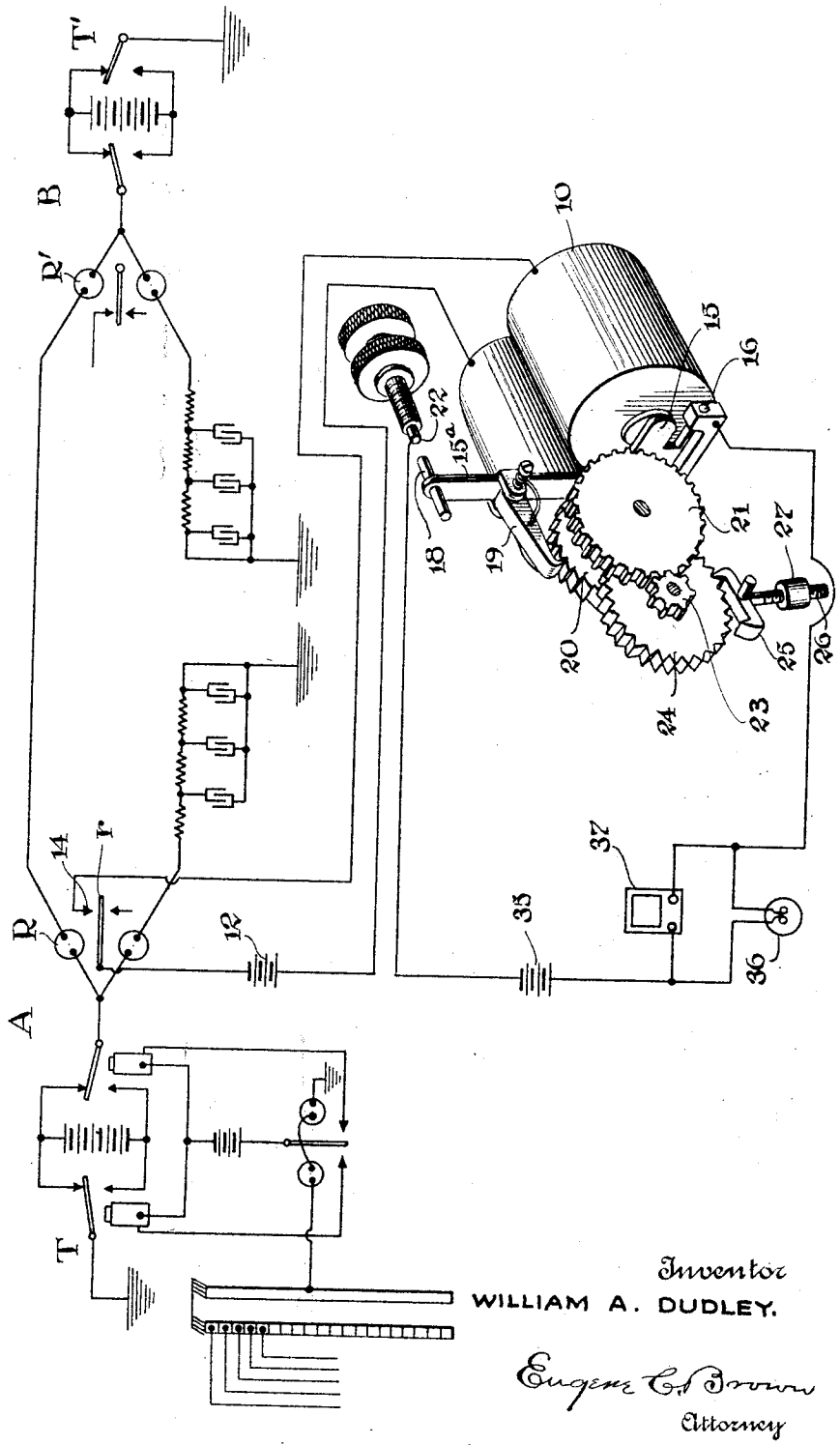
Feb. 12, 1929. 1,702,204

W. A. DUDLEY

SELECTIVE SIGNALING DEVICE FOR TELEGRAPH CIRCUITS

Filed July 12, 1923 2 Sheets-Sheet 1

Fig. 1.



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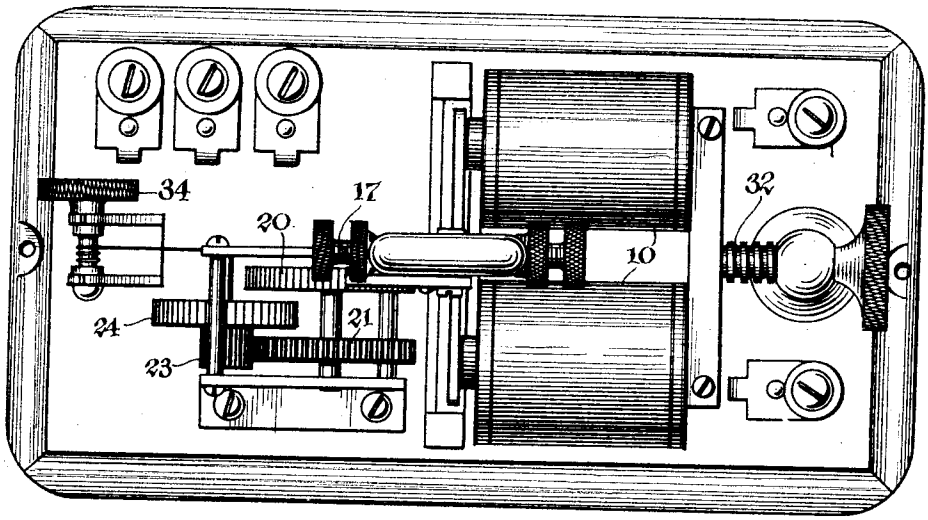


Fig. 2.

