EXPERIMENTAL

ELECTRICITY

BY EDWARD TREVERT.

Extract:
"How to Make a Telegraph Instrument

LYNN, MASS.:

BUBIER PUBLISHING COMPANY.

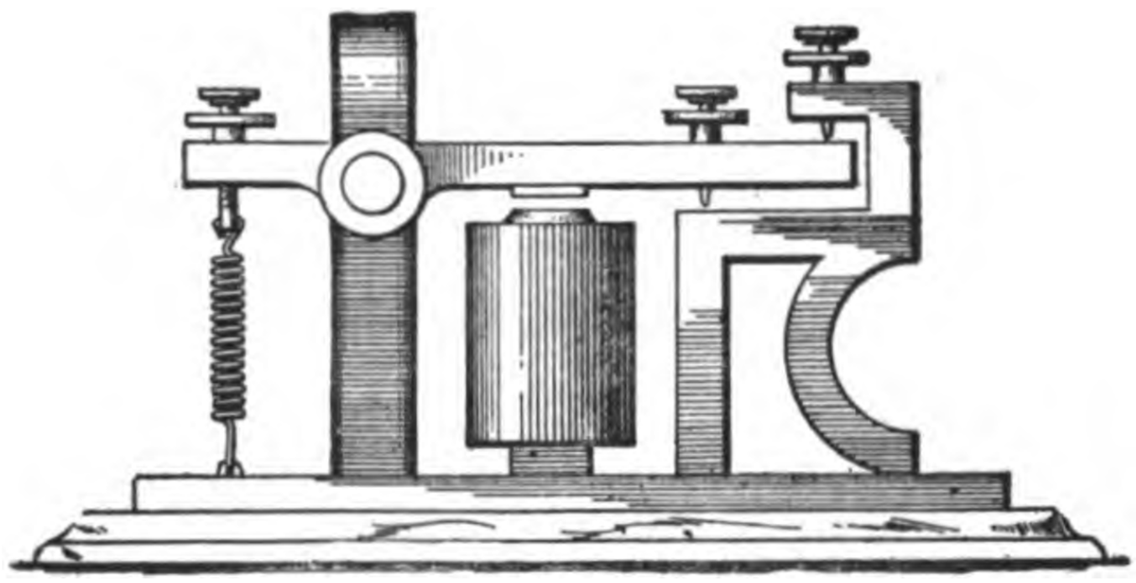
1890.

CHAPTER VII.

HOW TO MAKE A TELEGRAPH INSTRUMENT.

THE most satisfactory way the author knows for an amateur to make a telegraph instrument is to saw wood, or apply himself to any other remunerative form of labor until he has made enough money and then buy himself one.

A cheap or poorly made instrument is a constant source of annoyance, and even the better



TELEGRAPH SOUNDER.

kind will occasionally take freaks. There exists, however, a class of people who take a much greater pleasure in anything home-made, and which they understand from beginning to end, than in the store article, even if the latter does look and work better; and it is to this class that I address my-

self, repeating my warning that they cannot expect to have a very pleasant time operating a home-made instrument. This instrument is one that cannot be "simplified" to any great extent without sacrificing its good qualities, so the form described will follow very closely that in general use at present.

The cores of the magnets are to be made of $\frac{3}{8}$ inch round wrought iron—Norway iron preferably, on account of its great purity and softness. Cut two pieces $1\frac{1}{2}$ inches long and tap one end of each for a $\frac{1}{8}$ inch machine screw. Fit over each end of each of them a washer made of fiber or ebonite 1 inch in external diameter and $\frac{1}{8}$ inch thick;—they must fit tightly. Insulate the cores between the washers and bore a $\frac{1}{16}$ inch hole in one washer on each spool to take out the beginning wire and then put the spools in a lathe and wind them full of No. 24 insulated wire according to the directions given in previous articles. It is customary to slip over the spool when the winding is finished a casing of ebonite both as a protection to the wire and to improve the appearance, but this is not essential.

