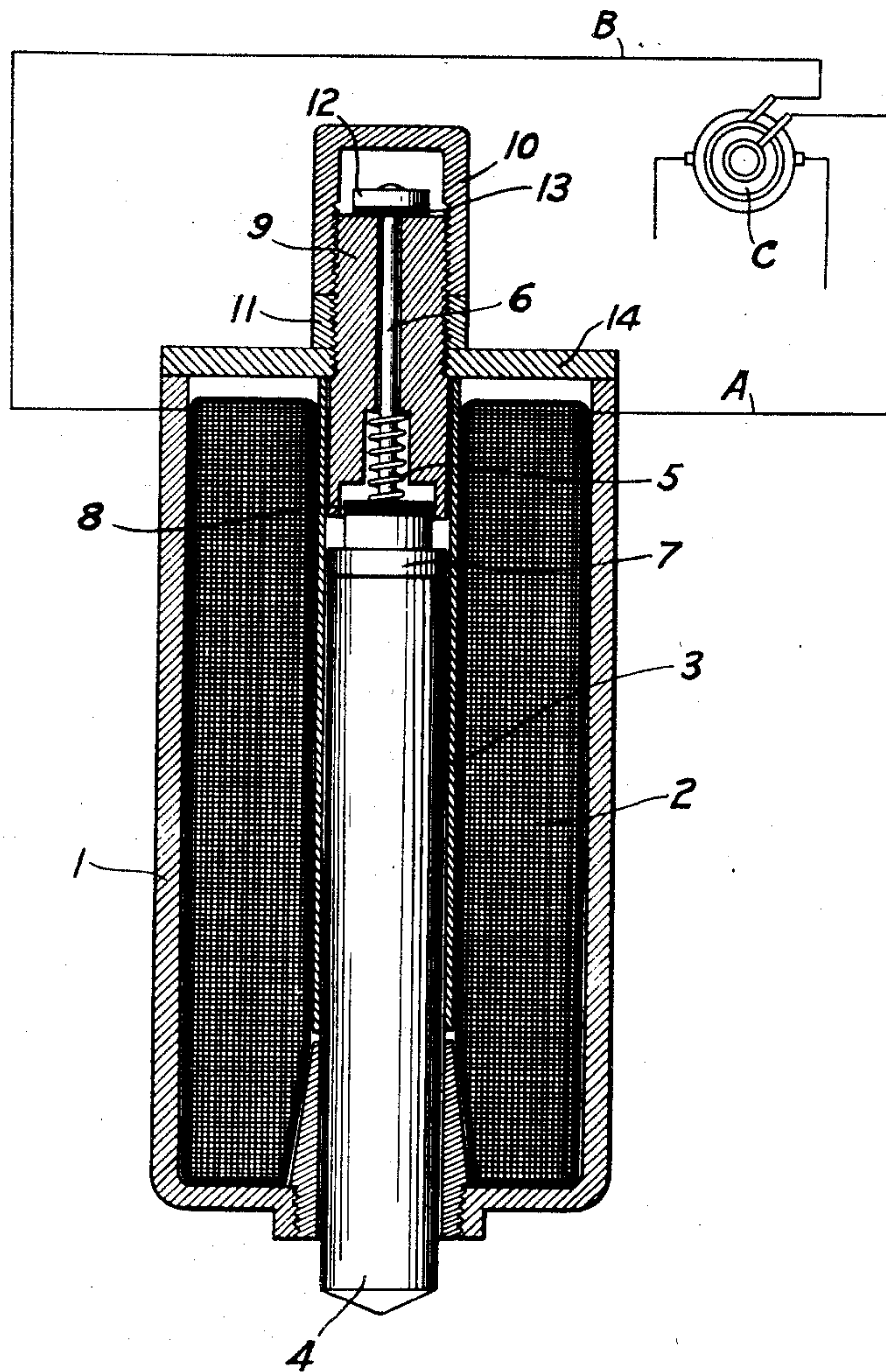


W. K. HOWE.
ELECTROMAGNETIC DEVICE.
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985,676.

Patented Feb. 28, 1911.



WITNESSES:

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UNITED STATES PATENT OFFICE.

WINTHROP K. HOWE, OF ROCHESTER, NEW YORK, ASSIGNOR TO GENERAL RAILWAY SIGNAL COMPANY, OF GATES, NEW YORK, A CORPORATION OF NEW YORK.

ELECTROMAGNETIC DEVICE.

985,676.

Specification of Letters Patent.

Patented Feb. 28, 1911.

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To all whom it may concern:

Be it known that I, WINTHROP K. HOWE, a citizen of the United States, and resident of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Electromagnetic Devices, of which the following is a specification.

