

July 15 , 1924.

1,501,437

F. N. CONNET

ELECTRICAL SIGNALING APPARATUS

Filed Feb. 5, 1920

2 Sheets-Sheet 1

Fig. 1

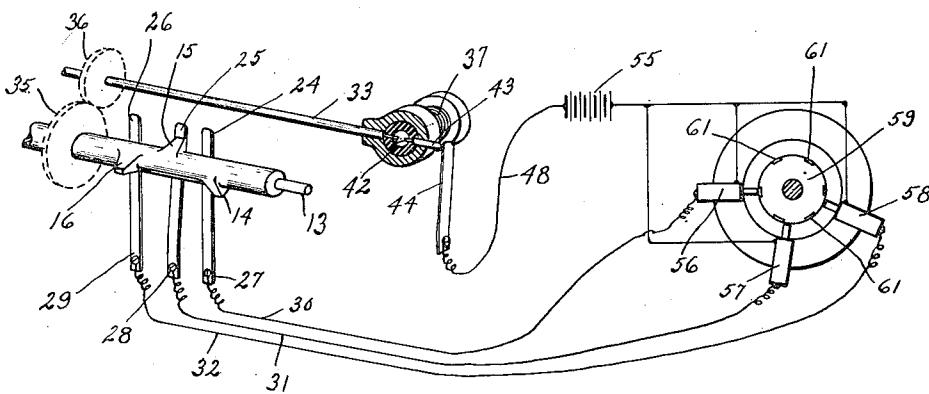
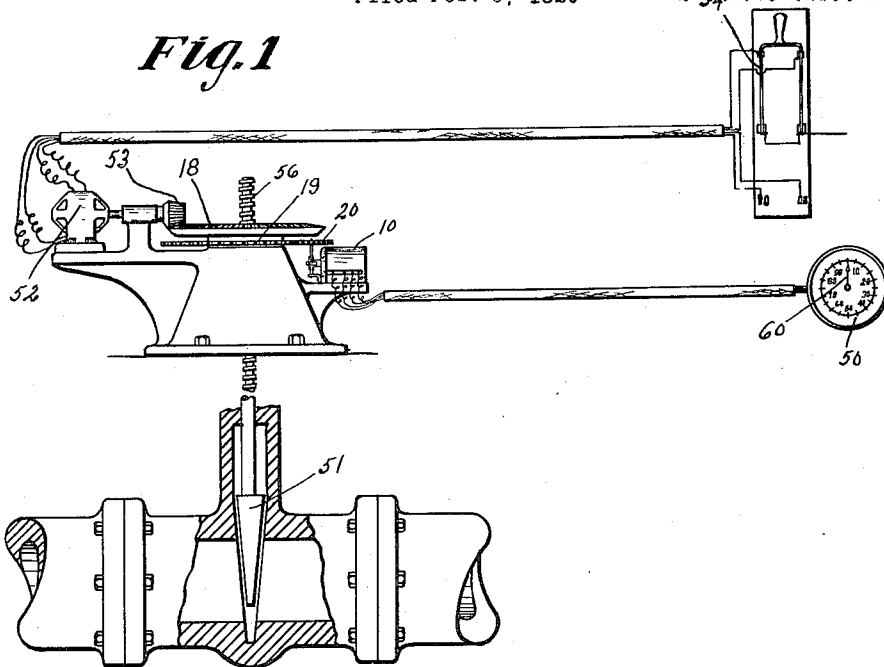


Fig. 2

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2 Sheets-Sheet 2

Fig. 3

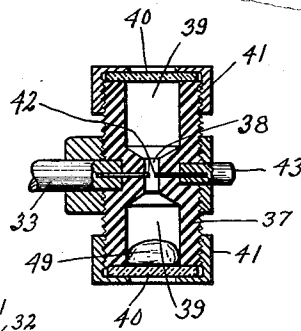
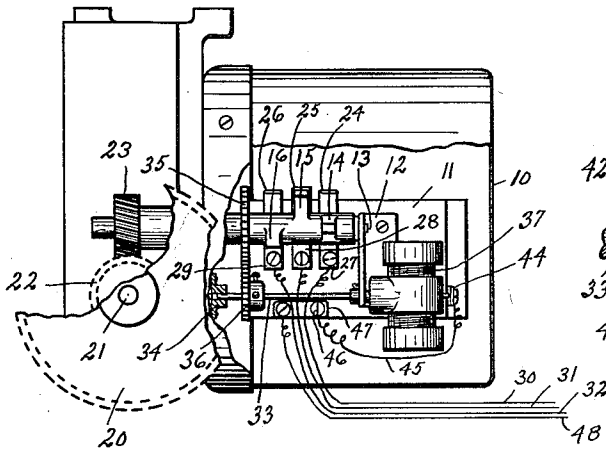