The yoke is also soft iron $\frac{3}{8}$ of an inch wide, $\frac{3}{16}$ of an inch thick and $1\frac{1}{2}$ inches long. Drill a $\frac{1}{8}$ inch hole in each end, $1\frac{1}{4}$ inches distant from each

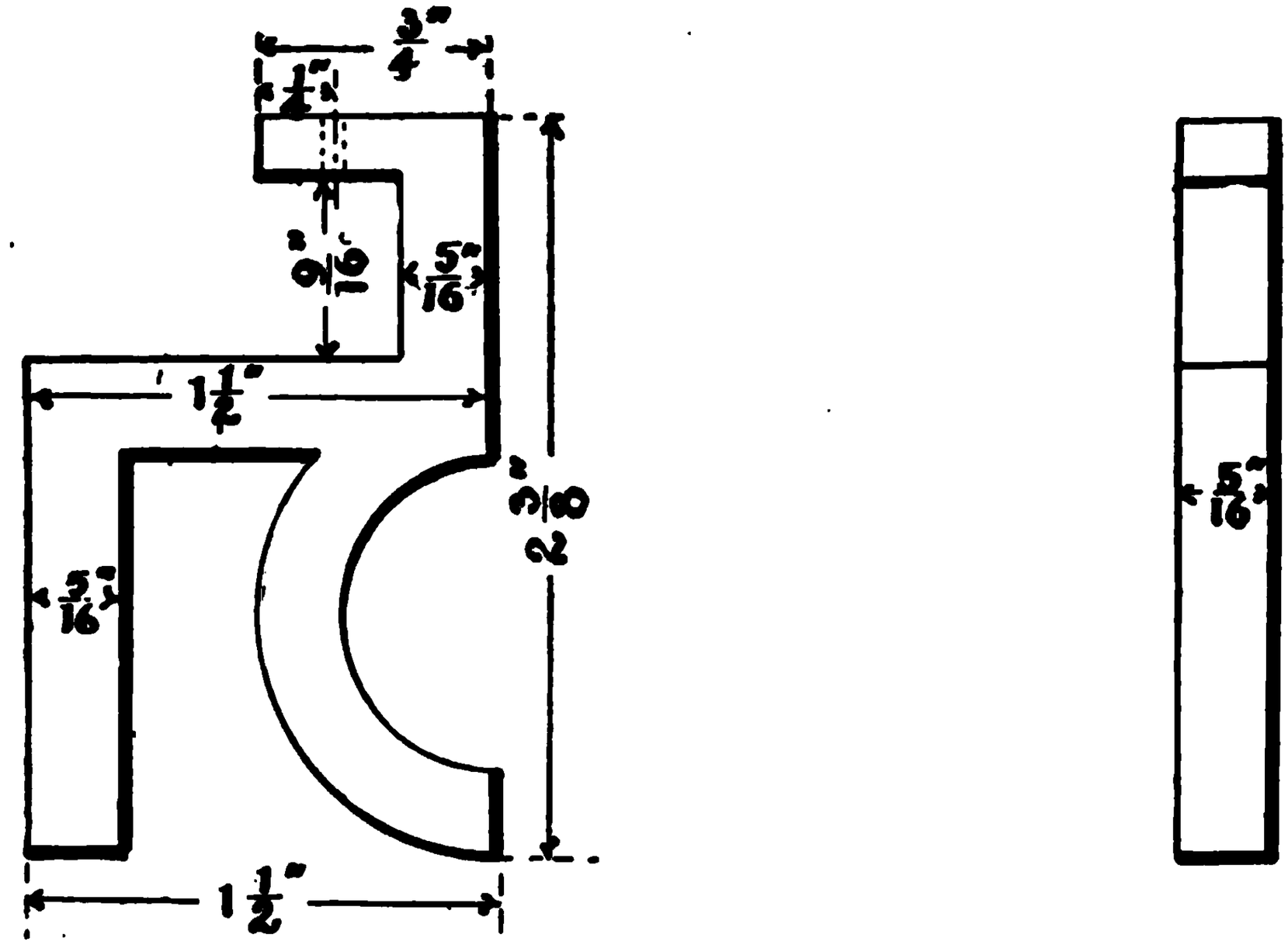


Fig. 1.

other and one in the middle tapped for a $\frac{3}{16}$ inch screw thread. Screw the spools you have wound to the yoke making a U shaped electro-magnet. This magnet stands on a base made of $\frac{1}{4}$ inch sheet brass, $2\frac{1}{4}$ inches wide and 5 inches long. Drill a $\frac{3}{16}$ inch hole through the base $2\frac{1}{4}$ inches from one end and midway between the sides: this hole is for the purpose of screwing the magnet to the base. Cut a strip of $\frac{1}{8}$ inch sheet brass $\frac{5}{16}$ of an inch wide and $10\frac{1}{8}$ long; bend it into a U shape, making the curved portion a semi-circle of 2 inches diameter; at 2 inches from each end drill and tap a hole for a $\frac{1}{2}$ inch screw.