My invention relates to an electromagnetic device comprising a winding or solenoid which is electrically energized, and an armature which is actuated by the magnetism produced in the winding. Devices of the kind above referred to are in common use for controlling the functions and operations of various electrical apparatus. In some forms of electrical apparatus, particularly in electric railway signaling systems, alternating currents are employed in the controlling devices. While an alternating current may be practically employed to energize an electromagnet or a solenoid by which an armature or core is actuated, the effect of such alternating current, owing to its fluctuating character, is not constant and uniform upon the armature, so that if the armature, when under the influence of the current, is in contact with a fixed or rigid stop, it tends to vibrate or chatter. In certain applications, where a device of the kind above referred to is used in connection with sensitive controlling mechanisms, the vibrations transmitted to the other parts of the apparatus from the electromagnetic controlling device as a result of such vibration in the armature may have the result of deranging such controlling apparatus, or causing accidental and improper operation.

The object of the present invention is to produce an electromagnetic device suitable for use with an alternating current which shall be free from the disadvantage above referred to, and which may be used in connection with sensitive controlling mechanism.

To the above end, my invention comprises an electromagnetic device provided with a stop for the armature, this stop having provision for yielding in such a way as to absorb vibrations in the armature without transmitting them to any substantial degree to other parts of the apparatus.

My invention further comprises provision, in said stop, for arresting the armature upon its initial movement without serious

jar, and also provision for absorbing shocks due to rebounding of the armature from the yielding stop.

Other objects and features of my invention will be set forth in connection with the following detailed description.

The accompanying drawing illustrates the preferred embodiment of my invention, and is a vertical section through the longitudinal axis of the device.

The illustrated embodiment of my invention comprises a winding 2 in the form of a solenoid, and an armature in the form of a cylindrical core 4 which moves longitudinally within the solenoid. The solenoid is inclosed within a soft iron shell 1 in the usual manner, and a bearing sleeve 3 of non-magnetic material is inclosed within the solenoid and constitutes a guide for the core. The upper end of the shell 1 is closed by a cover-plate 14, and threaded in a central opening in this cover-plate is a plug 9, which constitutes a bearing for the yielding stop. The stop is provided with a stem 6, movable longitudinally in a hole in the center of the plug 9, and the lower end of the stem 6 carries a head 7 adapted to be engaged by the upper end of the core. The stop is normally held in depressed position by a compression spring 5 coiled around the stem. When the winding 2 is energized, however, the core is raised into engagement with the head 7 of the stop, thereby compressing the spring 5, and so long as the winding continues to be energized, this engagement is maintained. No chattering can occur between the core and the stop because the spring maintains these parts constantly in engagement, while the spring acts also to absorb the vibrations of the core and prevents their transmission in any substantial degree to the fixed parts of the apparatus.

When the core is raised, upon the first closing of the circuit through the solenoid, it strikes the stop with sufficient momentum to compress the spring 5 beyond the normal degree, and to absorb this initial impact a supplementary yielding device, in the form of a soft-rubber washer 8, is arranged upon the upper surface of the head 7, and this washer is brought into engagement with a shoulder in the plug 9, and brings the core to rest in its uppermost position without severe shock.

To prevent the stop from falling out of

position in the plug 9, a head 12 is fixed to the upper end of the stem 6, and is adapted to prevent the withdrawal of the stem through the hole in the plug. The head 12 is provided, on its under side, with a yielding device, in the form of a soft-rubber washer 13, and this washer prevents the transmission of vibration to the apparatus through the rebounding of the stop when released from contact with the core.

The threaded engagement of the plug 9 with the plate 14 affords provision for vertical adjustment of the stop, and a nut 11 serves to secure the plug in adjusted position. A cap 10 threaded upon the upper end of the plug serves both as a lock-nut to secure the nut 11, and as a cover to protect the upper end of the stop and exclude dust from the working parts.

The solenoid is shown diagrammatically as connected, through wires A, B, with an alternating generator C which constitutes the source of current for energizing the solenoid.

My improved electromagnetic device is capable of use as a controlling device in a wide variety of apparatus. As an example, however, of a suitable application, an electric semaphore operating mechanism may be cited, such a mechanism being disclosed in my pending application, Serial No. 531,264, filed December 3, 1909.

My invention is not limited to the embodiment hereinbefore described and illus-

trated in the accompanying drawing, but may be embodied in various other forms within the nature of the invention, as defined in the following claims.

What I claim is:—

1. An electromagnetic device having, in combination, a winding, an armature actuated thereby, a resilient stop engaged by the armature at the limit of its movement, and means for cushioning the return of the stop when disengaged by the armature.

2. An electromagnetic device having, in combination, a winding, an armature actuated thereby, a stop arranged in position to be engaged by the armature at the limit of its movement, and resilient devices for resisting movement of the stop in either direction.

3. An electromagnetic device having, in combination, a solenoid, a core movable longitudinally within the solenoid, and a stop engaged by the core when the core is in its inward position and comprising a plurality of resilient devices controlling the inward movement of the core, one of said devices being primarily operative and another of said devices being operative secondarily to resist extreme inward movement of the core.

WINTHROP K. HOWE.

Witnesses:

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P. E. CARTER.