

NEW PHENOMENA IN ASSOCIATION WITH SUCKING EFFECTS OF SOLENOIDS

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When an iron or steel core is placed in the core hole of a vertically suspended solenoid (Fig. 1) carrying a direct current of electricity, nothing peculiar or unusual happens. The core, in such an instance, is sucked into the solenoid and held within it so long as sufficient current continues to flow through the winding.

With alternating current it is quite different; an iron or steel core is first sucked into the core hole as with direct current, but its introduction into the coil immediately increases the reactance, which in turn decreases the current flow through the coil. This decrease in the field strength tends to allow gravity to pull the core down. As the core moves downward, the coil's reactance is diminished and the current flow through the winding increases, thereby tending to pull the core up and from this it is to be noted that there is a tendency to set the core and circuit oscillating. If the inductance of the coil and the length, weight, and design of

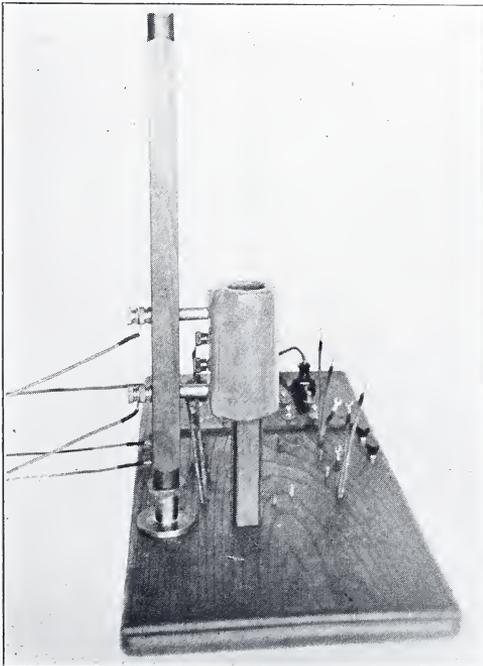


Fig. 1.

the core are properly worked out, it is possible to set up an oscillating circuit independent of the frequency of the implied current.

When all components of such a circuit are set to functioning properly, the circuit oscillates continuously; but if any one component functions improperly, the circuit will not oscillate at all, or, if so, not perpetually.

By properly adjusting a circuit of this character it is possible to increase the amplitude of vibration of the iron core until it will jump entirely out of the solenoid. Aside from the very interesting and instructive value of this experiment or demonstration, it is very probable that many practical and valuable applications may be made of it.

If a second inductance, also with removable core, is introduced in series with this type of circuit other interesting effects may be produced (Fig. 2). For instance, by the manual operation of the core in coil No. 2, the movement of the core in coil No. 1 will be affected, and, in fact, can be controlled at will. As the core in coil No. 2 is moved, its movement affects the impedance of the circuit, thereby affecting the movement of core No. 1. From this it is to be seen that by properly manipulating core No. 2, it is possible to actuate core No. 1 as desired; in fact, it may be caused to move so slowly that its movement is imperceptible, or it can be made to move very rapidly. By properly positioning core No. 2 within its solenoid, core No. 1 can be caused to move to any desired place in its solenoid and will remain stationary at that position so long as none of the circuit's characteristics are altered.

From the foregoing, it is obvious that many practical ideas could be evolved for employing this idea in remote control and numerous other applications.

