No. 886,824. PATENTED MAY 5, 1908.

L. O. LANGWORTHY.

CHOKE COIL.

APPLICATION FILED OCT. 4, 1907.

Fig. 1.

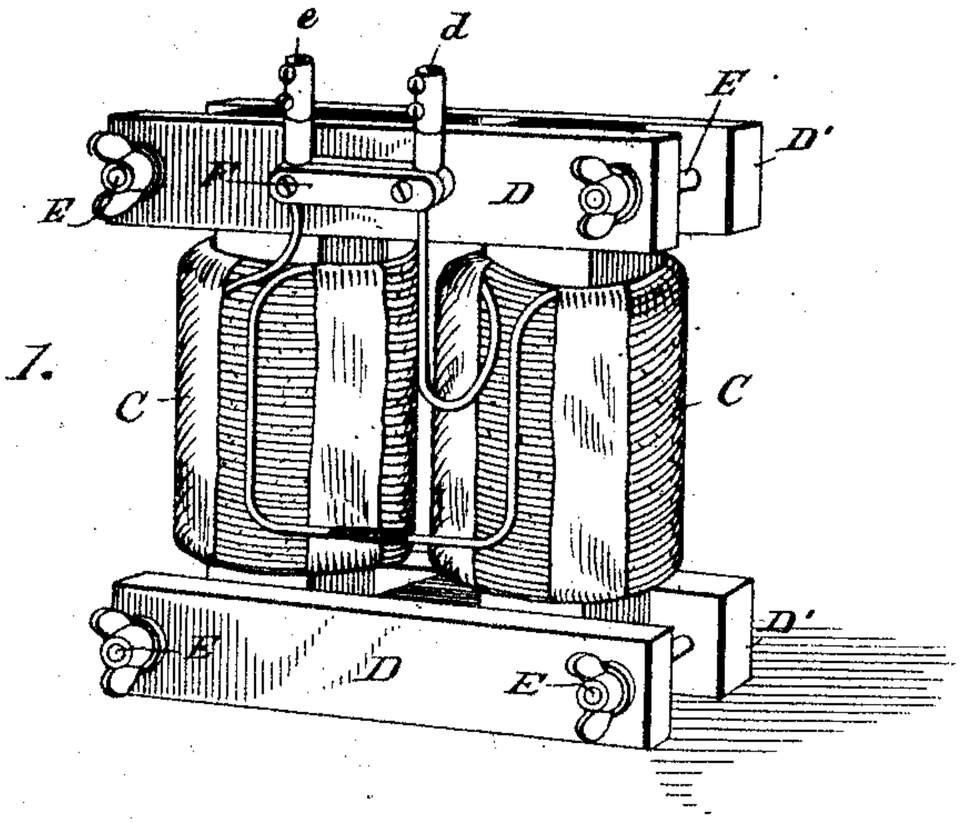
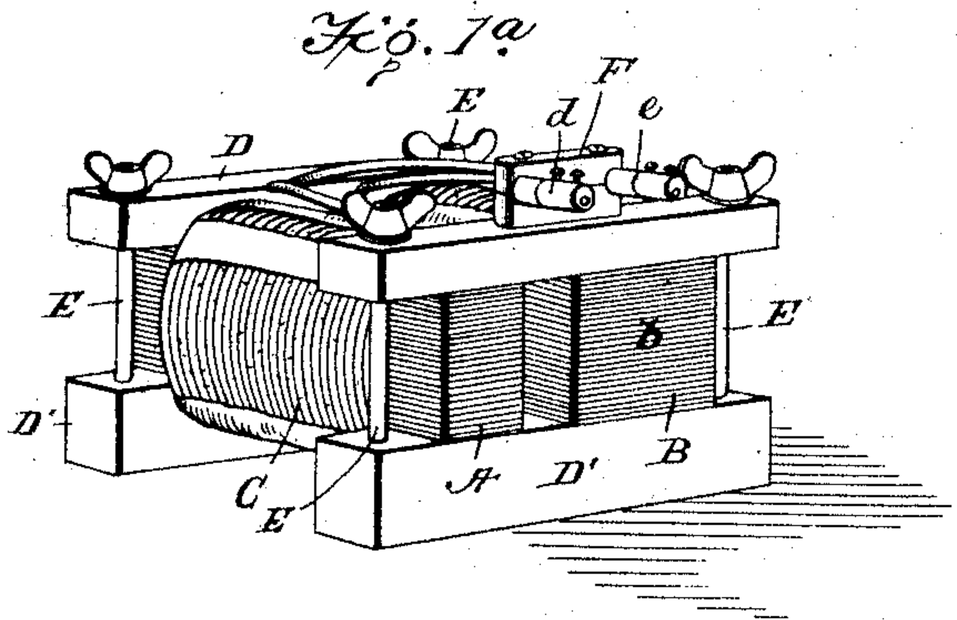


Fig. 3.