Now file a groove in the edges of the two sides of the base-plate, $\frac{5}{16}$ of an inch in width, and $\frac{1}{8}$ of an inch deep, the edge of the groove to be $1\frac{3}{32}$ inches from the end of the plate the magnet is nearest. The legs of the U piece fit with this groove and are to be secured to the base with 8-32 machine screws.

The anvil had best be cast from brass, making a pattern for the same from Fig. 1. The bottoms of the legs of the anvil are to be tapped for 8-32 machine screws, and holes drilled in the brass base through which to pass the screws from underneath and secure the anvil. The straight leg should be 3 inches from the end of the base, and toward the magnet, as shown in the drawing of the completed instrument. The hole in the short arm is $\frac{1}{4}$ of an inch from the end, and is drilled and tapped for a $\frac{1}{8}$ inch screw.

Another brass piece which should be cast from brass, should be made in accordance with Fig. 2. The holes Y and Z are to be drilled and tapped for a $\frac{1}{8}$ inch screw, and X drilled with a No. 30 drill. Through the hole in the little downward projection of this piece is to be driven a piece of No. 14 Stubbs' steel wire, pointed at each end, and well hardened.

A soft iron armature of the shape and dimensions shown in C, Fig. 2, is screwed on the upper

side of the brass casting, to the hole Y. Four thumb screws and check nuts will be required, and may be made by following the dimensions given at B, Fig. 2. Two of the thumb screws should have their ends slightly countersunk or drilled with a very fine drill, to form bearings for the pointed ends of the Stubbs' steel pivot. Two more screws and nuts are needed: the screw to be made