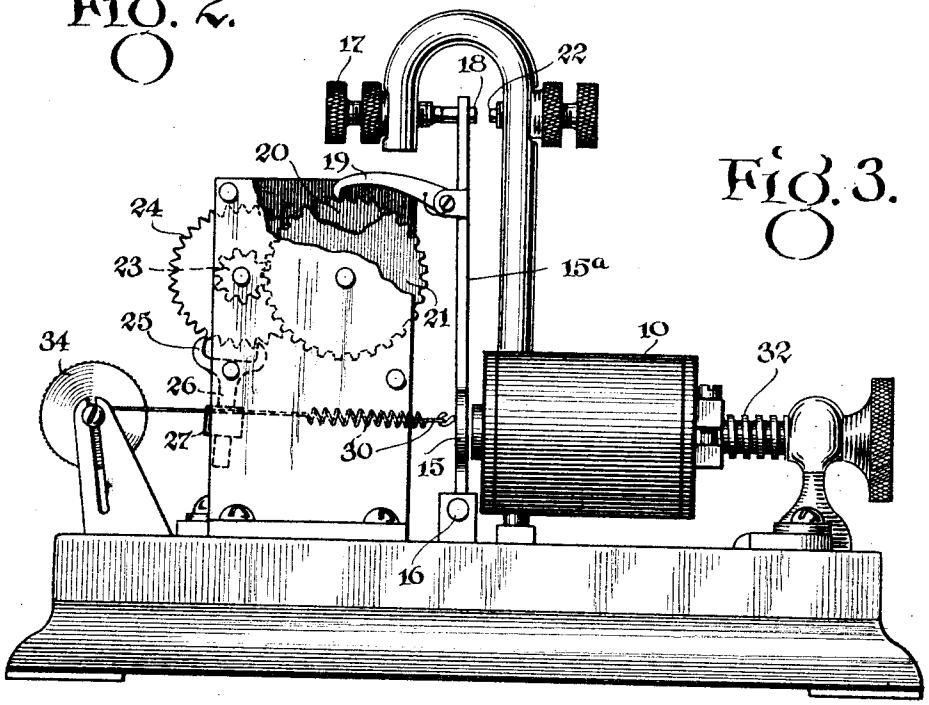


Fig. 3.

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UNITED STATES PATENT OFFICE.

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SELECTIVE-SIGNALING DEVICE FOR TELEGRAPH CIRCUITS.

Application filed July 12, 1923. Serial No. 651,130.

This invention relates to signaling or calling devices for attracting the attention of an attendant at a telegraph station.

On long telegraph circuits the signals are regenerated at intervals by means of repeating instruments. The repeaters operate automatically and hence the attendant is not required to be near the instrument except when testing or adjusting the circuit. It is desirable, therefore, to provide at the repeater stations, some form of visual or audible means of calling in the attendant when he is wanted.

Any device of this nature must necessarily be operated from a line signal sent from a distant station but at the same time it must not respond to the normal line impulses of a working circuit. The frequency of line signals in multiplex operation, varies from sixty cycles for a four channel circuit working at sixty words per minute, to three cycles for a two channel circuit sending merely spacing impulses on both channels, i. e., both channels being idle. This lower limit may even be decreased to one and a half cycles per second, as is the case when one channel of a two channel circuit is sending "letters", i. e., all marking impulses, while the other channel is idle or merely sending spacing impulses.

It is necessary, therefore, that the selective signaling or calling device shall remain inoperative on all line signals which occur at a frequency of one and one half cycles per second or greater.

The object of my invention is to provide a selective signaling or calling device which shall only respond to current impulses having a length or duration greater than the minimum line frequency. A further object is to provide a device of staunch construction having no delicate mechanism subject to rapid wear or liable to get out of order and which may be readily adjusted to vary the time lag or degree of retardation.

In the accompanying drawings, Figure 1 is a diagrammatic view illustrating a telegraph circuit equipped for multiplex operation and provided with a signaling or calling device embodying my invention; Figs. 2 and 3 are respectively a top plan view and side elevation of the signaling relay provided with a time lag mechanism.

The conventional illustration of the multiplex transmitting equipment T, T′ at stations A and B, and the receiving line relays R, R′ at each end of the line, arranged for duplex operation will be apparent to telegraph engineers without further description.