Fig. 1a.



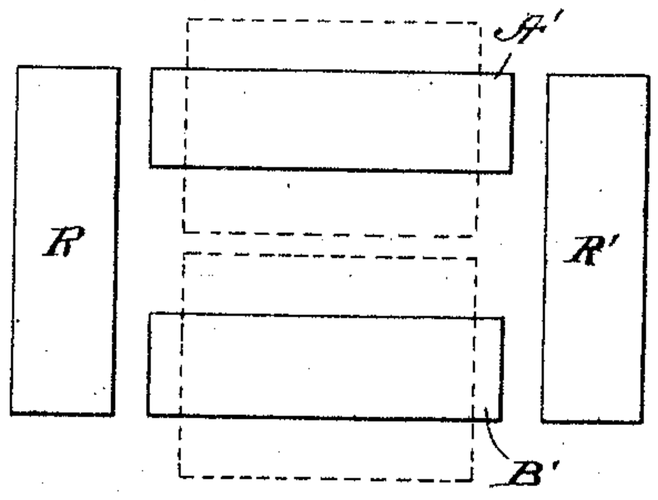
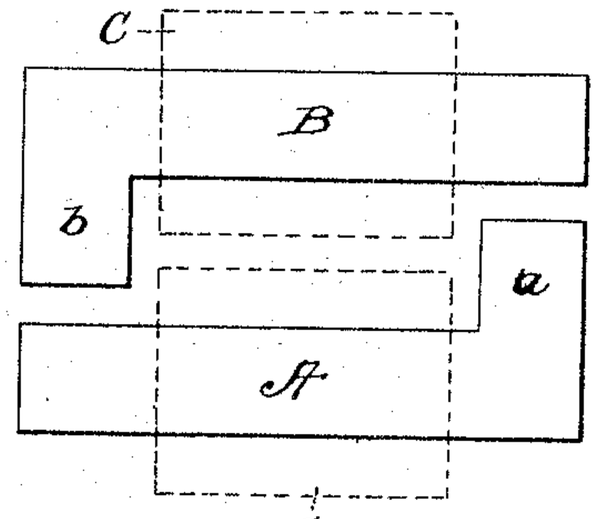


Fig. 2.



WITNESSES

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CHOKE-COIL.

No. 886,824. Specification of Letters Patent. Patented May 5, 1908.

Application filed October 4, 1907. Serial No. 395,917.

To all whom it may concern:

Be it known that I, LOUIS O. LANGWORTHY, a citizen of the United States, and a resident of Bradford, in the county of McKean and State of Pennsylvania, have invented certain new and useful Improvements in Choke-Coils, of which the following is a specification.

My invention is in the nature of an improved choke coil to be used on alternating current arc lamps, and especially those which are used with moving picture machines.

The usual moving picture arc requires about two kilowatts to light properly, and to get this current at the proper voltage, it is necessary to use the regular wire rheostat, and in using the wire rheostat it is necessary to waste more current than the lamp uses, for the voltage must be reduced to at least 45 volts, and the usual service is 110 to 115 volts. For example, the service is 110 volts; the lamp requires but 45 volts; this is 65 volts drop. The lamp draws 50 amperes, so the watt loss in the rheostat is 50 times 65 or 3250 watts. The useful watts at the lamp is 50 times 45 or 2250 watts. To overcome this rheostat loss I have designed a choke coil which has a total loss of 250 watts, or in other words makes a saving of 3 kilowatts over the rheostat.

My invention consists in the novel construction and arrangement of parts of the coil and means for adjusting the same as will be hereinafter more fully described with reference to the drawing, in which

Figure 1 is a perspective view of the choke coil standing up on end. Fig. 1ª is a perspective view of the same lying down. Fig. 2 is a detached view of the associated coils and cores showing their coaction and adjustment to and from each other, and Fig. 3 is a diagrammatic view of a modified form of my invention.

The coil consists of two cores A, B, two coils C, C, two clamping blocks D, D′ for each end of the coils, and four clamping bolts E. The core is made up of laminated sheets, and the coils are wound with copper wire of a sufficient number of turns to secure the desired choking effect. The core is made in two sections A, B, of the same shape, each section being formed of laminated plates with one end extended at right angles, as shown at *a* and *b*, which respectively approach the opposite poles but leave an air gap between the same. The idea is to secure a positive adjustment of the voltage by varying the air gap between the two sections of the core. For this purpose the cores are bound together at the points where they protrude beyond the coils by means of the hard wood strips D and D′ which are clamped together securely by the bolts E, so as to hold the same in unitary relation. To vary the voltage at the lamp it is only necessary to loosen the four nuts and bring the coils together to decrease the voltage, or to move them farther apart to increase the voltage.