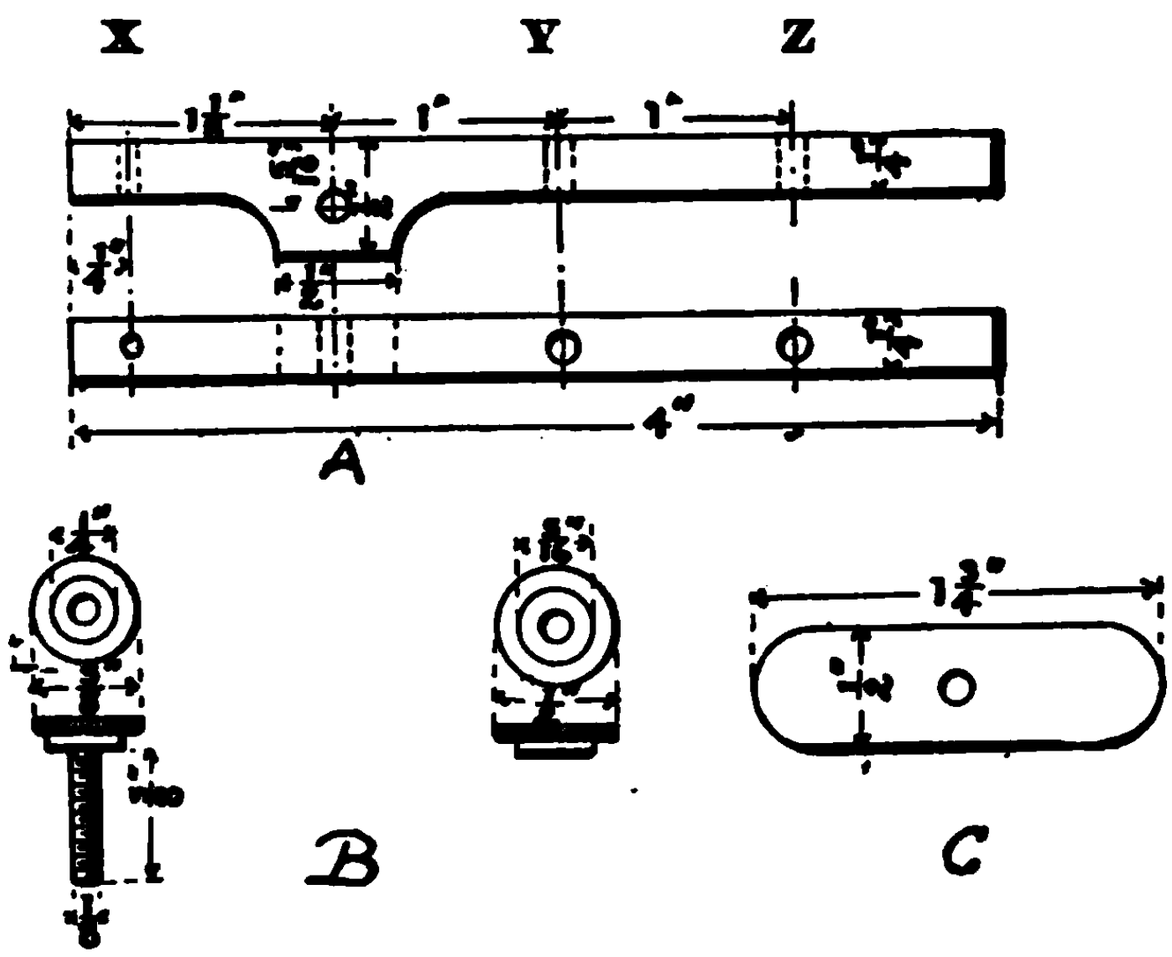


Fig. 2.

from $\frac{1}{8}$ inch brass wire, 1 inch long, and threaded the entire length, and the nut to fit this thread. Through one end of this screw drill a small hole. At $\frac{3}{8}$ of an inch from the end of the base plate, and directly under the projecting end of the armature carrier, back of the pivot, solder a small hook. Make a closed spring out of No. 22 spring brass

wire. We are now ready to put things together.

In the first place, the brass base-plate should be mounted on a neat wooden base, a little larger than the brass plate, and on the wooden base place two binding posts. Screw the magnet to the base-plate, if you have wound both cores in the same direction and have screwed them to the yoke so that both starting ends are together, connect the two inside wires together and the remaining ends to the binding posts, or, in other words, see that the wires are connected in such a way that if the magnet were bent out straight, the current will pass around the bar in one direction throughout its whole length. Screw the anvil to the base-plate and put in the adjusting screws and nuts as shown in the general drawing.

Place the armature in position and adjust it so that it moves easily on the pivot point by means of the adjusting screws in the sides of the U shaped piece. Put the nuts on the piece of threaded wire you made and slip it into the hole in the end of the armature. The end with the hole in it should be down, and into the hole hook one end of the spring you wound, and cut off the other end so that it will reach the hook beneath with a little stretching, and hook it there. The tension on the spring can then be regulated by the nuts on top,

and should be such that the armature will be pulled against the top stop when freed.

Adjust the screws in the anvil so that the armature will have $\frac{1}{8}$ of an inch play between them, and at its lowest point the soft iron piece will be $\frac{1}{32}$ of an inch from the ends of the magnet, and your sounder will be ready for work, that is to say, whenever you put a current through the coils the armature will draw down and make a click, and when the current is taken off, will fly up and make another.

The place in which the instrument is set makes a good deal of difference in the sound. A sounding board of some sort is necessary if it is desired to have the instrument make much noise. A good table answers for this very well, and often the instrument is placed upon a plate of glass or has a bell or a curved piece of tin attached to the anvil for the purpose of increasing the volume of sound. The Morse Alphabet is given below :

