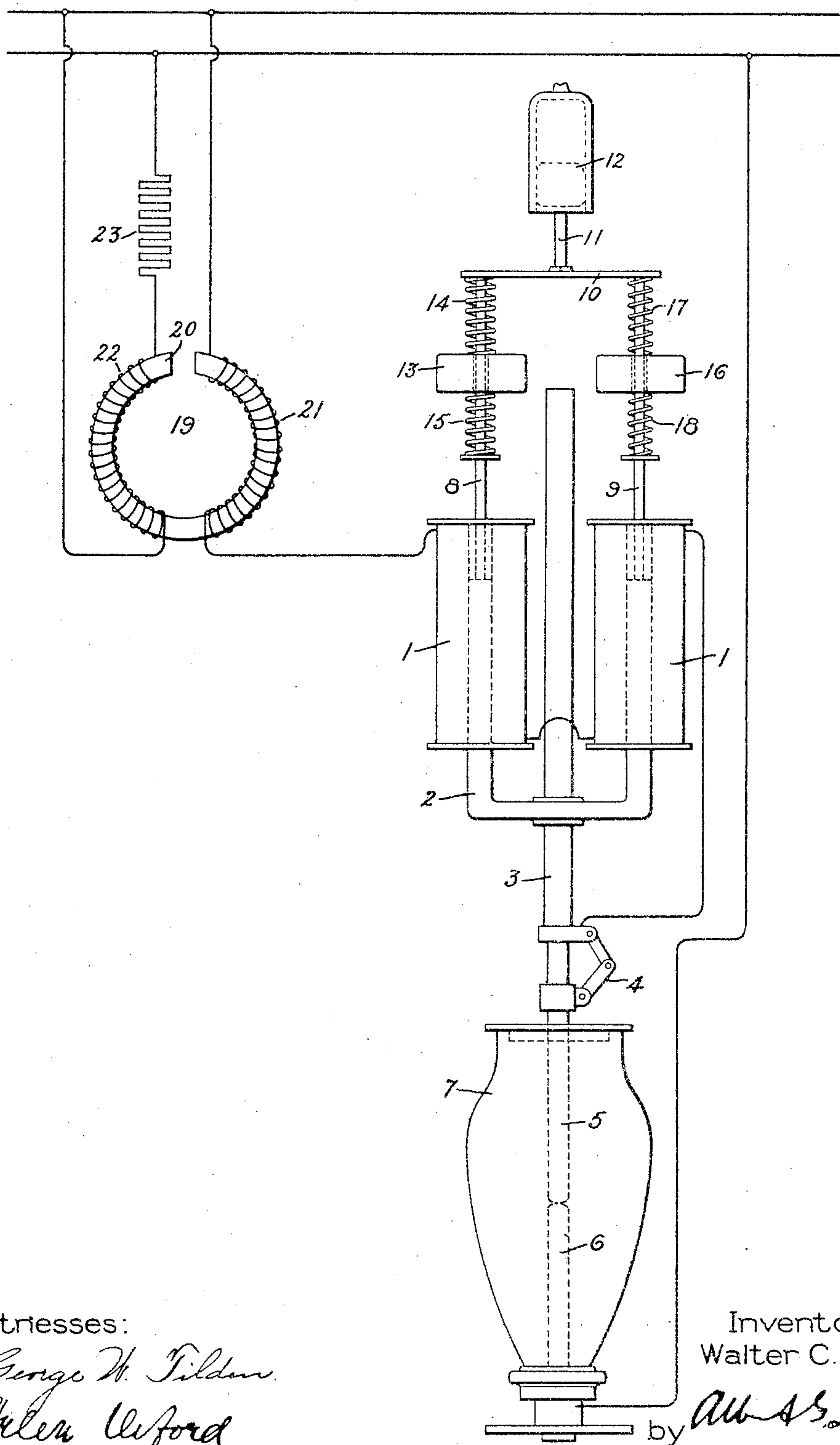


No. 779,996.

PATENTED JAN. 10, 1905.

W. C. FISH.
INDUCTANCE COIL.
APPLICATION FILED SEPT. 3, 1903.



Witnesses:

George W. Tildan
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by *Alb. S. Davis*
Att'y.

UNITED STATES PATENT OFFICE.

WALTER C. FISH, OF LYNN, MASSACHUSETTS.

INDUCTANCE-COIL.

SPECIFICATION forming part of Letters Patent No. 779,996, dated January 10, 1905.

Original application filed June 24, 1901, Serial No. 65,773. Divided and this application filed September 3, 1903. Serial No. 171,732.

To all whom it may concern:

Be it known that I, WALTER C. FISH, a citizen of the United States, residing at Lynn, county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Inductance-Coils, (division of my application, Serial No. 65,773, filed June 24, 1901,) of which the following is a specification.

My present invention relates more especially to inductance-coils, and is shown herein as embodied in an arc-lamp organization.

The various novel features which constitute my invention I have particularly pointed out in the claims appended hereto and have described the same in detail in the following specification, which for convenience of understanding is to be taken in connection with the accompanying drawing, which forms a diagrammatic representation of a lamp embodying various features of my invention.