Fig. 7

Fig. 4

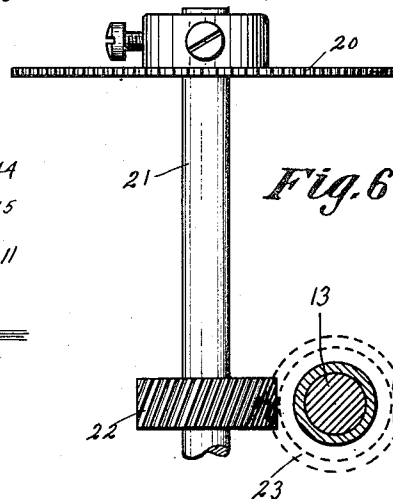
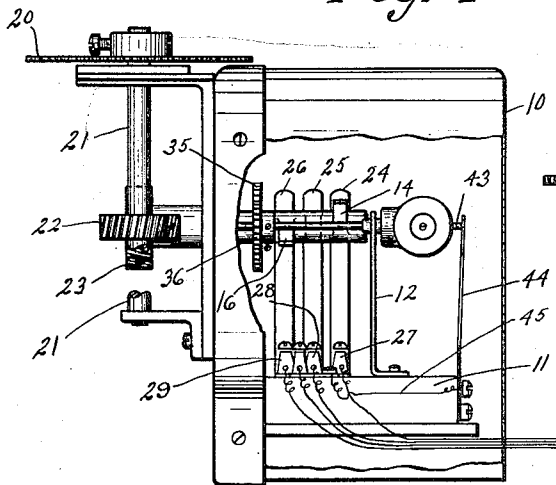


Fig. 6

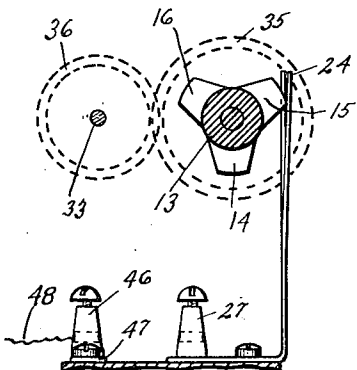


Fig. 5

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UNITED STATES PATENT OFFICE.

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ELECTRICAL SIGNALING APPARATUS.

Application filed February 5, 1920. Serial No. 356,474.

To all whom it may concern:

Be it known that I, FREDERICK N. CONNET, a citizen of the United States, and resident of the city of Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Electrical Signaling Apparatus, of which the following is a specification.

10 This invention relates to electrical signaling apparatus; and has for its object to provide a transmitter member including a circuit-breaking device adapted to control the passage of current to a receiving or
15 indicating instrument located remotely with respect to said member, for the purpose of causing the receiver to indicate the extent of action of the transmitter.

20 A further object of the invention is to so construct the transmitting instrument that it will be impossible for the circuit to remain closed except for a definite or predetermined period and will not be prolonged under any circumstances sufficiently to exhaust or injure the battery employed for
25 supplying energy thereto.

30 With these and other objects in view, the invention consists of certain novel features of construction, as will be more fully described, and particularly pointed out in the appended claims.

In the accompanying drawings:

35 Figure 1—is a diagrammatic view illustrating the transmitting and receiving instruments as connected to a mechanism for positioning a flow-controlling gate.

40 Figure 2—is a diagrammatic view illustrating the operating mechanism and the electric circuit connecting the same.

45 Figure 3—is a plan view partly broken away illustrating the impulse-transmitting instrument.

50 Figure 4—is a side elevation of the instrument illustrated in Figure 3.

55 Figure 5—is an end view illustrating the three-arm cam switch and the contact fingers adapted to be engaged thereby.

60 Figure 6—is an enlarged end view showing the gear through which power is received and the upright shaft and spiral gears through which the power is transmitted to the cam-shaft.

