

Aug. 10, 1943.

H. F. OBERGFELL

2,326,388

IMPULSE TRANSMITTING DEVICE

Filed Nov. 2, 1940

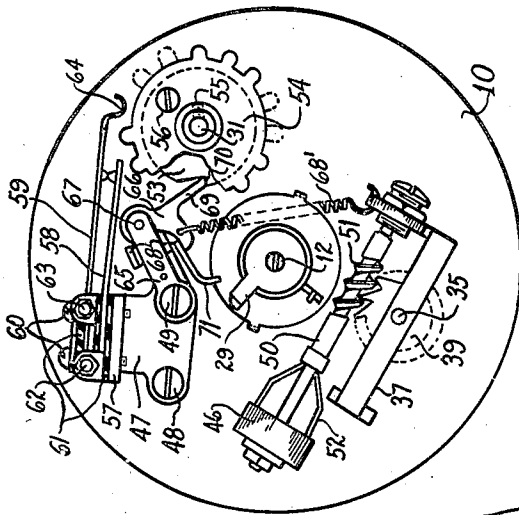


Fig. 3

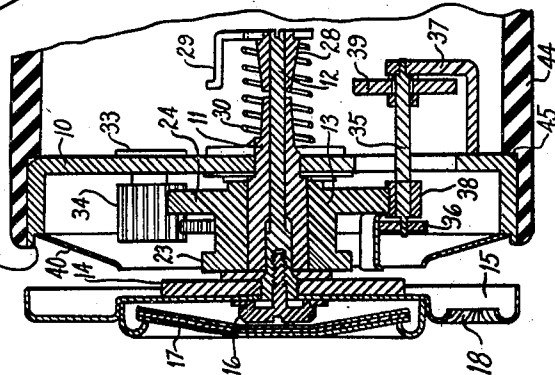


Fig. 2

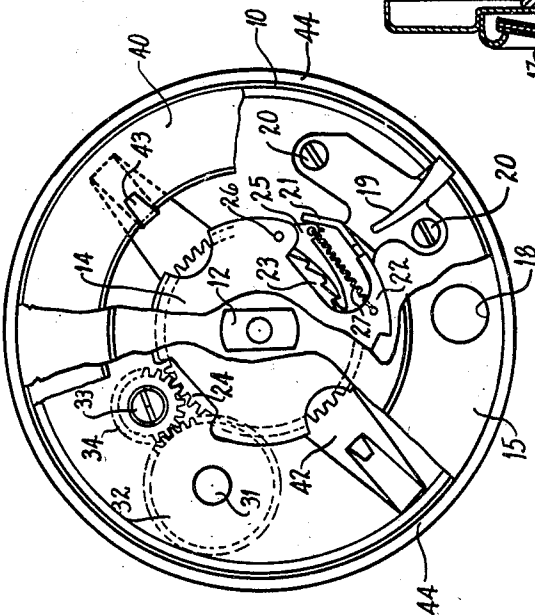


Fig. 1

INVENTORS
HERBERT F. OBERGFELL
HANS SENGEBUSCH
BY
Davis, Lindsey, Smith & Shonts
ATTORNEYS

UNITED STATES PATENT OFFICE

2,326,388

IMPULSE TRANSMITTING DEVICE

Herbert F. Obergfell, River Forest, and Hans Sengebusch, Villa Park, Ill., assignors to Associated Electric Laboratories, Inc., Chicago, Ill., a corporation of Delaware

Application November 2, 1940, Serial No. 364,040

2 Claims. (Cl. 177—380)

The present invention relates to impulse transmitting devices of the type employed in code signaling systems.

Code signaling systems conventionally comprise impulse transmitting devices of special and complicated construction in order to send the various code signals thereover.

Accordingly, it is an object of the present invention to provide an improved impulse transmitting device adapted for use in code signaling systems, which is of the general construction and arrangement conventionally employed in automatic telephone systems and which is of simple and rugged construction.

Another object of the invention is to provide an improved impulse transmitting device of the finger-dial type which comprises an arrangement for positively preventing false or incomplete operation thereof.

The objects set forth above are attained in accordance with the present invention by providing an impulse transmitting device comprising a rotatable shaft, a finger-operated dial carried by the shaft and operative to rotate the shaft in one direction, a spring motor, an operative connection between the shaft and the spring motor, whereby the spring motor is wound when the shaft is rotated in the one direction and the shaft is rotated in the opposite direction when the spring motor is unwound, an impulse wheel and a one-way drive connection between the shaft and the impulse wheel, whereby the impulse wheel is rotated when the shaft is rotated in the opposite direction. Also, the device comprises means including a normally set latch for locking the impulse wheel against rotation and means controlled in response to a fixed predetermined rotation of the shaft corresponding to a full winding of the spring motor for releasing the latch, thereby to unlock the impulse wheel for rotation.

