

Sept. 25, 1923.

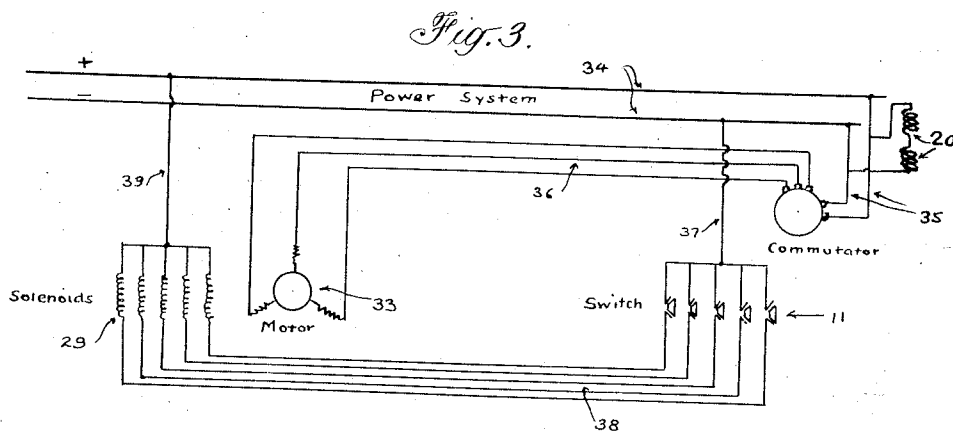
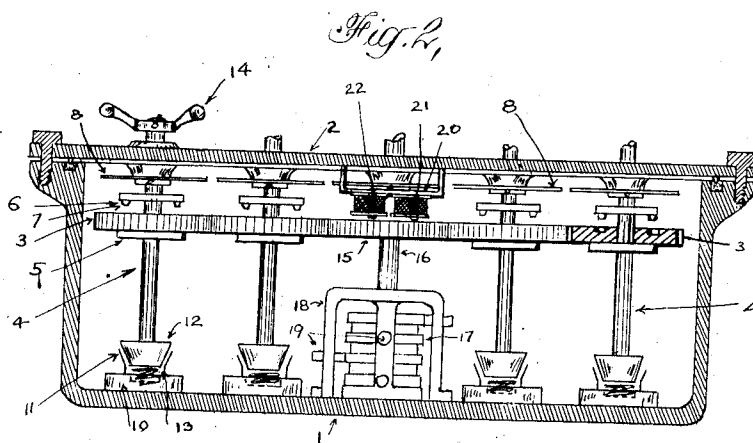
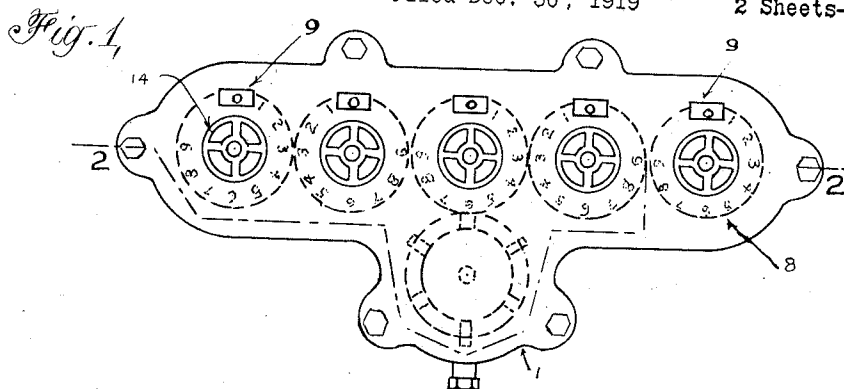
1,468,660

