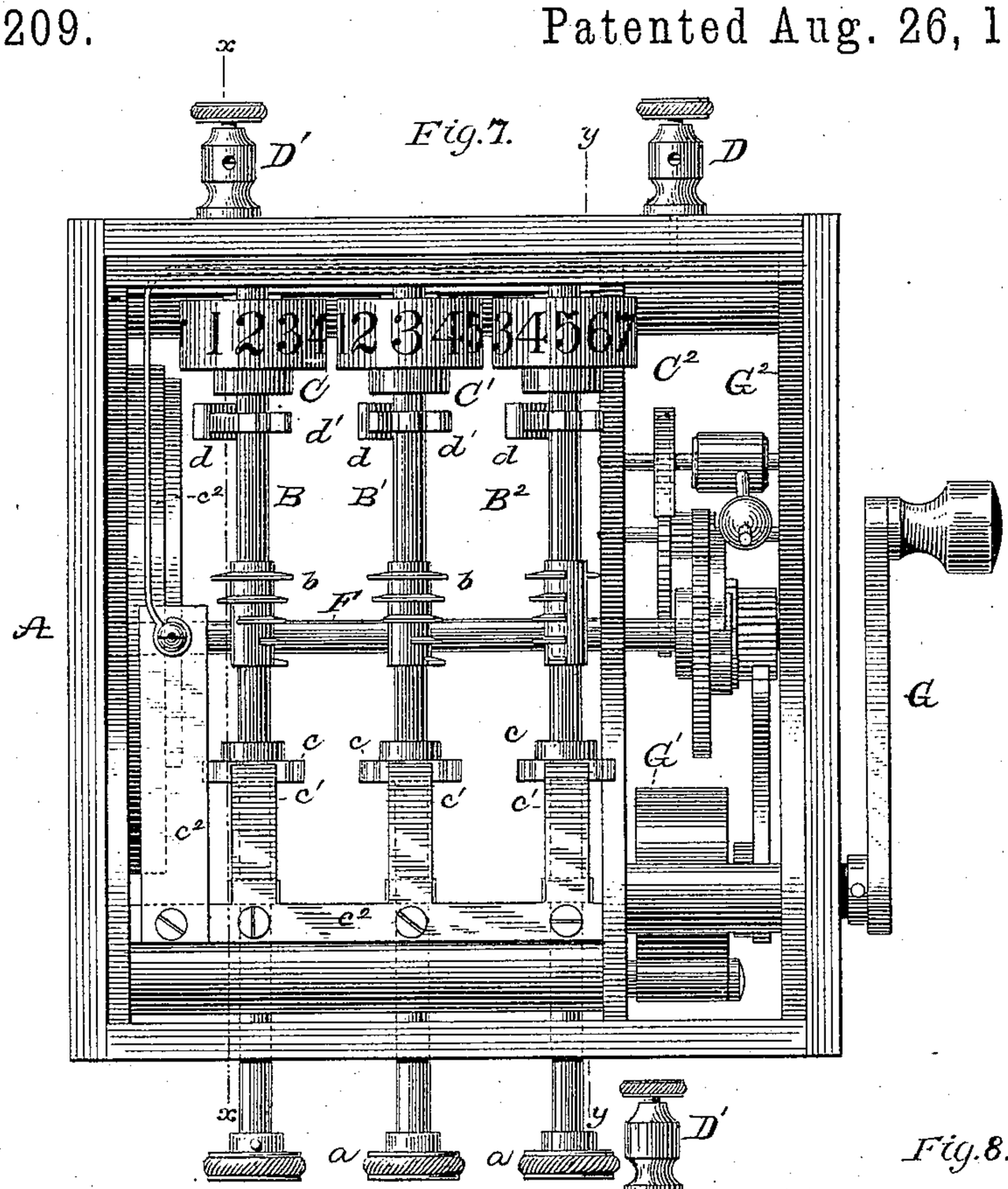


Fig. 8.