At 1 is indicated a pair of solenoids which coöperate with a U-shaped core or armature 2. This armature is mechanically connected to a clutch rod or tube 3, carrying at its lower end the clutch 4, this clutch engaging in the usual manner a carbon or other electrode 5. The coöperating carbon or electrode is shown at 6, and the ends of both of these electrodes are inclosed within an inclosing globe 7 in the usual manner. The upper ends of the core 2 carry, respectively, upwardly-projecting rods 8 and 9, joined at their upper ends to a cross-bar 10, secured to one member, 11, of the dash-pot. The other member, 12, of the dash-pot is fastened to some stationary portion of the lamp-frame. (Not here shown.) The dash-pot serves the usual purpose of preventing too violent reciprocation of the core 2 and the parts carried thereby.

In order to secure stable operation of the lamp with the usual steadying resistance omitted, it is necessary that the arc-controlling mechanism shall move easily and respond readily to slight variations of current. If any tendency to hunting or pumping arises, especially in starting the lamp, I have found that the same may be suppressed or greatly reduced by providing the reciprocating parts

of the lamp with a mechanical device or devices attached thereto and having a natural period or periods of oscillation different from the approximate period of reciprocation of the arc-controlling mechanism as a whole. To this end I mount upon one of the rods 8 a small block 13 of metal, such as lead, this block being confined between a pair of springs 14 15. In a similar manner a block 16 is confined between springs 17 and 18 on the companion rod 9. These springs 14 and 17 may be of different strengths and of different numbers of convolutions, so that the blocks 13 and 16 possess different natural periods of oscillation when set into motion.

When current is passed through the lamp, the core 2 is drawn up suddenly, thereby putting the springs 15 and 18 under compression, due to the inertia of the blocks 13 and 16 supported thereby. The blocks 13 and 16 are therefore caused to oscillate up and down on the rods 8 and 9, and due to the fact that their natural periods of oscillation are different from the period of movement of the armature 2 they act to break up any tendency toward a continued pumping or reciprocating of the armature 2 and its connected parts.

In addition to the mechanical means thus described for securing stability of operation I may in any case where it is desired employ a reactive coil in series with the lamp for opposing fluctuations in the current supplied to the lamp, and thereby securing greater stability of operation. This coil may be of any well-known type. I have found, however, that very superior results may be obtained by the use of the reactive coil indicated in the drawings, though the use of any reactive coil greatly assists the operation of the mechanical device above described. This reactive coil is indicated in diagram at 19 and consists of the core 20, having thereon two windings, a main or reactive winding 21 and a separate constantly-excited counter-magnetizing winding 22. The main winding 21 is in series with the lamp, as shown. The counter-magnetizing winding 22 is supplied with current from any suitable source—as, for example, across the same mains that supply the lamp.

This winding carries current sufficient to neutralize the magnetizing effect of the reactive winding 21 when the current through the lamp is steady and of normal value. The magnetic flux in the core 20 is therefore zero under normal conditions. When, however, current in the lamp fluctuates, the current in the winding 21 varies up or down, as the case may be, and thereby sets up a strong magnetic flux. This flux produces a particularly powerful reactive effect upon the current fluctuations, due to the fact that the flux is varying through the zero-point of the magnetization-curve, and therefore along the steepest portions of the same. This magnetization is especially prompt and vigorous, since that under these conditions the hysteresis-lag is very much less than if the iron were worked at points higher up on the magnetization-curve.

It will be evident that fluctuations of current in the winding 21 tend, as in a transformer, to set up corresponding fluctuations of current in the winding 22 inductively related thereto. In order to steady the current in the winding 22, I connect in series therewith a resistance 23. The electromotive forces introduced into the circuit of a winding 22 are caused thereby to have a less proportionate effect, and the current therein is consequently rendered steadier, the degree of smoothness obtainable being dependent upon the amount of this resistance and the proportions of the circuit as a whole, as will readily be understood by one skilled in the art.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. An inductance-coil consisting of a core, a main winding carrying a unidirectional current subject to fluctuations, and a counter-magnetizing winding excited by direct current.

2. An inductance-coil consisting of a core, a winding mounted on said core and carrying a direct current which is subject to fluctuations, and means for impressing upon said core a magnetomotive force of substantially constant intensity.

3. An inductance-coil comprising a main winding traversed by a fluctuating unidirectional current, and means for counterbalancing the magnetizing effect of a component of current in said winding without opposing fluctuations in the current.

4. The combination of a core, a winding thereon traversed by a current subject to fluctuations, and means for maintaining the flux in said core at or near the zero-point when no current fluctuation is taking place.

5. The combination of a core provided with two windings, currents traversing said windings so as to produce opposite magnetizing effects on said core, and a steadying device in circuit with one of said windings.

In witness whereof I have hereunto set my hand this 1st day of September, 1903.

WALTER C. FISH.

Witnesses:

CHATTIN BRADWAY,
DUGALD MCK. MCKILLOP.

Correction in Letters Patent No. 779,996.

It is hereby certified that Letters Patent No. 779,996, granted January 10, 1905, upon the application of Walter C. Fish, of Lynn, Massachusetts, for an improvement in "Inductance Coils," was erroneously issued to said "Fish" as owner of said invention; whereas the said Letters Patent should have been issued to the *General Electric Company*, a corporation of New York, as owner of the entire interest in said invention, as shown by the assignments of record in this office; 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 7th day of March, A. D. 1905.

[SEAL.]

F. I. ALLEN,
Commissioner of Patents.