A. P. DAVIS

SIGNALING SYSTEM

Filed Dec. 30, 1919

2 Sheets-Sheet 1



Inventor

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Fig. 4

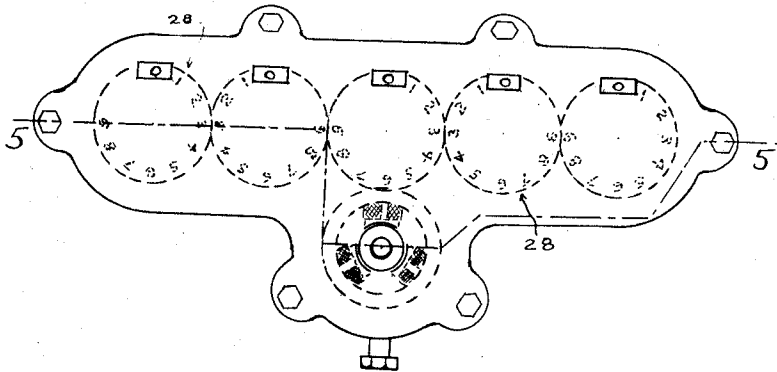
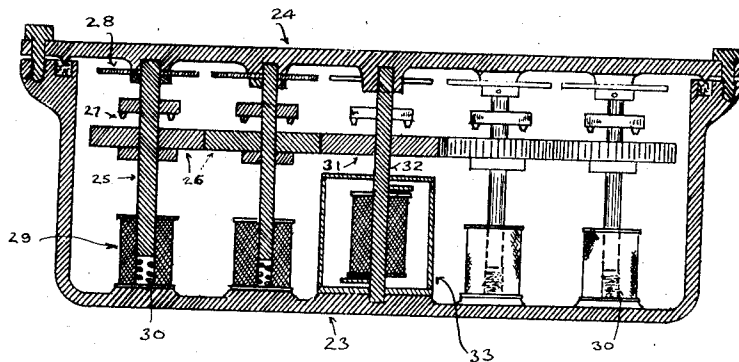


Fig. 5



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UNITED STATES PATENT OFFICE.

ARTHUR P. DAVIS, OF BROOKLYN, NEW YORK.

SIGNALING SYSTEM.

Application filed December 30, 1919, Serial No. 348,365.

To all whom it may concern:

Be it known that I, ARTHUR P. DAVIS, a citizen of the United States, residing at Brooklyn, in the county of Kings, State of New York, have invented certain new and useful Improvements in Signaling Systems; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention is directed to the provision of an improved form of signaling apparatus adapted particularly for use on shipboard or in connection with land fortifications for transmitting signals between distant points. The signals transmitted may be numbers, orders, or data of any other form. On shipboard, the transmitting station may be the bridge, the conning tower, the fire control tower, or the engine room, and the receiving station may be the steering room, the engine room, a turret or the fire room. In a coast fortification, the transmitting station may be the plotting room or the range finding station and the receiving station may be at the guns. It will be understood, however, that the invention may be utilized in signaling apparatus for a wide variety of uses.

The invention involves the provision of a transmitter having a plurality of independently operable transmitting elements, any one of which may actuate a transmitting generator or controller, and also open and close a circuit extending to the receiver, and a receiver having a synchronous motor which is connected to the generator or commutator in the transmitter and a plurality of receiving elements any one of which may be rendered operative by the closure of a circuit in the transmitter and actuated independently of all the others by the receiver-motor.

In the preferred embodiment of the invention, a commutator is provided in the transmitter and the rotating member of this commutator may be actuated by any one of a plurality of driving devices such, for instance, as intermeshing gears. These gears are so mounted that normally they may rotate freely but an operating device is associated with each of the gears whereby any operating device may be moved into engagement with its gears to turn that gear a predetermined amount and thus actuate the rotating member of the commutator. When the oper-

ating element of any gear is moved to engage its gear, it closes a circuit extending to the receiver. In the receiver, the rotating element of the synchronous motor is rotated an amount exactly commensurate with the rotation of the rotary element of the commutator in the transmitter and in doing so it actuates one of a plurality of indicating elements which is automatically connected to the synchronous motor to be driven thereby by the energization of a particular one of several circuits extending from the transmitter to the receiver. The operating elements of the transmitter are equipped with dials and the distance through which they are turned is accurately gauged by reference to these dials. The indicating elements in the receiver are provided with corresponding dials and the operation of the entire apparatus results in movement of the various dials of the receiver or indicators moving over them in exact accordance with the movement of the corresponding operating devices in the transmitter.