More particularly, the arrangement for positively preventing false or incomplete operation of the device comprises a movable latch carried in guided relationship with respect to the impulse wheel, a cooperating shoulder carried by the impulse wheel, resilient means for urging the latch into engagement with the shoulder, thereby normally to lock the impulse wheel against rotation, and a trip carried by the shaft and cooperating with the latch, whereby the trip is operative to disengage the latch from the shoulder when the shaft is rotated a fixed predetermined amount corresponding to a full winding

of the spring motor, thereby to unlock the impulse wheel for rotation.

Further features of the invention pertain to the particular construction and arrangement of the elements of the impulse transmitting device, whereby the above-outlined and additional operating features are attained.

The novel features believed to be characteristic of the invention are set forth with particularity in the appended claims. The invention, both as to its organization and method of operation, together with further objects and advantages thereof, will best be understood by reference to the following specification taken in connection with the accompanying drawing, in which Figure 1 is a fragmentary front view of an impulse transmitting device embodying the present invention; Fig. 2 is a fragmentary side elevational view, partly in section, of the impulse transmitting device shown in Fig. 1; and Fig. 3 is a rear view, partly broken away, of the impulse transmitting device.

Referring now more particularly to Figs. 1 to 3, inclusive, of the drawing, the impulse transmitting device there illustrated comprises a substantially cup-shaped casing 10 having a centrally disposed opening in the bottom wall thereof, in which a tubular supporting column 11 is rigidly affixed. A rotatable driving shaft 12 is suitably journaled interiorly of the supporting column 11; while a rotatable bushing 13 is suitably journaled exteriorly of the supporting column 11. The outer end of the driving shaft 12 has a substantially rectangular head thereon which is received in aligned openings provided in a stop cam 14 and a finger dial 15, the finger dial 15 being arranged exteriorly of the stop cam 14, and both the stop cam 14 and the finger dial 15 being securely fastened to the head of the driving shaft 12 by a screw 16. The finger dial 15 has a substantially cup-shaped recess centrally disposed therein, which receives an escutcheon plate 17 which covers the screw 16. Also, a finger receiving recess 18 is provided in the finger dial 15 in cooperating relationship with respect to a finger stop 19 secured to the bottom wall of the casing 10 by two screws 20. Further, the finger stop 19 comprises an upstanding stop portion 21 which cooperates with oppositely disposed shoulders provided on a lug 22 carried by the stop cam 14.

The bushing 13 comprises a ratchet wheel 23 and a driving gear 24 arranged in spaced-apart relationship longitudinally of the axis thereof. A pawl 25 is pivotally mounted upon a pivot pin 26 carried by the stop cam 14 and arranged in

cooperating relationship with respect to the ratchet wheel 23. The pawl 25 is biased in a clockwise direction, as viewed in Fig. 1, about the pivot pin 26, toward the ratchet wheel 23 by a coil spring 27 extending between the pawl 25 and the lug 22. The inner end of the driving shaft 12 carries a head 28 which supports a trip 29 which is utilized for a purpose more fully explained hereinafter. Also, a spring motor in the form of a coil spring 30 is provided, which surrounds the driving shaft 12, one end of the coil spring 30 being affixed to the bushing 13 and the other end of the coil spring 30 being affixed to the head 28.

Also, a rotatable driven shaft 31 is suitably journaled in the bottom wall of the casing 10 and has a driven gear 32 rigidly affixed thereto. Further, a pin 33 is rigidly affixed in an opening provided in the bottom wall of the casing 10 and carries a transmission gear 34 journaled thereon, the transmission gear 34 being meshed with both the driving gear 24 and the driven gear 32, for a purpose more fully explained hereinafter. Further, a spindle 35 is suitably journaled in two brackets 36 and 37 carried by the bottom wall of the casing 10, the spindle 35 extending through an opening provided in the bottom wall of the casing 10. One end of the spindle 35 has a pinion 38 rigidly affixed thereto which is arranged in meshing relationship with respect to the driving gear 24; and the other end of the spindle 35 carries a worm gear 39 which is utilized for a purpose more fully explained hereinafter.