The advantages of this coil are

First: The entire absence of heat;

Second: The perfect adjustment of the voltage and hence of clearness of the light on the picture;

Third: The economy over every other form of rheostat;

Fourth: The freedom from excessive current on short circuit, as the coil is designed to allow only a certain current to pass. Any decrease of resistance *i. e.* short circuit, will react on the coil and it will not allow the current to increase—rather the actual effect is that the power drops nearly to zero on short circuit.

Fifth: The indestructibility of the coil under the actual conditions of service, the ordinary rheostat usually burning out in a few months service.

I have designed the coil for use on the various frequencies of the alternating current circuits, the only difference being that 60 cyles require a certain percentage more turns than 125 cycles. It will be seen that the whole combination forms an apparatus designed to lower the voltage on the line to any predetermined amount by means of the back electro-motive force of self induction set up in said coils, on the passage of a suitable alternating current. For varying the voltage, the cores are, as before stated, adjusted to or from each other to produce the variable air gap between the ends of the cores, the variation in the terminal voltage being accomplished by the simple act of varying the length of said air gap by moving the cores closer together or further apart.

The action of the cores A and B close together is to increase the back electro-motive force of self induction and so lower the terminal voltage, and when adjusted further apart, to decrease the back electro-motive force of self induction and so increase the terminal voltage. Any voltage within the

range of the coils may be obtained between the maximum and minimum movement of the cores. This adjustment of the terminal voltage is a vital point in my invention, as in the application of the coil it is necessary to vary the current, *i. e.*, the voltage at the terminals of the coil, from the fact that it is necessary to have different degrees of light at the picture. Some picture films are very dark and some light, and hence the current supplied to the lamp must be increased or decreased to provide for this variation.

There are several different methods which may be employed to accomplish the adjustment of the cores. That shown in Figs. 1 and 1ª is deemed the simplest and best and is made by the simple adjustment of the clamping nuts. The coils and cores, however, may be adjusted to and from each other by any suitable means.

The coils are so designed that the total losses do not exceed 250 watts, sufficient radiating surface being provided to take care of this heat loss.

As to the detail construction of the coils, the cores are made up of about 200 sheets of transformer iron of L-shape form seen in Fig. 2. This L-shape form prevents excessive leakage through the ends of the copper coils. Such leakage causes eddy currents in the copper coils and hence excessive heating. The iron cores are assembled as shown in Fig. 2, the idea being to so lead the magnetic lines around the iron and across the air gap with minimum leakage.

The coils are form-wound and are placed over the cores and held in position by the porcelain cleat F, securing the terminals *d*, *e* of the coils.

As a modification of my invention, the design of the cores may be changed to the form shown in Fig. 3, in which A′, B′ represent the cores in which the variable air gap is formed by means of the armatures R and R′. This form requires separate iron armatures either at one or both ends of the cores. The adjustment of the terminal voltage is limited to the distance apart of the iron cores, for when the armatures are moved beyond the distance apart of the cores, the magnetic lines leak across the cores, causing excessive heat in the coils and so limiting the variation of the voltage. This form of coil, however, is not so desirable as that shown in Fig. 2, in which the L-shape core is ideal in respect to the adjustment and leakage; for in the latter form as the cores are separated, to give greater current, the coils are also separated, increasing the effective radiating surface for the heat, at the same time the heating effect would be increased by the passage of the larger current. The magnetic leakage is not increased, as the end of the L-shape core is always the closest to the other core.

I claim—

1. A choke coil comprising two cores with coils wound thereabout, and means for holding the same in a predetermined relation and adjusting one core and coil to the other core and coil to produce a variable air gap.

2. A choke coil comprising two cores each having an L-shape extension arranged at opposite ends to each other, two coils embracing said cores, and means for clamping the coils and cores in variable relation to each other to produce a variable air gap.

3. A choke coil comprising two laminated cores each having an L-shaped extension arranged at opposite ends to each other, two coils embracing said laminated cores, and means for clamping the coils and laminated cores in variable relation to each other to produce a variable air gap.

4. A choke coil comprising two laminated cores each having an L-shaped extension arranged at opposite ends to each other, two coils embracing said laminated cores, two clamps for each end of the cores with clamping bolts for securing them together, the said ends of the cores being extended beyond the coils and retained in adjustable position between the clamps with a variable air gap between them.

5. A choke coil comprising two cores, two coils embracing said cores, two clamps for each end of the cores with clamping bolts for securing them together, the said ends of the cores being extended beyond the coils and retained in adjustable position between the clamps with a variable air gap between them.

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Witnesses:
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