In order to guard against operation of an element of the transmitter unaccompanied by operation of the corresponding element of the receiver, which would result in getting the two instruments out of step, an electrically operated clutch mechanism is provided in the transmitter between the several operating elements thereof and the commutator, the arrangement being such that the commutator of the transmitter can be operated only when the circuit is closed through the synchronous motor, whereby operation of the motor of the receiver simultaneously with the commutator of the transmitter will be assured.

The embodiment of the invention which I prefer to employ is illustrated in the accompanying drawings in which Fig. 1 is a plan view of the transmitter; Fig. 2 is a sectional elevation of the same on line 2—2 of Fig. 1; Fig. 3 is a diagram of the circuits and Figs. 4 and 5 are views corresponding to Figs. 1 and 2 respectively and illustrating the receiver, the section line of Fig. 5 being line 5—5 on Fig. 4.

Referring first to Figs. 1 and 2, the transmitter is mounted within a casing 1 having a detachable front plate 2 which is provided with a plurality of openings 9 arranged in line as shown in Fig. 1. In line with each of these openings is a gear 3 loosely mount-

ed upon a shaft 4. Each gear 3 rests upon a flange 5 rigidly secured to the shaft 4 so that each gear 3 is supported and may rotate independently of its shaft 4. All of the several gears 3 are of the same size and intermesh so that all of them rotate in unison.

Each gear 3 is adapted to be rotated by the shaft 4 which passes loosely through it and for this purpose each shaft 4 has a clutch member 6 mounted thereon. This clutch member consists of a crosshead having two pins 7 thereon adapted to enter holes in the side of the gear 3 and each gear 3 is provided with a plurality of such holes arranged in a circle about the axis of the gear.

Secured on each shaft 4 in front of the crosshead 6 is a dial 8 having figures from zero to 9 inclusive thereon. The positions of these figures upon the dials 8 are such that one figure on each dial is visible at a time through the corresponding opening 9 in the front plate 2 of the casing. On the back wall of the casing 1 are a plurality of blocks 10 mounted opposite the ends of the shafts 4 and each block 10 carries a pair of spring contacts 11 which are adapted to be bridged by a contact 12 which is carried by the corresponding shaft 4. Between each block 10 and the end of the shaft 4 is a spring 13 adapted to move the shaft 4 axially to carry the contact 12 out of engagement with the two contacts 11. The opposite end of each shaft 4 is provided with an operating handle 14 outside the casing. Thus, any one of the operating handles 14 may be grasped and moved axially to carry the pins 7 on the shaft 4 of that handle into holes in the corresponding gear 3 so as to connect the gear to the shaft and at the same time to carry the contact 12 into bridging relation to the contacts 11 and thereby close the circuit passing through the contacts 11. Preferably the contacts 11 and 12 are closed during the axial movement of the shaft 4 actuated by its handle 14 slightly before the pins 7 enter the holes in the gear 3, thereby insuring that no movement of gear 3 actuated by its shaft 4 will occur before the circuit through the contacts 11 is closed.

In the present instance, five operating devices 14 with their associated shafts 4, gears 3 and contacts 11 are illustrated, these being arranged in line across the transmitter, but it will be understood that the number may be more or less as desired. The middle one of the several gears 3 meshes with a gear 15 of the same size secured upon a shaft 16. This shaft carries the rotating member 17 of a commutator which may be of any suitable construction but preferably consists of collector rings and segments mounted upon an insulated cylinder and

adapted to convert direct current into three-phase alternating current. Surrounding this rotating member 17 is a frame 18 fastened to the casing 1 of the transmitter and on this frame are mounted the brushes 19 which bear on the rings and segments of the commutator.

A pair of coils 20 are mounted opposite the face of gear 15 and are provided with plungers 21. Behind these plungers are placed springs 22 so that when the system is de-energized the plungers are forced into corresponding holes in the side of gear 15. This prevents the transmitter handles 14 from being turned when there is no power on the system, and accordingly prevents the indicators from getting out of step with the transmitter. When the system is energized current flows through the coils 20, withdrawing the plungers 21 from the gear 15 and permitting the transmitter handles 14 to be rotated.

