

(No Model.)

F. H. ROOT.
SPARK COIL.

No. 400,795.

Patented Apr. 2, 1889.

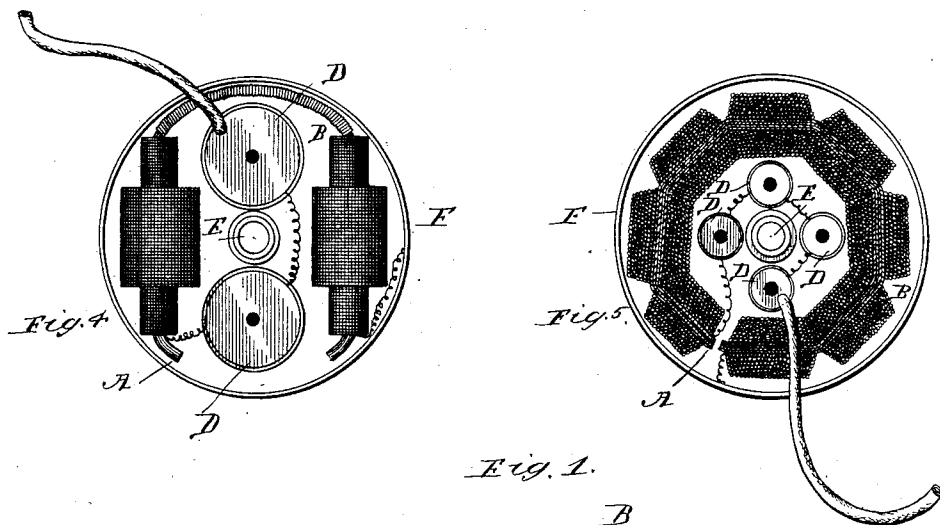


Fig. 1.

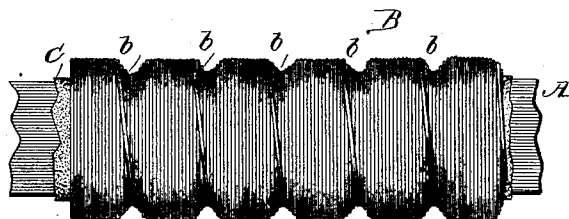


Fig. 2.

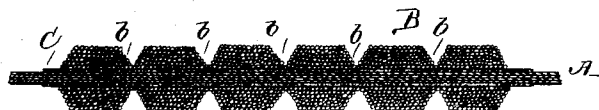


Fig. 3.

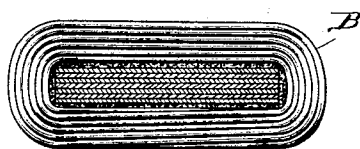
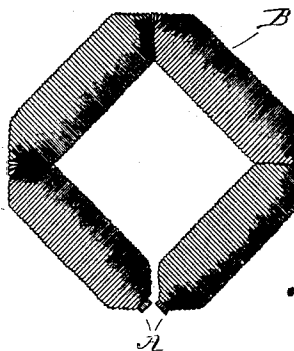


Fig. 4.



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UNITED STATES PATENT OFFICE.

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SPARK-COIL.

SPECIFICATION forming part of Letters Patent No. 400,795, dated April 2, 1889.

Application filed April 19, 1888. Serial No. 271,245. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS H. ROOT, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Spark-Coils, of which the following is a specification.

This invention relates to an improvement in spark-coils particularly designed for service in the electric gas-lighting apparatus embodied in Letters Patent of the United States, No. 325,569, granted to me September 1, 1885, and involving the presence of a proximately-circular or ring-shaped spark-coil which surrounds the battery, the general configuration of such coil permitting it to be brought within the small compass allotted for its presence within the casing and at the same time allowing the coil to be made of effective length.

My improvement is also applicable to spark-coils for other situations wherein the presence of a spark-coil of the aforesaid general configuration may be found desirable, it being, however, observed that my improvement relates to coils commonly known as "spark-coils," and employed for producing sparks for actual service in contradistinction, for example, to the armature-coils in dynamo-machines, wherein ring-armatures comprising coils wound in connected lengths or sections either upon a ring of iron wires or a ring comprising metal-plate sections are quite common.

In the manufacture of spark-coils for electric gas-lighters and other like devices it is desirable to lessen, as far as possible, the time, labor, and cost involved in their production, so as to render the apparatus whereof they form a part a commercial success.

To prepare a spark-coil having its core brought substantially within the radius of a circle by winding the wire about a core previously shaped to form the greater part of a ring (that is to say, a ring having at one point along its length a gap which separates the ends of the core) would involve an objectionable amount of time, labor, and cost. To wind the coil in the usual way upon a straight core and to then attempt to bend the coil and core would be objectionable, first, because of the

opposition offered to the bending by the combined stiffness of the coil and core, and, next, because the act of bending the coil would necessarily break and injure it. To attempt to first bend or shape the core so as to bring it within the radius of a circle and to then slip thereon a previously-prepared coil is obviously out of the question.

The object of my invention is to produce in a rapid, simple, reliable, and economical way a spark-coil, wherein the core is brought substantially within the radius of a circle, thereby not only permitting the economical production of a highly-serviceable form of spark-coil, but also permitting the application of such coils to electric gas-lighting devices, such as shown in my said patent, without increasing to an objectionable extent the cost of the same.