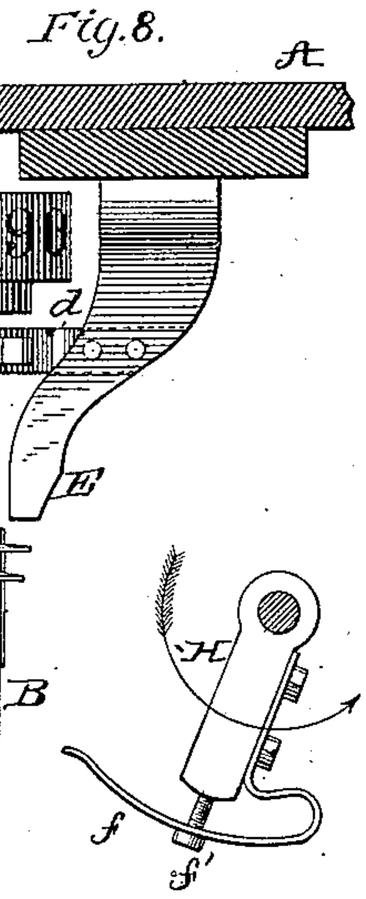
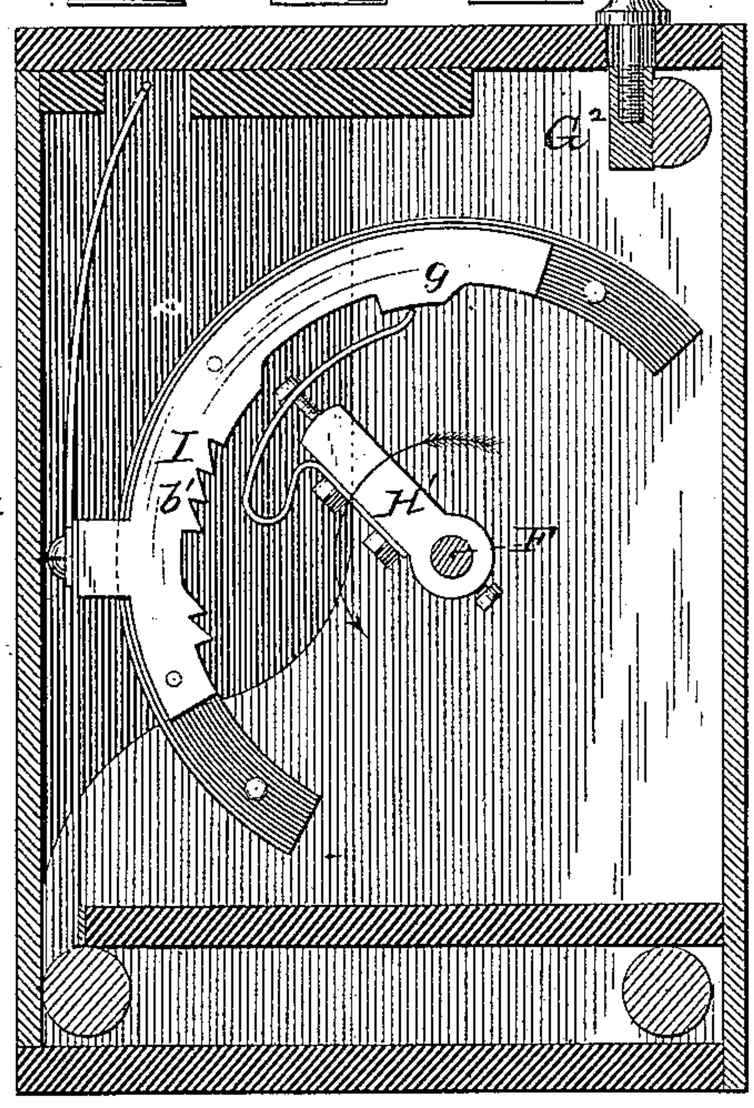


Fig. 9.



