

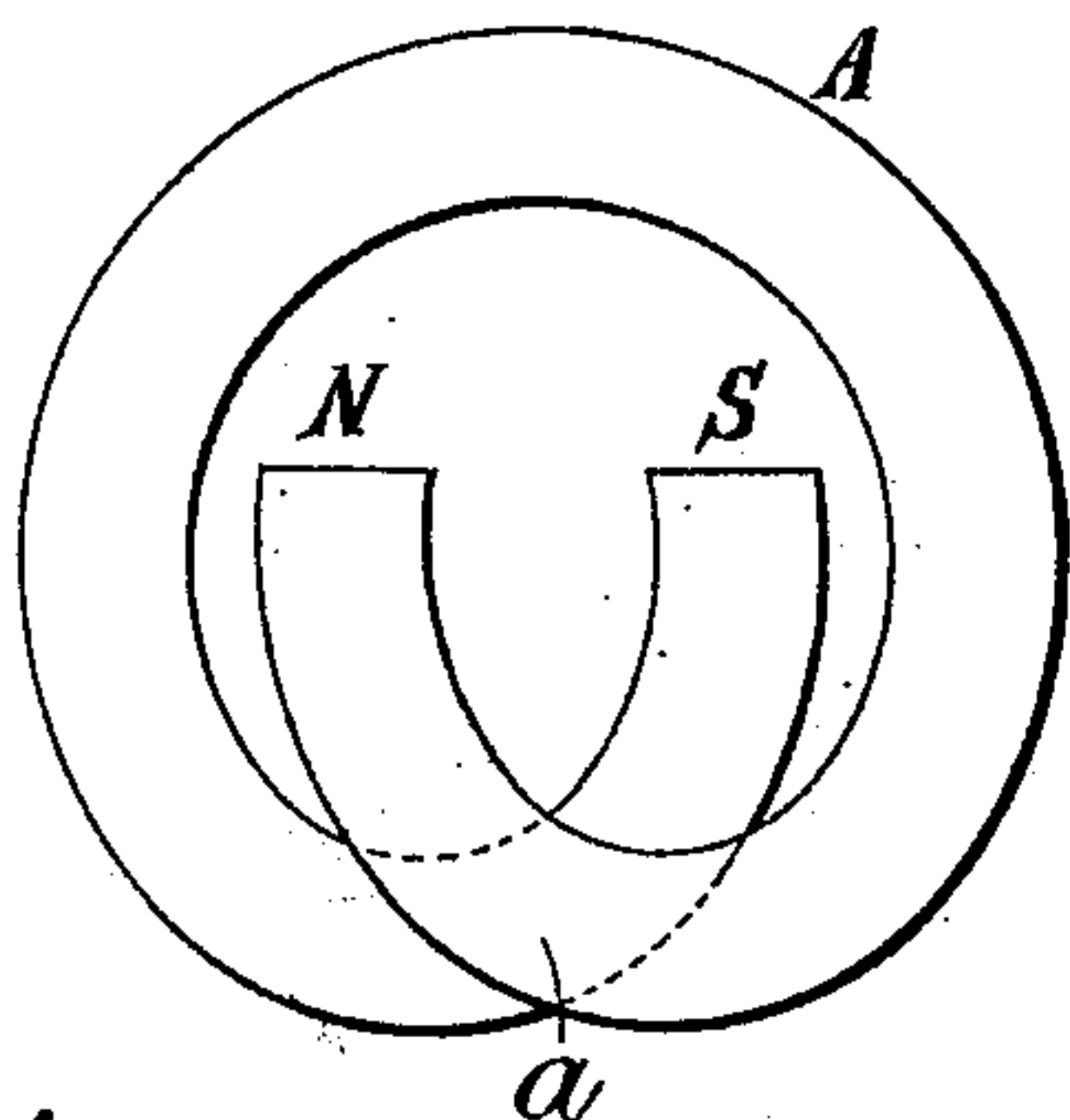
(No Model.)

