

Fig. 15-21. An electric pencil is a useful tool for writing names or identification marks on tools and metal objects.

ELECTRIC PENCIL

Project IX

This is a real practical project. You will find many uses for it around the home and shop. By means of the electric pencil, you can write your name on any metal object. Tools with your name permanently etched on them are easily identified. See Fig. 15-21.

Two additional electrical principles are demonstrated in the construction of this project. First, a current flowing through a coil or inductor resists a change in the value of current. This property of a coil is called inductance. In the electric pencil when the circuit is broken as a result of magnetic action, the current attempts to continue flowing as a result of the inductance of the coil. This results in a small spark which jumps across the gap between the pencil point and the tool on which you are writing. Second, an electric

spark has an intense heat and actually eats into the metal, thus causing a permanent mark on the metal.

To write well with the electric pencil will require a few minutes of practice. At first you will notice that the point tries to stick to the metal tool. You will learn to write with just the correct pressure so that an arc is continually jumping the gap. An electric welder must learn to strike and hold an arc as one of the first lessons in welding.

Construction Hints:

1. Your first consideration in making this pencil is to keep the size small enough so that it may be easily handled as a pencil.
2. Fig. 15-22 gives you a detailed drawing of one way that this can be accomplished.
3. The core is a 16-d. nail, threaded on one end, on which is cemented two 3/8 in. fiber or plastic washers, to act as coil ends. The coil is wound with two layers of #18 enamel covered wire. One coil end runs to the connecting terminal at the end of the pencil. The other coil end is attached to the moving armature.
4. The armature is made of 20 ga. spring brass 1/4 in. wide, cut to suitable length.
5. The end of the brass armature is drilled for a 1/4-6-32 bolt. The bolt serves two purposes. It provides a piece of iron which the magnet can attract and also provides a means of attaching a short

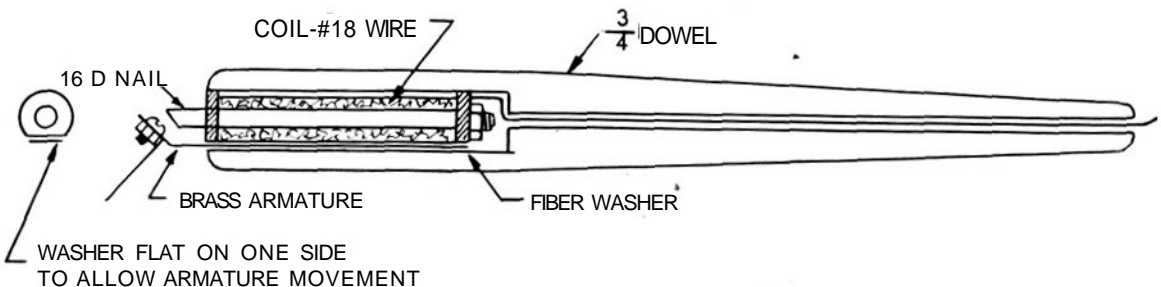


Fig. 15-22. Construction plan for an electric pencil.

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piece of copper wire to be used as a writing point.

6. After the pencil assembly has been made, it can be fitted into a 6 in. length of $3/4$ in. dowel. See Fig. 15-22. Mount the dowel in a lathe and bore a $3/8$ in. hole in one end of sufficient depth to take the coil. Then drill a $1/8$ in. hole all the way through the dowel for the connecting wire.

7. To use the pencil, connect one terminal of a 6 v battery to the tool on which you wish to write. Connect the pencil to the other battery terminal. When the pencil touches the tool, the circuit is closed and a current will flow, creating magnetism which draws the point from the tool, which opens the circuit. The point then touches the tool again. The resulting arc will mark the tool.