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UNITED STATES PATENT OFFICE.

JAMES U. MACKENZIE, OF NEW YORK, N. Y.

ELECTRICAL SIGNALING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 304,209, dated August 26, 1884.

Application filed October 9, 1883. (No model.) Patented in England April 11, 1883, No. 1,829.

To all whom it may concern:

Be it known that I, JAMES U. MACKENZIE, of New York city, in the county and State of New York, have invented a certain new and useful Improvement in Electrical Signaling Apparatus, of which the following is a specification.

The object I have in view is to produce meams for transmitting signals electrically which will be simple, compact, and durable in construction and reliable in operation.

In carrying out my invention I provide the signal-box with two or more revolving spindles or contact carriers arranged side by side and not in line with each other. Each spindle is provided with a number of projecting contacts. The contacts for each spindle are disks or rings cut away more or less on their edges, which are arranged on concave lines to form a series of concave signaling-surfaces, and present more or less contacts in the circular path of a moving contact-spring, according to the adjustment of the spindle; or these contacts may be in a single piece properly formed and secured upon and forming part of the spindle, as shown in another application for patent of even date herewith. For each contact-spindle of the box there is a character-cylinder turning therewith and mounted directly upon the contact-spindle, or operated therefrom through cog-wheels or otherwise, the latter construction being shown in the application before referred to. The character-cylinders carry numbers, letters, words, or characters of any desired kind, each being a distinct signal or service, and all forming a code; or the character-cylinders may represent units, tens, hundreds, &c. Each cylinder is placed opposite an opening in the inclosing-case, through which one character or word only can be seen. The contact-spindles project through the case, and are provided with milled heads, by which they are turned; or, where the character-cylinders are on separate spindles connected with the contact-spindles, the character-cylinder spindles may be provided with the milled heads for adjusting the parts. Upon each contact-spindle, preferably within the case, is secured a toothed wheel, with which engages a tooth on a spring. This spring regulates the movement of the spindle, and may serve also to connect the spindle through one or more metallic strips or wires with one binding-post, the spindles being mounted in or upon insulating-supports. An additional spring bearing constantly on each spindle may be used to assist in maintaining the circuit-connection. The toothed springs and the wheels upon which they bear are preferably so constructed that the contact-spindles may be turned in either direction. There is provided in connection with each spindle a concave circuit closing or opening block arranged in the path of the moving contact-spring and mounted upon an insulating-support. This block is arranged in the path of the moving contact-spring after or before the contacts carried by the spindle. It is used to begin or finish alternate signals by a prolonged closure or opening of the circuit. It is brought into circuit by being connected with the spindle. This is done by means of a spring engaging with the teeth of a wheel on the spindle for alternate signals, and resting clear of such wheel, between the teeth of the same, for the other signals. The box is provided with as many contact-springs as there are contact-spindles, the contacts of each spindle having a separate contact-spring working upon them. The box has a shaft arranged at right angles to the contact-spindles, and carrying the contact-springs, which shaft is given one revolution at each operation of a clock-train. The train is prevented from movement by the engagement of the operating handle or sector with a stop. The operating sector or wheel is moved by a handle, as usual, and winds up the spring to the same extent that it runs down at each operation. The shaft operated by the train carries two or more rigid arms having contact-springs traveling over the spindle-contacts. Each of these springs is secured to the arm, and bent forward away from the arm and then backward across the end of the arm, its end being bent outwardly to form a contact-point. On the end of the arm is a screw, which passes loosely through the spring, but catches the spring under its head. This screw guides the spring-contact, preventing its movement, except laterally toward and away from the contact-spindle, and by turning the screw the spring-contact can be properly adjusted to the station-

ary contacts. The revolving contact-arms are arranged on the shaft at different points of a circle, so that they will operate in succession or progressively, one contact-spring leaving the last contact before the next spring is brought into operation. One binding-post, as has already been intimated, is connected with the contact-spindles. The other binding-post is connected with the contact-arms through the metallic base or frame.