To the attainment of the foregoing and other useful ends I form the core in the first instance of a plurality of straight and flat pliable metal strips, which are laid together flatwise and in sufficient number to provide a core of desired thickness. The wire is then wound upon the straight core thus composed of a series of comparatively thin and pliable flat metal strips, the manner of winding the wire being such as to form the coil into distinct coil sections or lengths, which, however, are all composed of a continuous wire. The result of this arrangement is in effect a coil provided with a straight core and having certain gaps or depressions formed at intervals along its length, which depressions can be made to a depth that will leave simply the thickness of a single wire upon the core at the points where they occur. After the completion of the winding in the manner aforesaid the core is bent and brought substantially within the radius of a circle. The gaps, notches, or depressions in the coil obviously provide weak points along the structure, so that while the core may be re-enforced and stiffened at points along its length by the coil lengths or sections the core will be left free to bend at the said weak points. While, therefore, the core can be bent at such points, its remaining portions that are covered by the coil lengths or sections will remain sub-

stantially straight, thereby avoiding any bending of or undesirable breakage in the coil, and further permitting the coil as an entirety to readily conform to the ultimate required shape of the core. During the act of bending the core the flat, pliable, and comparatively thin metal strips of which it is composed slide or shift upon one another to an extent to adapt themselves to the differences between the radii of the two circles, within which the inner and outer strips of the core are respectively brought, thereby permitting the bending to be done by hand with great ease and rapidity. Thus by taking one end of the coil in one hand and the opposite end of the coil in the other hand the operator can, with slight exertion, bend and bring the same substantially within the radius of a circle, and, in fact, if the coil is short enough, such bending can be effected by the use of but one hand.

The relationship between the core divided longitudinally into a plurality of thin flat pliable metal strips and the coil wound thereon in the manner aforesaid preparatory to bending the core will be obvious, since if the coil were wound in the ordinary way it would be objectionably broken by the act of bending the core, and also render such bending extremely difficult. If the coil were wound with gaps or notches along its length upon a core formed of a single bar of thickness suitable for the core, the structure would to some extent be weakened at the gaps; but in such case the core itself would offer to the attempt to bend it a resistance which would not only render the proper bending of the same a matter of considerable difficulty, but also render it extremely difficult to bend the core without breaking and injuring the coil.

It may also be observed that a core composed of a bundle of coarse wires would not answer the purposes of my invention, since in attempting to bend the same the wires would wedge together, and hence buckle up, in place of sliding and adjusting themselves, as in the case of a core composed of a set of flat pliable strips laid together flatwise and each extending the length of the core.

In the drawings, Figure 1 represents a portion of a spark-coil wound upon a core in accordance with my invention, the core being in its primary straight condition, but ready for bending. Fig. 2 is a longitudinal central section through Fig. 1. Fig. 3 represents, on a somewhat larger scale, a section taken transversely through the spark-coil. Fig. 4 represents the spark-coil, composed of three sections and arranged within the shell or casing of the battery-containing portion of an electric gas-lighting apparatus, wherein the spark-coil is brought substantially within the radius of a circle and disposed about a couple of battery-cells. Fig. 5 represents a like portion of an electric gas-lighting apparatus containing several battery-cells, with the surrounding spark-coil formed to comprise a com-

paratively large number of coil-sections. Fig. 6 represents the spark-coil brought into quadratic form.

In said drawings, A indicates the core, and B the wire coil which is wound about the same. The core comprises a plurality of flat pliable metal strips, *a*, which preparatory to winding the wire about the core are laid together flatwise and in a straight condition, as in Figs. 1, 2, and 3. The wire is then wound about the core, so as to provide upon the latter a plurality of connected coil sections or lengths. After the completion of such winding, the core is bent so as to bring it substantially within the radius of a circle, which feature, it will be observed, comprehends either the proximately-circular form in Fig. 4, the octagonal form shown in Fig. 5, the quadratic form shown in Fig. 6, or, obviously, other similar polygonal forms.

In Figs. 1 and 2 the coil is wound for producing the polygonal shape shown in Fig. 5, it being understood that after the flat strips are laid together, and preparatory to winding the wire about the same, a piece, C, of some suitable textile material or its equivalent, is usually wrapped about the core. The frequency of the gaps or notches *b* along the coil in Figs. 1 and 2 obviously permits the core to be bent, so as to provide a coil of the shape shown in Fig. 5, it being seen that the bends in the core occur at points adjacent to such notches. Where, for example, a coil of the form shown in Fig. 6 is to be produced, but three of such gaps in the coil will be necessary.

In Fig. 4 the bent core is provided with three coil-sections, of which the two end sections are somewhat larger in diameter than the middle section; and, further, the end sections are wound so as to have a swell or increased diameter along their middle portions, such winding of the coil being made with a view of accommodating the spark-coil to the space within the casing which is not occupied by the battery-cells D and gas-passage E, and which is hence available for the spark-coil.

In Fig. 5, where several battery-cells D are arranged about the gas-passage E, a substantially annular coil-receiving space is left between the circular casing F and such battery-cells, and hence the sections of the spark-coil may be made of uniform size throughout the coil.

In conclusion, it may be observed that spark-coils can be formed in accordance with the hereinbefore-described method with ease and rapidity, since the winding can be readily accomplished with the assistance of a lathe or other like device for revolving the straight core. It is also understood that said straight core can be readily bent into various shapes, all of which, however, may be comprehended under the term "within the radius of a circle."

What I claim as my invention is—

1. As an improvement in the manufacture of spark-coils, a core consisting of pliable metal strips laid together flatwise, and a winding which is wound to provide gaps or notches, such as set forth, the whole being substantially within the radius of a circle.
5 such as set forth, whereby the core may be readily bent and brought substantially within the radius of a circle.
2. A spark-coil consisting of a core formed

of pliable metal strips laid together flatwise, and a winding which is wound to provide gaps 10 or notches, such as set forth, the whole being substantially within the radius of a circle.

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