Referring now to Figs. 4 and 5, the receiver is of a similar construction. It has a casing 23 and a detachable front plate 24 provided with a plurality of openings extending in line across it. Within the casing are a plurality of shafts 25 on which gears 26 are loosely mounted in a manner similar to the mounting of gears 3 of the transmitter. Each shaft 25 carries a crosshead provided with pins 27 adapted to enter holes in the face of the corresponding gear 23. Also, each shaft 25 is provided with a dial 28 and the figures on these dials may be observed one at a time through the openings in the front plate of the casing. Each shaft 25 is movable axially a short distance sufficient to carry the pins 27 into the holes in the gears 23. On the back plate of the casing are a plurality of coils 29 into which the ends of the shafts 25 extend and these ends of the shafts constitute cores for the coils. Within each coil is a spring 30 tending to move the shaft 25 axially in a direction to carry it out of the coil. The several gears 26 intermesh and the middle one of them meshes with a gear 31 mounted directly below it on a shaft 32. On this shaft is mounted the armature of a synchronous motor 33 which may be of any suitable construction.

Referring to Fig. 3, 34 indicates the wires of an electrical supply system. Branches 35 from these wires lead to a pair of brushes of the commutator in the transmitter and the coils 20 are connected across these wires 35. From the brushes bearing on the rings of the commutator three wires 36 lead to the synchronous motor 33. From one of the wires 34 a wire 37 is led to one of the contacts 11 of each pair and from the other contacts 11, wires 38 lead to the coils 29 of the receiver. The opposite sides of all of the coils 29 are connected together by a

wire 39 to the opposite side of the supply circuit.

The operation of the apparatus will now be described.

5 When current is flowing in the supply circuit 34, the coils 20 will be energized and will attract their cores, withdrawing the ends of the cores from openings in the gear 15 so that the apparatus will be in condition
10 for operation. In order to transmit a signal, the handle 14 constituting one of the signaling elements, is grasped and first moved inwardly. This effects connection of the shaft of that handle to its gear 3 and at the
15 same time, closes circuit through the corresponding contacts 11. The closure of this circuit through the contacts 11 by means of the wire 37, one of the wires 38 and the wire 39, energizes the coil 29 to which that wire 38 is connected. This coil
20 29 in the receiver attracts its core, that is, the shaft 25, and moves that shaft axially so as to connect it to its gear 26. The handle 14 is then rotated and the distance through which it is rotated is gauged by watching
25 the digits on its dial 8 passing under the opening 9 in the front plate of the casing of the transmitter. When the handle 14 is so rotated, the corresponding gear 3 is rotated and causes corresponding rotation of the whole train of gears 3 and the gear 15 which is connected to the shaft 16 of the commu-
30 tator. Thus three-phase alternating current is transmitted from the commutator to the motor of the receiver and the number of alternations of the current flowing to the motor is commensurate with the distance through which the handle 14 is rotated.

When the motor is so rotated, it operates
10 through its gear 31 and the train of gears 26 to rotate all of those gears, but that gear which is mounted upon the shaft 25 which was attracted by the energizing of its coil 29, is clutched to its shaft and the shaft rotates with it. The dial 28 mounted on that
15 shaft is therefore carried around an amount exactly corresponding to the amount of the rotation of the dial on the corresponding shaft 4 of the transmitter so that the same digit is displayed in the corresponding opening in the front plate of the receiver as that which is observed through the corresponding opening 9 of the transmitter. In like manner other operating handles 14 on other shafts 4 of the transmitter may be first moved axially and then rotated and cause the same amount of rotation of the corresponding shaft 25 of the receiver. Thus, any number of not more than five digits in the case of the apparatus illustrated in the drawing, may be transmitted from the transmitter to the receiver by moving all of the operating devices 14 of the receiver first inwardly and then rotationally and the digits of that number will be displayed through the

openings in the casing of the transmitter and also through the openings in the casing of the receiver.

One of the advantages of the apparatus above described is that it requires a less
70 number of wires extending from the transmitter to the receiver than systems of the same general character heretofore employed. It should be observed that the wires required are merely those for transmitting the alternating current from the commutator to
75 the synchronous motor and one wire for each of the digits of the largest number which may be transmitted.