As so far described, the box is adapted for transmitting variable signals only. For many purposes it is also desirable that it should transmit a fixed signal at each operation, indicating the number of the box or station, or other signal, to designate the point from which the signal is sent. For this purpose a stationary segment is mounted upon an insulating-support and connected by a strip or wire with the same binding-post that the contact-spindles are connected with. This segment is cut with proper teeth or spaces to give the fixed signal, and it may be arranged to be brought into operation before or after the spindle contacts. This fixed segment may be arranged in the path of a contact-spring which acts upon the contacts of a spindle; or a separate contact-arm and spring may be employed for the segment. The box will be arranged to send the fixed signal with each of the variable or code signals, and it may also be arranged for sending the fixed signal alone, which can be one of the signals of the code. This can be done by cutting away all the spindle-contacts on one line, so that when the spindles are adjusted to a certain position none of the spindle-contacts will be touched by the moving spring-contacts.

The features of novelty of my signal-box are applicable, it will be seen, to boxes working with the circuit either closed or open normally, to boxes transmitting any one of a number of signals forming a code, as well as to boxes transmitting a fixed signal alone, or in addition to any one of a code of signals.

The character of receiving apparatus will depend upon the use to which the signal-box is put. It may be employed with any suitable apparatus for receiving signals electrically, such as with a chemical or embossing register, or with an electrical visual indicator, with or without a bell-connection, as desired.

The uses to which the signal-box can be put are numerous. It can be employed for all systems of code telegraphy, private-line systems, bell signaling systems, telephone-calls, fire-telegraphs, district telegraphy, police-signaling, hotel-annunciators, &c.

In the accompanying drawings, forming a part hereof, Figure 1 is an external view of a signal-box embodying my invention in part; Fig. 2, a front elevation of the mechanism, the inclosing-box being in dotted lines; Figs. 3 and 4, elevations of the mechanism from the sides; Fig. 5, a top view of one of the circuit-closing blocks, showing the connection with its contact-spindle; Fig. 6, a sectional view showing the spring for regulating the movement of each contact-spindle. Fig. 7 is a front elevation of the mechanism of a signal-box embodying all the features of my invention; Fig. 8, a vertical section showing one contact-spindle, and Fig. 9 a vertical section showing the segment for transmitting a fixed signal.

Like letters denote corresponding parts in all the figures.

With reference more especially to Figs. 1 to 6, inclusive, A is the case of the box, having the openings shown, through which the signal for which the box is set may be seen.

B B′ B² are contact-spindles arranged side by side, parallel with each other, within the box. These spindles project through the box, and are provided with milled heads *a*, by which they are adjusted.

C C′ C² are the character-cylinders, which are shown as carried by the contact-spindles. These cylinders are inclosed within the case A, and carry the numbers or other characters of which the variable signals are composed. Each spindle carries a number of contacts, *b*, which are arranged so that the adjustment of the spindles axially will bring more or less of them into the path of a moving contact-arm; and, since the contact-arm describes a circle, the contacts are formed on the same circle, presenting a series of concave signaling-surfaces. Each contact-spindle also has a toothed wheel, *c*, with which engages a toothed spring, *c′*. The wheel *c* has a notch for each adjustment of the spindle, and these notches and the toothed spring are preferably constructed, as shown in Fig. 6, so that the spindle can be turned in either direction. The contact-spindles are mounted in insulating-supports, and are connected with the binding post or screw D by the springs *c′*, which are connected by a strip or wire, *c²*, running to such binding-post. The wheels *c* and springs *c′* not only regulate and determine the adjustment of the contact-spindles, but by their frictional contact keep good the electrical connection of the spindles with the binding-post D. Extra springs, *c³*, bearing on the plain stems of the spindles, may also be employed to improve the connection.