65 Figure 7—is a detail sectional elevation of the mercury container.

70 To obviate difficulties experienced by the

use of contacts exposed to the corroding action of the air I have provided a device in which the contacts are mounted within a hermetically-sealed container, whereby it is impossible for oxidization to affect the terminals and prevent a perfect functioning of the means for making and breaking the circuit.

The following is a detailed description of one embodiment of my invention:—

75 With reference to the drawings, 10 designates the casing within which the electric impulse-transmitting mechanism is mounted, the same being provided with a base portion 11 on which is supported a
80 current distributor comprising an upwardly-extending bearing plate 12 which serves to receive the inner end of the cam-shaft 13 on which the three cams 14, 15 and 16 are mounted, which shaft receives its motion
85 from the gate-operating mechanism 18 through the driving gear 19, driven gear 20, short, upright shaft 21 and spiral gears 22 and 23.

90 On this base 11 are also mounted three upwardly-extending, spring-contact fingers 24, 25 and 26 of the distributor which fingers are positioned to contact with their respective cams 14, 15 and 16, the lower portion of each of these fingers being provided with
95 a binding post 27, 28 and 29 respectively, to which lead-wires 30, 31 and 32 are respectively connected.

100 A circuit-breaker, operating-shaft 33 receives its bearing at one end at 34 and at its opposite end in the upright plate 12. This shaft 33 is driven at a ratio of 3 to 1 with the cam-shaft 13 by means of gears 35 and 36 in order that the mercury circuit closer closes the circuit whenever
105 one of the cams closes the circuit. On the outer end of this breaker shaft is fixed a container member 37, the body of which is preferably formed of electrically-insulating material. This member is in tubular form
110 and is provided with a contracted center passageway or neck portion 38 between the two enlarged end chambers 39. The outer ends of these chambers are hermetically sealed, each with a glass disk 40 which is pressed tightly into place by the threaded collar 41.

Extending into this narrow neck portion from opposite sides are two spaced-apart, platinum terminal points 42, one be-

ing connected to the breaker shaft 33 and the other connected to the contact pin 43, the latter extending out in contact with the spring-pressed conductor finger 44 which is connected through the wire 45 to the binding post 46 and through the conductor block 47 and another binding post out through the wire 48, to complete the circuit hereinafter described.

In this container is a portion of mercury 49 which is rotated about the axis of the shaft 33 and when it is tipped up or inclined at a predetermined angle the mercury in the high side will run through the restricted passageway past the platinum points into the low side of the container and while passing these points will bridge the same and complete the electric circuit therethrough.

My improved electric circuit breaker above described may be employed in any electric circuit, but the same is herein shown as being in a circuit wherein a receiving or indicating instrument 50 is mounted in a distant receiving station to indicate the extent and direction of operation of the mechanism in the transmitting station where the circuit breaker is operating.

Any desired form of electrically-receiving instrument may be employed the one herein shown being provided with an armature or rotor 59 with armature strips 61 set approximately 60° apart while the electromagnets 56 and 57 and 58 are each set 80° apart. Therefore each time a magnet is energized the rotor to which the pointer finger is connected is pulled through an angle of 20°.

In this particular case herein illustrated the circuit breaker is applied to a valve operating mechanism in which the gate valve 51 is opened and closed to control the flow through the main by means of an electric motor 52 through pinion 53 and gear 18 operating on the screw 56, which motor is arranged to run in opposite directions by manipulation of the switch 54.

The operation is as follows:—

When the switch 59 is thrown to one position the motor 52 rotates the gear 18 to move the valve 51, and while rotating the gear 18, the small gear 19 which is attached thereto is also rotated, which in turn, through the pinion 20, rotates the cam-shaft 13 as above described and during the rotation of this shaft the cams are successively brought into contact with their respective fingers and as the circuit breaker shaft rotates the mercury container, the mercury in flowing back and forth from one end to the other thereof bridges the terminals 42 and completes the circuit intermittently through shaft 33, gears 35 and 36, cam-shaft 13, fingers and wires above described, and battery 55 thus energizing the three solenoids 56, 57 and 58, one at a time to rotate

the rotor 59 step by step and so move the indicator hand to indicate to the observer at this station both the direction and the extent of movement of the gate-valve 51.