The shafts 4 of the transmitter with their
80 handles 14 and dials 8 may be termed the operating devices of the apparatus as it is these parts which are grasped and moved by the operator in setting up the number or other indication which constitutes the signal to be transmitted; also, the shafts 25 of the receiver may be termed the actuated devices of the receiver for it is those shafts which are operated by the motor of the receiver to turn the dials 28 carried by them to the positions corresponding to the positions to which the dials of the operating devices of the transmitter are moved. It will be noted that any one of the operating devices of the transmitter may be moved independently of all of the others and that the first movement of these operating devices is a movement which renders the corresponding actuated device of the receiver operative. This movement must be accomplished before the movement of the operating device which results in operating of the actuated device can take place. But after an operating device in the transmitter has been operated to make the corresponding actuated device in the transmitter operative, then the rotational movement of that operating device results in causing commensurate operation of the actuated device in the receiver to set up the desired signal.
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I claim—

1. In a signaling system, a transmitter comprising the combination of a commutator for transmitting alternating current, a plurality of intermeshing gears connected
115 to the movable member of the commutator for driving it, a plurality of operating devices one for each of said gears, normally disconnected from the gears, and means operated by movement of any operating device for closing an electric circuit and for connecting that operating device to its corresponding gear for driving the rotating member of the commutator, and a receiver comprising the combination of a motor receiving current
120 from the commutator of the transmitter, a plurality of intermeshing gears driven by the motor, indicators each adapted to be driven by one of the gears and electro-responsive devices each controlled by the
125 130

contacts of one of the operating devices of the transmitter and each adapted to effect connection of one of the gears of the receiver to an indicator so that the gear may operate the indicator.

2. A signaling system comprising a transmitter and a receiver, the transmitter having in combination a plurality of operating devices, a common controller adapted to be operated by said devices but normally disconnected therefrom, means whereby any one of said devices may be operatively connected with the controller to operate the same, and the receiver having in combination a motor, the movement of which is determined by the position of said controller, a plurality of actuated devices corresponding with the operating devices of the transmitter and adapted to be operated by the motor but normally disconnected therefrom, and means whereby manipulation of any one of the operating devices in the transmitter automatically establishes an operative connection between the corresponding actuated device in the receiver and the motor whereby said corresponding actuated device will be moved an amount commensurate with the movement of the operating device.

3. A signaling system comprising a transmitter and a receiver, the transmitter having in combination a plurality of operating devices, a common controller adapted to be operated by said devices but normally disconnected therefrom, each of said operating devices being capable of axial and rotative movement, means whereby axial movement of any one of said devices operatively connects it with the controller so that rotative movement of such device will rotate the controller, and said receiver having in combination a motor the movement of which is determined by the position of said controller, a plurality of actuated devices corresponding with the operating devices of the transmit-

ter and adapted to be operated by the motor but normally disconnected therefrom, and means whereby the aforesaid axial movement of any operating device in the transmitter automatically establishes an operative connection between the corresponding actuated device in the receiver and the motor whereby said corresponding actuated device will be moved an amount commensurate with the movement of the operating device.

4. A signaling system comprising a transmitter and a receiver, the transmitter having a plurality of rotatable indicating members each bearing a series of numbers ranging from zero to nine, an operating device associated with each of such indicating members, a common controller adapted to be operated by said devices but normally disconnected therefrom, means whereby any one of said devices may be operatively connected with the controller to operate the same, and a receiver having a plurality of rotatable indicating members corresponding with the indicating members of the transmitter and each bearing a series of numbers ranging from zero to nine, a motor the movement of which is determined by the position of said controller, an actuated device associated with each indicator of the receiver, said devices being adapted to be operated by the motor but normally disconnected therefrom, and means whereby the manipulation of any one of the operating devices in the transmitter automatically establishes an operative connection between the corresponding actuated device in the receiver and the motor, whereby said corresponding actuated device and its indicator will be moved an amount commensurate with the movement of the operating device and its indicator.

In testimony whereof I affix my signature.

ARTHUR P. DAVIS.