In the path of each contact-arm is a block, E, for producing a prolonged closure of the circuit for alternate signals. These blocks are mounted upon insulating-supports, and have each a spring, *d*, making contact with the teeth of a wheel, *d′*, on the corresponding contact-spindle. There are half as many teeth on each wheel *d′* as there are adjustments for each contact-spindle, the spring *d* resting in the spaces between the teeth for alternate signals, and in contact with the teeth, as shown in Fig. 5, for the other signals, the blocks being in circuit for alternate signals only.

F is a shaft arranged at right angles to the contact-spindles, and extending across the box back of such spindles. This shaft is given a

revolving movement by a spring-operated mechanism.

G is the operating-handle, which, being thrown forward, winds up the spring G′ to the same extent that it runs down each time. The movement which the mechanism is permitted to make gives the shaft F one complete revolution at each operation, as will be well understood.

The speed of the spring mechanism is controlled by an escapement-bob, *e*, so that the box will work properly in connection with the receiving apparatus.

Upon the shaft F are secured three contact-arms H, arranged at different points of a circle, and carrying each a contact-spring, *f*. This spring *f* is secured to the arm at its end, and is bent forward away from the arm and then backward across the end of the arm, its end being bent outwardly to form a contact-point. An adjusting and guiding screw, *f′*, passes loosely through this spring and enters the end of the arm. The points of the springs *f* describe circles and touch the spindle-contacts *b* and blocks E in their movement. This, however, is done progressively, the contacts of one spindle and the corresponding block being passed over before the spring of the next contact-arm reaches the contacts of its spindle.

The shaft F is journaled in the metallic frame G^2 of the spring mechanism, and with this frame is connected the second binding post or screw, D′. The box is connected in circuit with the receiving instrument by the wires 1 2. As constructed, each contact-spindle, with its block E, is adapted to produce ten different signals; but of course this number can be varied as desired. By adjusting the contact-spindles any number of signals within the capacity of the box can be produced. Thus with the box shown one thousand different signals can be produced. It will be seen that the circuit will be completed when a contact-spring touches one of the contacts. The circuit is from the post D, by strip c^2 and springs c' c^3, to wheel *c* and its spindle, through the contact *b* to the contact-spring *f*, touching it, to contact-arm H, shaft F, frame G^2, and post D.

The box shown in Figs. 1 to 6 is an open-circuit box, and it is adapted to produce variable signals only.

A closed-circuit box, and one adapted to transmit a fixed signal, as well as any one of a number of variable signals, is illustrated in Figs. 7, 8, and 9, to which reference is now particularly made. This box has all the elements of the box first described, and is in every respect like that box, with the exceptions now to be noted. In addition to the adjustable contact-spindles, the box is provided with a stationary segment, I, which is connected by wire c^2 with the binding-post D, the same as are the contact-spindles. This stationary segment is provided with contacts or spaces *b′*, representing a fixed signal, which may be, for instance, the number or other designation of the box. This segment is in the path described by the spring of an extra contact-arm, H′, secured to the revolving shaft F.

The segment I is adapted to be acted upon before any of the spindle-contacts. To make the box a closed-circuit box, the segment I has a projection, *g*, upon which the spring of arm H′ rests normally or while the box is at rest, thus completing the circuit through the box. Another difference over the box first described is the location of the blocks E before instead of after the spindle contacts. This, however, is a matter of choice, the change not affecting the operation of the box otherwise than bringing the prolonged closing or opening of the circuit for the alternate signals at the beginning instead of at the end of the divisions of the signals. The spindle-contacts of this box are cut away on one line, so that the box can be adjusted to send the fixed signal alone or in connection with any one of the variable signals.