By the use of my improved mercury circuit closing and opening member, the circuit is positively closed and opened to obtain exactly the required indicator operating impulse because when the container is tipped to a certain angle the globule of mercury flows from one end thereof to the other and in passing bridges the adjacent terminals thereby positively completing the circuit for a definite and limited period.

Then again by mounting these terminals in a hermetically sealed container they are protected from oxidizing or deteriorating and always remain in condition to insure proper and accurate functioning of the device.

The foregoing description is directed solely towards the construction illustrated, but I desire it to be understood that I reserve the privilege of resorting to all the mechanical changes to which the device is susceptible, the invention being defined and limited only by the terms of the appended claims.

I claim:

1. In a device as described, an electric circuit having a plurality of branches, a current distributor in said circuit for selectively completing the circuit through said branches, a circuit closer in the main portion of the circuit comprising a hermetically sealed chamber, terminals in said chamber, means in said chamber for bridging the terminals therein for a limited period of time, and means for operating said bridging means and said current distributor to selectively complete the circuit through one of said branches.

2. In a device as described, an electric circuit having a plurality of branches, a shaft, a series of contact members actuated by said shaft for selectively completing the circuit through said branches, a circuit closer in the main portion of the circuit comprising a chamber, terminals in said chamber, movable means for bridging said terminals in said chamber adapted to close the circuit through said terminals for a limited period of time, and means for operating said bridging means and said contact members simultaneously to complete the circuit through one of said branches.

3. In a device as described, an electric circuit having a plurality of branches, a current distributor in said circuit for selectively completing the circuit through said branches, means for operating the distributor, a circuit closer in the main portion of the circuit comprising a hermetically sealed chamber, terminals in said chamber, bridging means arranged in said chamber whereby said terminals may be bridged for

only a limited period of time when said bridging means is actuated, and means whereby said bridging means is actuated from the distributor operating means whenever the distributor is operated to close either one of the branch circuits.

4. In a device as described, an electric circuit having a plurality of branches, a shaft, a series of contact members actuated by said shaft for selectively completing the circuit through said branches, means for operating said shaft, a circuit closer in the main portion of the circuit comprising a chamber, terminals in said chamber, movable bridging means in said chamber adapted to close the circuit through said terminals for a limited period of time when actuated, and means whereby said bridging means is actuated from said shaft operating means when said contact members are operated to close any one of the branch circuits.

5. In a device as described, an electric circuit having a plurality of branches, an electromagnet in each of said branches, an indicator controlled by said magnets, a current distributor in said circuit for selectively completing the circuit through said branches to energize one of said magnets at a time, a circuit closer in the main portion of the circuit comprising a hermetically sealed chamber, terminals in said chamber, mercury in said chamber for bridging the terminals therein for a limited period of time, and means for operating said mercury and said current distributor to selectively complete the circuit through one of said branches to operate the indicator.

6. In a device as described, an electric circuit having a plurality of branches, an electromagnet in each of said branches, an indicator controlled by said electromagnets, a pair of shafts, one of said shafts having

a plurality of contact members thereon spaced around its periphery, a relatively stationary contact member in each of said branches engaging respectively with a contact member on the shaft, a container on the other shaft, mercury in said container, terminals in the container included in the main portion of the circuit, means operating said shafts in a definite relation whereby the mercury bridges said terminals each time one of the plurality of branch circuits is closed through said contacts.

7. In a device as described, an electric circuit having a plurality of branches, an electromagnet in each of said branches, an indicator controlled by said electromagnets, a pair of shafts, one of said shafts having a plurality of contact members thereon spaced around its periphery, a plurality of relatively stationary contact members engaging respectively with the contact members on the shaft, each branch circuit including a stationary contact member and its respective contact member on the shaft, a mercury container on the other shaft, contact members in the container included in the main portion of the circuit cooperating with the mercury in the container to bridge said contacts, the arrangement of the contacts and the mercury in the container being such that when the container is moved to a certain position the mercury will bridge the contacts for a limited period, and means for rotating both shafts, said means including means for so rotating the last mentioned shaft whereby the mercury will temporarily close the main portion of the circuit whenever either branch is closed by its corresponding contact members.

In testimony whereof I affix my signature.

FREDERICK N. CONNET.