Sept. 24, 1946. F. A. STEARN 2,408,106

DROP SIGNAL WITH VIBRATION LOCK

Filed May 26, 1944

Fig. 1.

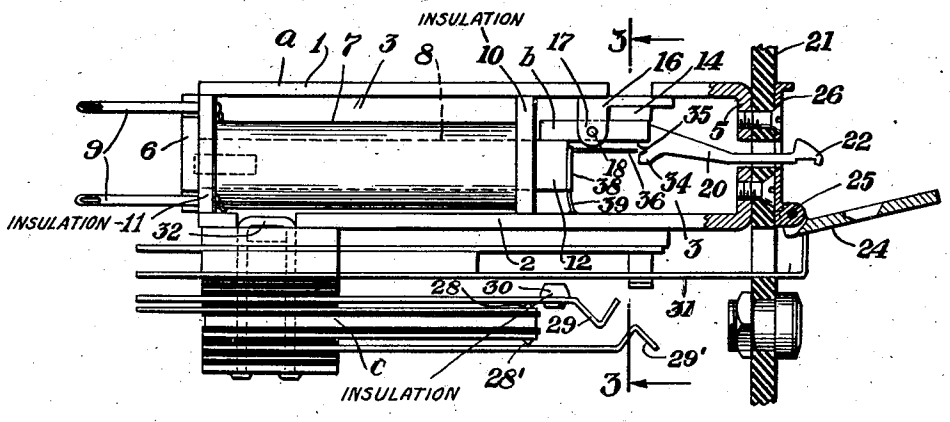


Fig. 2.

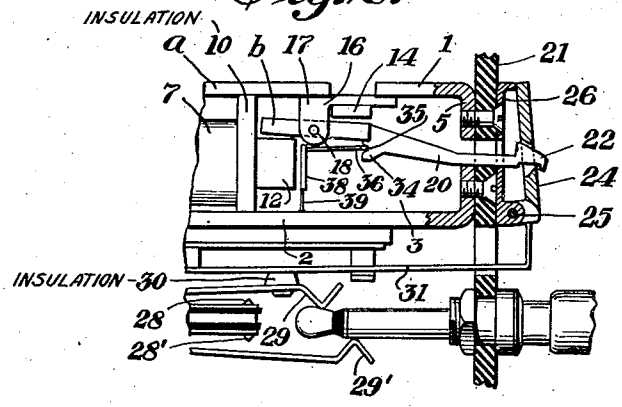
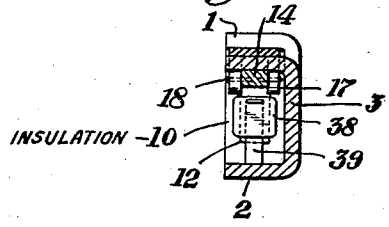


Fig. 3.



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Patented Sept. 24, 1946 2,408,106

UNITED STATES PATENT OFFICE

2,408,106

DROP SIGNAL WITH VIBRATION LOCK

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Application May 26, 1944, Serial No. 537,518

6 Claims. (Cl. 177—329)

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This invention relates to improvements in a drop signal device of the type customarily employed in conjunction with manually operated switchboards of telephone systems. It comprises an improved design and structural arrangement including a special provision operating to prevent non-impulse releasing of the signal drop due to vibration. As a result it eliminates danger of and the annoyance of improper signalling to the operator.

The improved features of the invention are desirably incorporated in a combined magnet controlled drop and restoring jack arrangement wherein the signal drop is restored to its non-busy line position by the insertion of the usual line plug connection in the usual arrangement wherein the plug restores the drop, completes the line extension circuit and disconnects the magnet or signal circuit as it is moved into position. As is well known, in the equipment of this type as customarily employed and particularly after an extended period of use the delicate adjustment of the latch, as a result of wear and resulting changes in alignment, tends to become insecure in the holding arrangements of the drops with the result that certain of the drops may release in response to vibration as a result of which improper signals are conveyed. In accordance with the present invention this objectionable factor is overcome by the provision of a supplemental locking means having a retaining finger engagement with the latch hook in a manner to prevent vibration from raising the hook to such elevation that the shutter will be released. It is further arranged that the locking feature or detent shall be under the control of and released by the signalling current for which purpose it is provided with a supplemental armature to be moved thereby into non-locking position responsive to energizing of the magnet coil of the signal circuit.