I do not claim herein the broad invention of a universal transmitter, this being covered by my application No. 29,660; neither do I claim herein the use of a single contact-spindle, or of any of the features of my invention in connection with the single contact-spindle, such features being claimed in my application No. 108,521, excepting, however, the block for producing the prolonged opening or closing of the circuit; the said block with the adjusting devices for placing it in and out of circuit; the combination of adjustable contacts and spaces with the fixed contacts and spaces, so arranged that both sets, or the latter alone, may be brought into action, and the contact-spindle cut away on one line, in connection with the fixed contacts and spaces.

What I claim is—

1. In electrical signaling apparatus, the combination of two or more spindles arranged side by side, each having two or more series of contacts and spaces, and adapted to be adjusted axially to bring into position any one of the series of contacts and spaces, and a moving circuit-controlling device acting upon the spindles progressively, substantially as set forth.

2. In electrical signaling apparatus, two or more spindles arranged side by side, each having two or more series of contacts and spaces, and adapted to be adjusted axially to bring into position any one of the series of contacts and spaces, in combination with two or more contact-springs acting progressively upon the contact-spindles, substantially as set forth.

3. In electrical signaling apparatus, the combination of two or more spindles arranged side by side, each having two or more series of contacts and spaces, and adapted to be adjusted axially to bring into position any one of the series of contacts and spaces, with two or more revolving contact-springs acting progressively upon the contact-spindles, substantially as set forth.

4. In electrical signaling apparatus, the combination, with two or more adjustable contact-spindles arranged side by side, of a revolving shaft making a complete revolution at each operation of the mechanism, and two or more contact-springs carried by said shaft and located at different points of a circle, said contact-springs acting upon the spindle-contacts progressively, substantially as set forth.

5. In electrical signaling apparatus, the combination, with two or more contact-spindles arranged side by side, of two or more character-cylinders connected and moving with the contact-spindles, and contact-springs acting progressively upon the said spindle-contacts, substantially as set forth.

6. In electrical signaling apparatus, the combination of two or more contact-spindles, two or more revolving contact-springs turning on an axis at right angles to the contact-spindles, and two or more character-cylinders, substantially as set forth.

7. In electrical signaling apparatus, the combination, with a spindle carrying two or more series of contacts and spaces, and adapted to be adjusted axially to bring any one of the series of contacts and spaces into the path of a moving contact-spring, of a block for producing a prolonged closing or opening of the circuit, and means for bringing it into operation for alternate signals, substantially as set forth.

8. In electrical signaling apparatus, the combination, with a spindle carrying two or more series of contacts and spaces, and adapted to be adjusted axially to bring any one of the series of contacts and spaces into the path of a moving contact-spring, of a block for producing a prolonged closure or opening of the circuit, a toothed wheel on the spindle, and a spring projecting from the block for connecting the block with the spindle for alternate signals, substantially as set forth.

9. In electrical signaling apparatus, the combination, with the adjustable contact-spindles, of the toothed wheels and the springs, whereby the axial adjustment of said spindles may be independently controlled and determined, substantially as set forth.

10. In electrical signaling apparatus, the combination, with two or more sets of adjustable contacts and spaces for producing variable signals, of a set of fixed contacts and spaces for producing a fixed signal, substantially as set forth.

11. In electrical signaling apparatus, the combination, with adjustable contacts and spaces, of fixed contacts and spaces, and means whereby both the adjustable and fixed contacts and spaces, or the latter alone, can be brought into action, substantially as set forth.

12. In electrical signaling apparatus, the combination, with one or more adjustable contact-spindles having the contacts cut away on one line, of the fixed contacts, whereby both sets of contacts, or the fixed contacts alone, can be brought into operation, substantially as set forth.

13. In electrical signaling apparatus, the combination, with two or more adjustable contact-spindles arranged side by side, a fixed contact-segment, and revolving contact-springs turning at right angles to the contact-spindles, substantially as set forth.

This specification signed and witnessed this 24th day of September, 1883.

JAMES U. MACKENZIE.

Witnesses:
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EDWARD H. PYATT.