I have shown my selective signaling or calling device connected to the armature of the line relay R at station A. The signaling relay 10 is actuated by a local battery 12 and controlled by the armature r of the line relay. The armature swings against its contact 14 whenever a marking impulse is sent from the distant station B, thus closing the local circuit of the battery 12 and energizing the coils of the relay 10, but the circuit is broken before the armature 15 can respond owing to the time-lag retarding mechanism.

The armature is pivoted at 16 and is provided with an upwardly extending arm 15^a carrying a contact 18. A pawl 19 carried by the arm 15^a engages a ratchet 20 which is connected to the gear 21 and the latter meshes with a pinion 23. The pinion is carried by a ratchet 24 which is controlled by an escapement 25 having a pendulum arm 26 threaded to receive a nut 27 acting as an adjustable weight.

The armature is normally held in retracted position by the spring 30. When the relay is energized the pull or magnetic attraction exerted on the armature causes the pawl 19 to exert a torque tending to rotate the ratchet and gear mechanism. The speed of rotation is determined by the escapement governor 25, the effect of which may be altered by adjusting the threaded weight 27 along the stem 26. In this manner the time required for the armature to move from its retracted to its attracted position is determined. The time-lag or length of time required for the armature contact 18 to move from the back stop 17 to the front contact 22 may be determined with great accuracy. It depends upon (1) the ratio of teeth in the pinion and the gear, (2) the length of armature travel, (3) the strength of the magnet, (4) the length of the air-gap between the armature and the pole-pieces, (5) the strength of the retractile spring, and (6) the position and magnitude of the weight on the escapement arm.

The gear ratio and magnet strength are constants fixed by design and by the resistance of the electric circuit, but the other elements are adjustable. The thumb screw 32 controls the length of the magnetic air gap. The back stop 17 regulates the length of armature travel. The position of the knurled

knob 34 adjusts the tension of the retractile spring 30. The position of the pendulum weight 27 on the stem 26, can be adjusted and one weight may be substituted for another to vary the period of oscillation of the escapement 25.

The operation of my selective calling device will be evident from the foregoing detailed description of the structural parts. As long as the line is being operated normally in the transmission of telegraph characters, the calling device will not function owing to the delayed action of the signaling relay 10, but when the operator at station B sends a prolonged impulse over the line the armature r of the line relay R will remain against its front contact 14 until the retarding gear mechanism has rotated sufficiently to permit the armature 15 to move the contact 18 against the contact 22, thereby closing the circuit of battery 35 and causing the lamp 36 to light and the buzzer 37 to sound.

The time-lag or retarding mechanism disclosed herein is peculiarly adapted to be used in a calling or signaling device. There is no delicate mechanism and practically nothing to get out out of order and consequently, it will always be ready to respond even though it may be operated quite infrequently. The several adjustments which may be made enable the attendant to adjust the device with great accuracy to respond to a predetermined frequency or period. The pendulum controlled escapement causes the retarding mechanism to operate with uniformity throughout the entire retardation period.

By arranging the pendulum stem 26 so that it depends vertically from the pivot it has a natural period of oscillation upon either side of the vertical axis which may be varied by adjusting the distance of the weight 27 from the pivot. It will be observed that this is not merely a weighted escapement. This regular pendulum swinging movement produces a steady uniform retarding effect upon the armature. The magnetic pull on the armature operates through the pawl 19 and the gearing to start the oscillation of the pendulum, which thereupon serves as a governor for the movement of the gears. This pull exerted by the magnet tends to cause a forced oscillation of the pendulum greater than its natural period and thus to interfere with its uniform oscillation. I therefore provide adjusting means 34 to accurately adjust the tension of the retractile spring 30 which exerts a pull counter to the magnetic pull. I am thus enabled to adjust this counter pull of the spring proportionately to the rates of oscillation of the pendulum which are determined by the distances of the weight from the pivot. By thus controlling the relationship between the counter force exerted by the spring opposing the magnetic pull and the natural oscillation periods of the pendulum determined by the position of the weight, I am enabled to provide a slow acting relay having a long predetermined period and operating with uniformity over the entire period.

I claim:—

1. A selective slow-acting relay, comprising an electro-magnet having an armature, a retractile spring connected thereto and opposing the pull of the magnet, a gear train provided with a ratchet wheel and with an escapement, a pawl carried by said armature and engaging a tooth of said ratchet when the armature is attracted, a stem depending centrally and vertically from the pivot of said escapement to thereby constitute a pendulum and provided with a weight adjustable thereon to vary the oscillatory period thereof and thereby control the movements of the escapement, and means to graduate the tension of the retractile spring to adjust its retarding force and vary it in accordance with the changes in the oscillatory periods of said pendulum.

2. A selective slow-acting relay, comprising an electro-magnet having an armature, a gear train provided with a ratchet and with an escapement, a pawl carried by said armature and engaging a tooth of said ratchet when the armature is attracted, a pendulum secured to said escapement and depending vertically so that it may swing to and fro through the vertical axis through the pivot thereof, a weight adjustable on the pendulum to vary the oscillatory period thereof and thereby control the movements of said escapement, a retractile spring opposing the pull of the magnet and means for varying the opposing pull of said spring.

In testimony whereof I affix my signature.

WILLIAM A. DUDLEY.