The described and other features and advantages of the present improvements will be more fully understood by reference to the accompanying drawing wherein like reference characters are applied to the corresponding parts in the several views:

In the drawing:

Fig. 1 is a view in side elevation showing the parts in signal position with the magnet energized.

Fig. 2 is a similar view showing the parts in the restored position with the magnet de-energized.

Fig. 3 is a vertical sectional view taken on line 3—3 of Fig. 1.

In the preferred embodiment of the invention

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as herein disclosed the features thereof are shown incorporated in an improved combined magnet controlled drop and jack construction wherein the latch or drop retaining hook, as customarily employed is moved by an armature fulcrumed forwardly of the magnet structure with the latter providing a double pole piece arrangement coacting uni-directionally with the armature on the opposite sides of its fulcrum. In the structure as shown *a* indicates the usual magnet supporting frame of open sided channel formation having the upper and lower walls 1 and 2, a vertical side wall 3 and inturned walls 5 and 6. Within the rearward portion of the frame there is supported the usual magnet coil 7 provided with the central core 8 and having the rearwardly extended connectors 9 for the signal circuit leads. The magnet is supported by the insulating washers 10 and 11 and as shown the core is forwardly extended to provide the pole piece 12 in suitable forwardly extended relation to the magnet. The frame has a portion of its upper wall severed and downwardly deflected to provide a lip flange and forward pole piece 14. This pole piece 14 provides a support for a flat body, bearing piece 16 assembled therewith from the open side of the frame and resiliently securing the bearing piece in position while allowing horizontal adjustment thereof. The bearing piece 16 at its rearward portion is formed with downturned ears 17 apertured to receive a bearing pin 18. The pin 18 is positioned intermediate of the pole pieces 12 and 14 and the armature *b* is fulcrumed thereon to extend forwardly and rearwardly for coaction with the pole pieces 14 and 12 to have normal, de-energized air gap relation. The armature has integrally formed therewith the forward latch or hook extension 20, which in the standard arrangement projects forwardly through an opening in the frame and in the supporting panel 21 and is formed with the detent 22 for retaining engagement with the usual hinged drop shutter 24. As will be noted the armature arrangement provides a double air gap at opposite sides of its fulcrum for imparting a uni-directional rotative force or magnetic attraction. There results an improved mode of operation having high efficiency, the features thereof being more fully explained in a copending application Serial Number 537,510, filed May 26, 1944.

With the described magnet and armature controlled latching arrangement there is employed the customary hinged shutter 24 pivotally mounted at 25 upon a bearing pin carried by the mounting plate 26 attached to the panel 21 by

screws likewise retaining the frame unit in position. The shutter is formed with the usual opening to receive the latching detent 22 with the lower wall of the opening formed in the usual manner for cooperative latching engagement. To the underside of the frame member 1 there is attached the jack assembly C, as customarily employed, composed of the horizontally extending spring contacts of the signal circuit 28—28', line extension contacts 29—29' and the usual drop restoring spring 31 forwardly extended to engage with the shutter as shown. The restoring spring is engaged by an insulating button 30 on the upper extension line contact 29 to be elevated for closing of the shutter upon insertion of the line extension plug in the manner well known. The referred to contacts and restoring spring are as shown supported by insulating plates and the jack assembly is secured to the frame 1 by means of the inverted U bolt 32.