The elements of the impulse transmitting device disposed within the cup-shaped casing 10 are partially enclosed by a substantially dish-shaped cover plate 40 extending from the periphery of the outer wall of the casing 10 inwardly below the finger dial 15, the outer marginal edge of the cover plate 40 being disposed in an annular recess 41 provided in the edge of the outer wall of the casing 10. The cover plate 40 is secured in place by a snap bracket 42 carried by the bottom wall of the casing 10 and provided with resilient fingers 43 which receive the inner marginal edge of the cover plate 40. Also, the casing 10 is carried by a substantially cup-shaped housing 44 formed of insulating material, the outer wall of the casing 10 being disposed in an annular recess 45 provided in the outer wall of the housing 44.

It is noted that the outer surface of the bottom wall of the casing 10 carries, in addition to the bracket 37, the housing 46 of a speed governor and a supporting bracket 47, the supporting bracket 47 being secured to the bottom wall of the casing 10 by two screws 48 and 49. The speed governor comprises, in addition to the housing 46, a rotatable shaft 50 suitably journaled in the housing 46 and in the bracket 37. The shaft 50 carries a worm 51 arranged in meshing relationship with respect to the worm gear 39 and a plurality of weighted friction arms 52 extending within the housing 46.

The outer end of the driven shaft 31 has rigidly affixed thereto an impulse wheel including a supporting base 53 and a toothed cam 54, the supporting base 53 being rigidly affixed to the outer end of the driven shaft 31 by a set screw 55 and the toothed cam 54 being removably secured to the supporting base 53 by a screw 56. Preferably, the toothed cam 54 is formed of a fibrous insulating material, whereby the teeth

carried thereby may be readily broken off for a purpose more fully explained hereinafter.

The supporting bracket 47 is provided with an upstanding flange 57 to which there are secured a stationary contact spring 58 and a movable contact spring 59 by two screws 60, the contact springs 58 and 59 being suitably insulated from each other and from the flange 57 by a number of intervening layers of insulating material 61. Also, the contact springs 58 and 59 respectively carry two terminals 62 and 63 which extend through two openings provided in the bottom wall, not shown, of the housing 44 in order to facilitate connection of the contact springs 58 and 59 to an external circuit. The movable contact spring 59 is biased due to its resiliency toward the stationary contact spring 58 in order normally to engage the pair of contacts carried by the contact springs 58 and 59. Also, the movable contact spring 59 is provided with an operating head 64 disposed in cooperating relationship with respect to the teeth carried by the cam 54.

A compound latch is pivotally mounted upon the supporting bracket 47 and comprises two spaced-apart members forming a first link 65 and an intermediate link 66, one end of the link 65 being pivoted upon the screw 49 and the other end of the link 65 being pivoted to the link 66 by a pivot pin 67. Also, the supporting bracket 47 carries two spaced-apart stops 68 disposed on opposite sides of the link 65. The link 65 is biased in a clockwise direction about the screw 49 and the link 66 is biased in a counterclockwise direction about the pivot pin 67 by an arrangement including a coil spring 68', one end of the coil spring 68' being affixed to the bracket 37 and the other end of the coil spring 68' being affixed to the link 66. Further, the link 66 carries an operating finger 69 which is normally disposed to engage a shoulder 70 provided by a notch formed in the supporting base 53 of the impulse wheel. Finally, the link 66 carries a tripping finger 71 arranged in cooperating relationship with respect to the trip 29.

Considering now the operation of the impulse transmitting device, it is noted that it is operative to transmit a fixed predetermined code, depending upon the arrangement of the teeth carried by the cam 54. When the impulse transmitting device is initially installed at a given signaling station, appropriate ones of the teeth carried by the cam 54 are broken off in order to form a code individual and corresponding to the given signaling station. More particularly, the teeth carried by the cam 54 are broken off to provide a plurality of clusters of teeth corresponding to the desired code, each cluster of teeth comprising either two or three adjacent teeth, and the adjacent clusters of teeth being separated by the space formerly occupied by two teeth broken off. Thus, it will be readily appreciated that a relatively large number of combinations of teeth clusters, each cluster of teeth comprising either two or three teeth, may be provided from the simple cam 54 having originally only a relatively few teeth.