a	b	c	d	e	f	g	h
·—	—···	—·—·	—··	·	··—·	——··	····

i	j	k	l	m	n	o
··	·———	—·—	·—··	——	—·	———

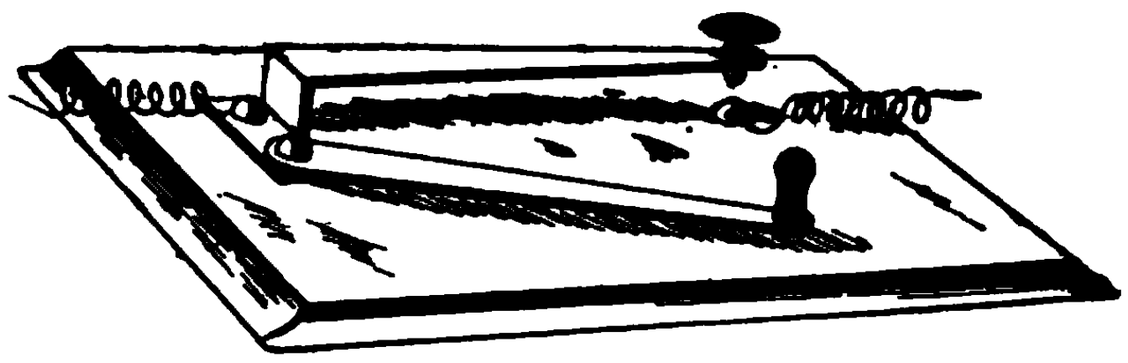
p	q	r	s	t	u	v	w
·——·	——·—	·—·	···	—	··—	···—	·——

x	y	z	&	.	?
—··—	—·——	——··	·—···	·—·—·—	··——··

,	1	2	3	4
——··——	·————	··——·	···——	····—

5	6	7	8	9	10
·····	—····	——···	———··	————·	—————

To break and make the circuit and thus work the instrument, we must have a key which can be made from a piece of spring brass, as shown in Fig. 3.



TELEGRAPH KEY.

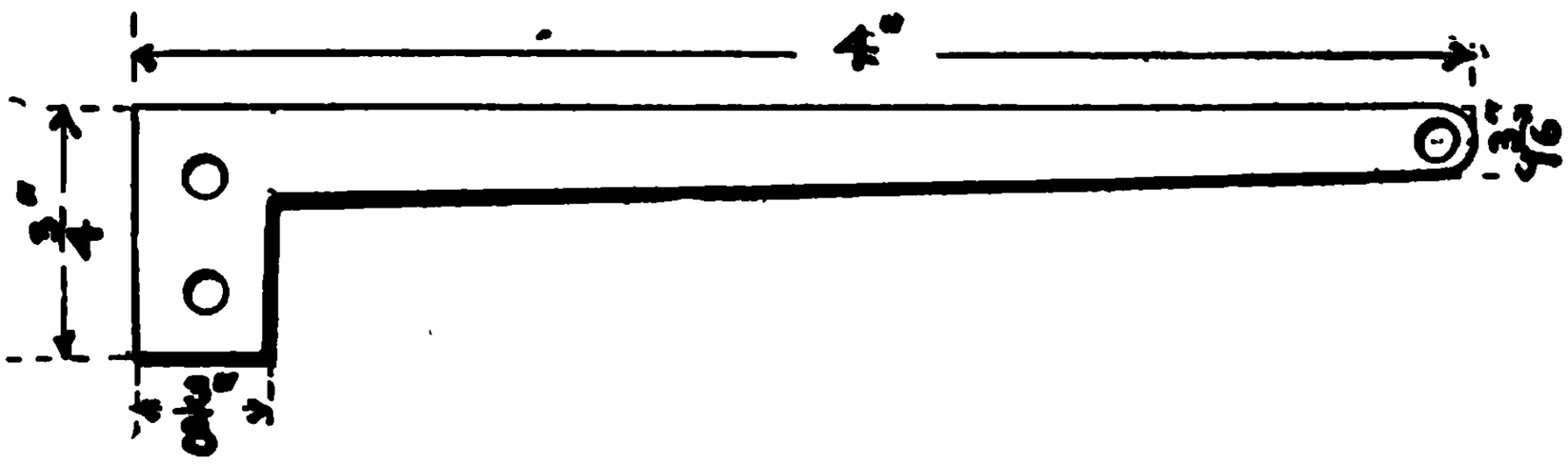


Fig. 3.

Cut and bend the brass in the shape shown, and screw a wooden or ebonite button to it. The screw head on the under side is to be filed off a little flat and another screw placed beneath, so that its head may be touched by the other when it is pressed down. The wires are to be connected to the strip and screw head as shown, though of course this is to be done underneath the board on which they are mounted, so that the wires will not

be seen. The circuit must be kept closed except when a message is being sent, so another strip of brass is to be screwed to the first, so it will move freely and will close the circuit when swung against the lower contact. A suitable handle is to be made for this.

The contacts of the key are apt to become fouled by the dirt and sparking on breaking the circuit, and must be occasionally cleaned. The fouling from the last cause can be obviated somewhat by soldering small pieces of platinum to the contacts as it does not oxydize as readily as most other metals.