In accordance with the present invention there is associated with the foregoing structure, which in its general mode of operation conforms to standard construction, a special and cooperating locking detent arrangement operating in an improved manner to prevent the release of the shutter responsive to vibrations and otherwise than by proper signal current reception. To this end the armature latch element 20 is formed on its under side with a shoulder portion 34 having its rear face formed with a horizontal cross slot or recess 35 for the reception of a flat metal detent or locking piece 36 secured to a supplemental armature 38 vertically positioned in alignment with and in normal close spaced relation to the central pole piece 12. This supplemental armature is mounted upon a flat spring metal support 39 secured to the lower wall 2 of the frame. In its structural arrangement the detent piece 36 and the resilient support 39 may be formed integrally of angular formation and secured within a groove in the armature 38 by being welded thereto.

The relative position of the detent 36 and the recess 35 is such that they will register and the detent end portion will be received within the recess when the hook or latch is in its lowered or retaining position. It will when in this position, as shown in Fig. 2 and with the magnet de-energized, retain the hook from elevating responsive to vibration. Upon energizing of the magnet responsive to line signal, the supplemental armature 38 will be attracted to pole piece 12 thereby to withdraw the detent from the recess 35 and to permit release of the drop as will be readily understood. The proportioning of the spring mounting 39 for the armature 38 is such as to permit this releasing operation to occur by its yielding responsive to the pull of the magnet as is shown in Fig. 1.

The improved arrangement as thus provided, is simple and effective in insuring against improper release of the drops such as may be caused by vibration of the housing or accidental brushing against the panel face. Its arrangement, whereby it is electro-responsive in its releasing to the signal impulse further provides for its related operation in a manner to avoid maintenance adjustments as might otherwise be required for correct operation.

What is claimed is:

1. A drop signal comprising a pivotally supported drop shutter, a magnet, a movable armature latch element operatively coacting with the shutter to effect release of the shutter on energizing of the magnet and to lock the shutter when the magnet is de-energized and supplemental locking means operative normally to lock the movable armature and to effect release thereof responsive to energizing of the magnet.

2. A drop signal comprising a pivotally supported drop shutter, a magnet, a movable armature latch element coacting with the shutter to release the shutter on energizing of the magnet and to retain the shutter when the magnet is de-energized, a supplemental armature operatively associated with the magnet and a locking element normally engaging the armature latch element and connected to the supplemental armature to be moved thereby for release of the armature latch element on energizing of the magnet.

3. A drop signal comprising a pivotally supported drop shutter, a magnet, a movable armature latch element coacting with the shutter and operative to release the shutter on energizing of the magnet and to retain the shutter when the magnet is de-energized, a movably supported locking element normally engaging the armature latch element to prevent release movement thereof and a supplemental armature carried by the locking element and associated with the magnet whereby on energizing of the magnet said supplemental armature will retract the locking element for release of the armature latch element.

4. A drop signal comprising a pivotally supported drop shutter, a magnet, a movable armature latch element coacting with the shutter to release the shutter on energizing of the magnet and to retain the shutter when the magnet is de-energized, said latch element being provided with a recessed shoulder, a supplemental armature operatively associated with the magnet and a locking element normally engaging the armature latch within the recess and connected to the supplemental armature to be withdrawn from the recess for release of the armature latch element on energizing of the magnet.

5. A drop signal comprising a pivotally supported drop shutter, a magnet having a forwardly extending pole pivoted to be movable relative to a side face of the pole piece and an armature latch element operatively coacting with the shutter to release the shutter on energizing of the magnet and to retain the shutter when the magnet is de-energized and a supplemental armature movable relative to the end of the pole pieces and locking means connected therewith to operate normally to lock the movable armature and to effect release thereof responsive to magnet energizing.

6. A drop signal comprising a pivotally supported drop shutter, a magnet, a movable armature latch element pivotally supported forwardly of the magnet and coacting with the shutter to be operative to release the shutter on energizing of the magnet and to retain the shutter when the magnet is de-energized, said armature latch element being formed with a depending shoulder having a rearwardly open recess, a resiliently supported locking element normally engaging the armature latch element within the recess to prevent release movement thereof and a supplemental armature carried by the locking element and associated with the magnet end whereby on energizing of the magnet said armature will retract the locking element from the recess for release of the armature latch element.

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