In order to cause the impulse transmitting device to transmit a code, the user inserts his finger into the finger receiving recess 18 provided in the finger dial 15 and rotates the finger dial 15 almost one complete revolution in a clockwise direction, as viewed in Fig. 1. It is noted that the normal position of the finger dial 15 is established by the engagement between the stop portion 21 of

the finger stop 19 and one of the shoulders provided on the lug 22 carried by the stop cam 14; similarly, the final operated position of the finger dial 15 is established by the engagement between the stop portion 21 of the finger stop 19 and the other of the shoulders provided on the lug 22 carried by the stop cam 14. As the finger dial 15 is rotated in a clockwise direction the driving shaft 12 to which it is rigidly secured is also rotated in the clockwise direction; thereby to wind the coil spring 30. As previously noted, when the finger dial 15 is rotated in the clockwise direction, the stop cam 14 is rotated therewith, whereupon the pawl 25 pivotally mounted on the stop cam 14 slides over the teeth provided on the ratchet wheel 23. Accordingly, as the finger dial 15, the stop cam 14 and the driving shaft 12 are rotated in the clockwise direction, there is no tendency for the ratchet wheel 23 to be rotated away from its normal position as the pawl 25 slides over the teeth provided thereon, as previously noted.

It is pointed out that, when the finger dial 15 is rotated in the clockwise direction away from its normal position, in order to wind the coil spring 30, it must be fully operated to its final position in the clockwise direction in order fully to wind the coil spring 30 before it may be released for return movement in the counterclockwise direction back into its normal position due to the arrangement of the latch comprising the links 65 and 66 and the cooperating shoulder 70 provided on the supporting base 53 of the impulse wheel, as will appear more fully hereinafter.

Referring now more particularly to the rear view of the impulse transmitting device shown in Fig. 3, it is noted that the coil spring 30 tends to rotate the driven shaft 31 and, consequently, the supporting base 53 of the impulse wheel in a clockwise direction when the coil spring 30 is even partially wound and the finger dial 15 is released. However, the engagement between the operating finger 69 carried by the link 66 of the latch and the shoulder 70 provided on the supporting base 53 of the impulse wheel positively prevents rotation of the impulse wheel. However, when the finger dial 15 has been rotated almost one complete revolution in the counterclockwise direction, as viewed in Fig. 3, thereby to cause the coil spring 30 to be fully wound, the trip 23 carried by the driving shaft 12 engages the tripping finger 71 carried by the link 66 of the latch, whereupon the link 66 is rotated in a clockwise direction about the pivot pin 67 against the bias of the coil spring 68' in order to cause the operating finger 69 carried by the link 66 to disengage the shoulder 70 provided on the supporting base 53 of the impulse wheel. When the operating finger 69 disengages the shoulder 70, the link 65 is rotated in a clockwise direction about the screw 49 by the coil spring 68', whereby the link 66 is moved therewith so that the operating finger 69 cannot reengage the shoulder 70 prior to full rotation of the impulse wheel. Thus, the impulse wheel is unlatched and the driven shaft 31 is free to be driven in the clockwise direction. As the driven shaft 31 is rotated in the clockwise direction, the teeth carried by the cam 54 alternately engage and disengage the operating head 54 of the movable contact spring 58, whereby the pair of contacts carried by the contact springs 58 and 59 are controlled in accordance with the code on the cam 54 in order to cause the impulse transmitting device to send from the associated signaling sta-

tion the individual code over the external signaling circuit.

Considering now Figs. 1 and 2 of the drawing after the finger dial 15 has been rotated in the clockwise direction, in order to cause the coil spring 30 to be fully wound and to cause the latch arrangement associated with the impulse wheel to be tripped, and the finger dial 15 has been released, the coil spring 30 is unwound due to its resiliency. As the coil spring 30 is unwound the driving shaft 12, the stop cam 14 and the finger dial 15 are rotated in the counterclockwise direction back into their normal positions. When the stop cam 14 is rotated in the counterclockwise direction the pawl 25 carried thereby engages an associated one of the teeth provided on the ratchet wheel 23 and hangs thereon, whereby the bushing 13 is rotated in the counterclockwise direction with the driving shaft 12. When the bushing 13 is driven in the counterclockwise direction the driving gear 24 carried thereby rotates the transmission gear 34 meshing therewith in the clockwise direction. When the transmission gear 34 is driven in the clockwise direction the driven gear 32 meshing therewith is rotated in the counterclockwise direction thereby to drive the driven shaft 31 in the counterclockwise direction in order to cause operation of the impulse wheel, in the manner previously explained. Reconsidering Fig. 2 of the drawing, it is noted that, when the bushing 13 is driven in the counterclockwise direction, the pinion 33 meshing therewith is rotated in the clockwise direction, thereby to cause rotation of the spindle 35 in the clockwise direction. Referring now to the rear view of the impulse transmitting device shown in Fig. 3 of the drawing, when the spindle 35 is rotated in the counterclockwise direction the worm gear 39 carried thereby rotates the worm 51 and the shaft 50 to which the worm 51 is affixed in the counterclockwise direction, thereby to cause the weighted arms 52 carried by the shaft 50 to be thrown outwardly into frictional engagement with the interior of the governor housing 46, whereby the speed of rotation of the various rotatable parts is established. This arrangement causes rotation of the impulse wheel at a substantially constant speed, thereby to establish the rate at which the impulse transmitting device is operative to transmit the code therefrom.

