the ground wire. They pass through one hole in the window frame and are insulated with two layers of cotton each. Whenever there is a lightning flash two or three miles away, perpendicular to the line, there is a flash between the wires where they pass through the window frame, as often and as quick as the lightning flash follows. The sound is usually heard a little later. I think the waves strike the wire and when they get near the ground wire they jump to that and pass down into the ground. We have little or no induction in our line and that is due to the fact, I suppose, that the two ends of the line are not more than one-quarter mile apart, although the whole line is about one mile long.

(7948) T. W. B., Jr., asks: Will you please give me directions for making a frictional electric machine which will give about 12 inch spark? A. We do not think you can get a spark 12 inches long from a friction machine. We never saw one that would give such a spark. A static machine will give a spark of that length. It may be either of the Wimshurst, or of the Toepler-Holtz form. In SUPPLEMENT Nos. 278, 279, 282, 548, 647, 914, price 10 cents each, are articles describing various machines of this sort. From these you can make your plans. We have no description of a machine giving a spark of 12 inches in length.

(7949) H. P. asks: How should soda ash be inserted and in what quantities to remove scale in two 90 horse power horizontal tubular steam boilers? A. Soda ash for boiler incrustation may be pumped in with the feed water about ¼ pound per horse power of the boiler, and left in for a day when the boiler should be blown out and cleaned out. A smaller quantity may be used if applied every week for two or three weeks and the boiler then cleaned out.

(7950) J. G. R. asks: 1. How many pounds of No. 30 cotton covered wire would I need to make an induction coil 18 inches long, 9 inches diameter 2-inch core, allowing about one-sixteenth of an inch between layers for insulation? A. We could calculate the weight of wire required for the coil as specified, but it would be time poorly spent, as it would be to make a coil on these lines. No one should use wire courser than No. 36 for a coil of this size. Nor should it be wound in layers, but in sections, with much less than one-sixteenth of an inch of insulation between the layers in the sections. 2. How many square feet of tin foil would it need for a condenser? A. We cannot tell. 3. If properly made what size spark ought it give? A. It might give 6 to 8 inches, but would soon perforate the insulation, and break down. You would far better get SCIENTIFIC AMERICAN SUPPLEMENT, No. 1124, price ten cents, and make a six-inch coil properly designed. It will give more satisfaction.

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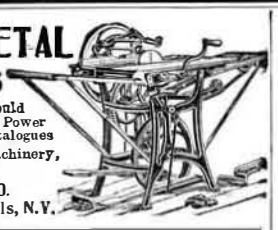

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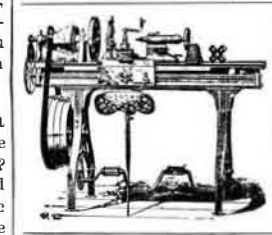

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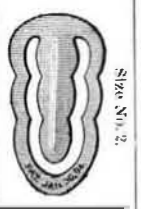

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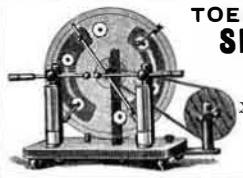

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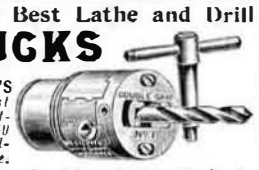

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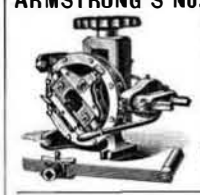

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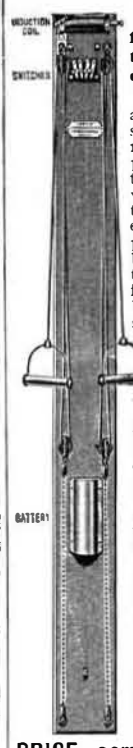

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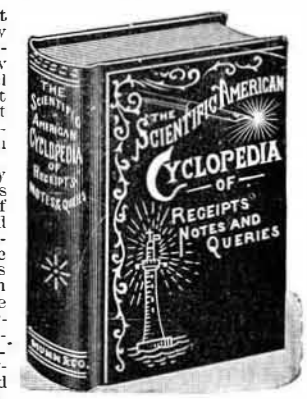

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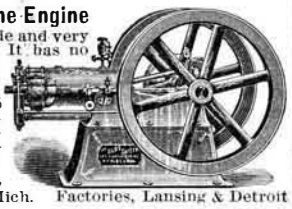

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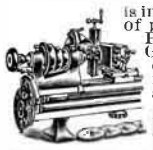

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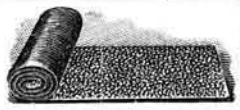

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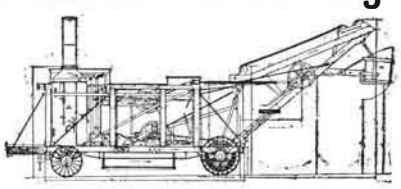

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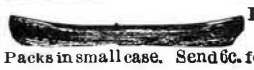

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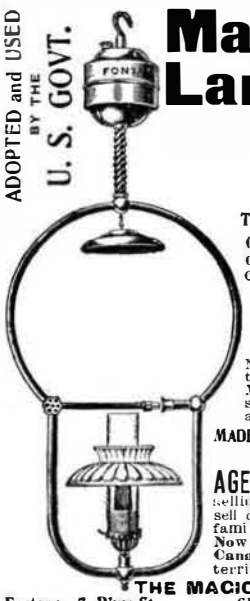

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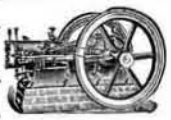

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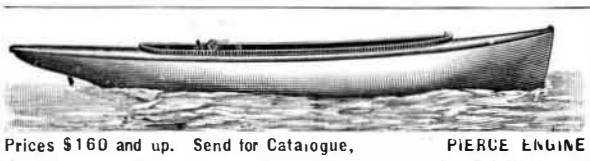

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