While there has been described what is at present considered to be the preferred embodiment of the invention, it will be understood that various modifications may be made therein, and it is intended to cover in the appended claims all such modifications as fall within the true spirit and scope of the invention.

What is claimed is:

1. An impulse transmitting device comprising a rotatable shaft, a finger-operated dial carried by said shaft and operative to rotate said shaft in one direction, a spring motor, an operating connection between said shaft and said spring motor, whereby said spring motor is wound when said shaft is rotated in said one direction and said shaft is rotated in the opposite direction when said spring motor is unwound, an impulse wheel, a one-way drive connection between said shaft and said impulse wheel, whereby said impulse wheel is rotated when said shaft is rotated only in said opposite direction, a support, a first link pivotally mounted on said support, a second link pivotally mounted on said first link, a co-

operating shoulder carried by said impulse wheel, resilient means for biasing said second link into engagement with said shoulder, thereby to latch said impulse wheel against rotation and to prevent rotation of said shaft in said opposite direction, and a trip carried by said shaft and cooperating with said said second link, whereby said trip is operative to disengage said second link from said shoulder when said shaft is rotated a fixed predetermined amount in said one direction corresponding to a full winding of said spring motor, thereby to unlatch said impulse wheel for rotation and to permit rotation of said shaft in said opposite direction, said resilient means being operative to move said second link about its pivot when said second link disengages said shoulder, thereby positively to prevent said second link from reengaging said shoulder prior to full rotation of said impulse wheel.

2. An impulse transmitting device comprising a rotatable shaft, a finger-operated dial carried by said shaft and operative to rotate said shaft in one direction, a spring motor, an operating connection between said shaft and said spring motor, whereby said spring motor is wound when said shaft is rotated in said one direction and said shaft is rotated in the opposite direction when said spring motor is unwound, an impulse wheel, a one-way drive connection between said shaft and said impulse wheel, whereby said impulse wheel is rotated when said shaft is rotated only in said opposite direction, a supporting plate, a movable contact control spring carried

by said supporting plate in cooperating relationship with respect to said impulse wheel, a first link pivotally mounted at its inner end on said supporting plate, a second link pivotally mounted at its inner end on the outer end of said first link, a cooperating shoulder carried by said impulse wheel, resilient means for biasing said first link about its pivotally mounted inner end and for biasing said second link about its pivotally mounted inner end in order to cause the outer end thereof to engage said shoulder, thereby to latch said impulse wheel against rotation and to prevent rotation of said shaft in said opposite direction, and a trip carried by said shaft and cooperating with said second link, whereby said trip is operative to move said second link about its pivotally mounted inner end against the bias of said resilient means in order to cause the outer end thereof to disengage said shoulder when said shaft is rotated a fixed predetermined amount in said one direction corresponding to a full winding of said spring motor, thereby to unlatch said impulse wheel for rotation and to permit rotation of said shaft in said opposite direction, said resilient means being operative to move said first link about its pivotally mounted inner end when the outer end of said second link disengages said shoulder, thereby positively to prevent the outer end of said second link from reengaging said shoulder prior to full rotation of said impulse wheel.

HERBERT F. OBERGFELL.
HANS SENGEBUSCH.

CERTIFICATE OF CORRECTION.

Patent No. 2,326,388.

August 10, 1943.

HERBERT F. OBERGFELL, ET AL.

It is hereby certified that error appears in the above numbered patent requiring correction as follows: In the heading to the drawing, for "H. F. OBERGFELL" read --H. F. OBERGFELLE ET AL--; page 3, second column, line 72, and page 4, first column, line 31, after "rotated" insert --only--; page 3, second column, line 73 and page 4, first column, line 32, strike out "only"; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 5th day of October, A. D. 1943.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.