A. T. COLLIER.  
PERMANENT MAGNET

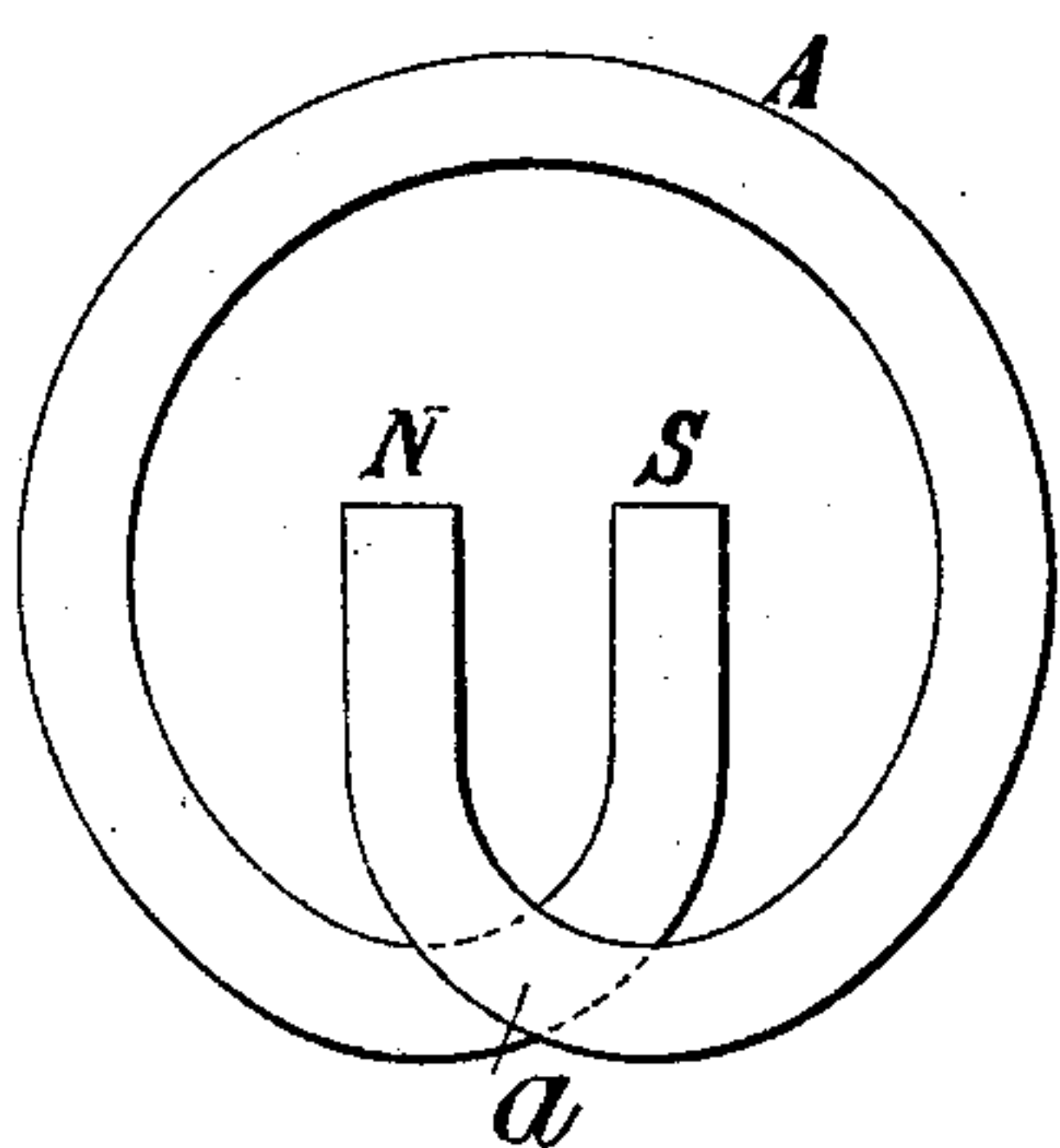
No. 518,092.

Patented Apr. 10, 1894.

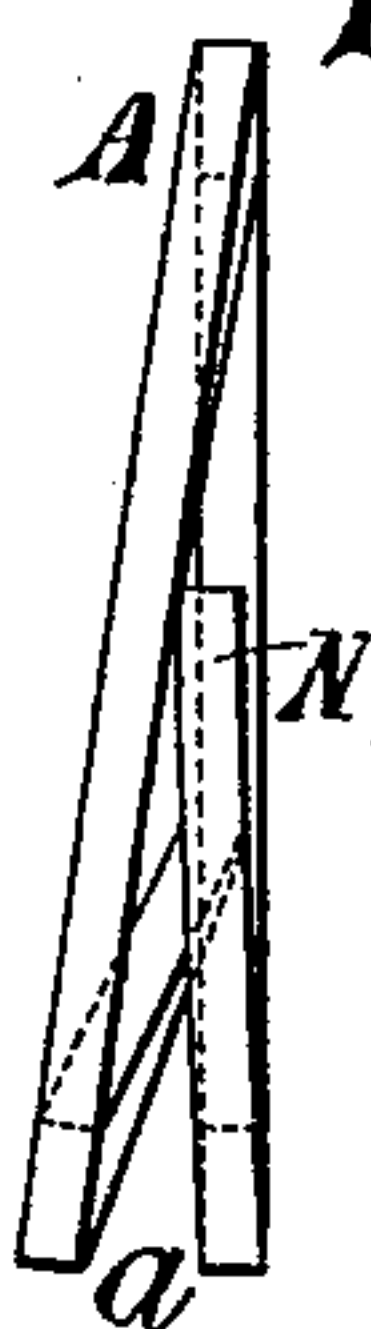
*Fig. 1.*



*Fig. 2.*



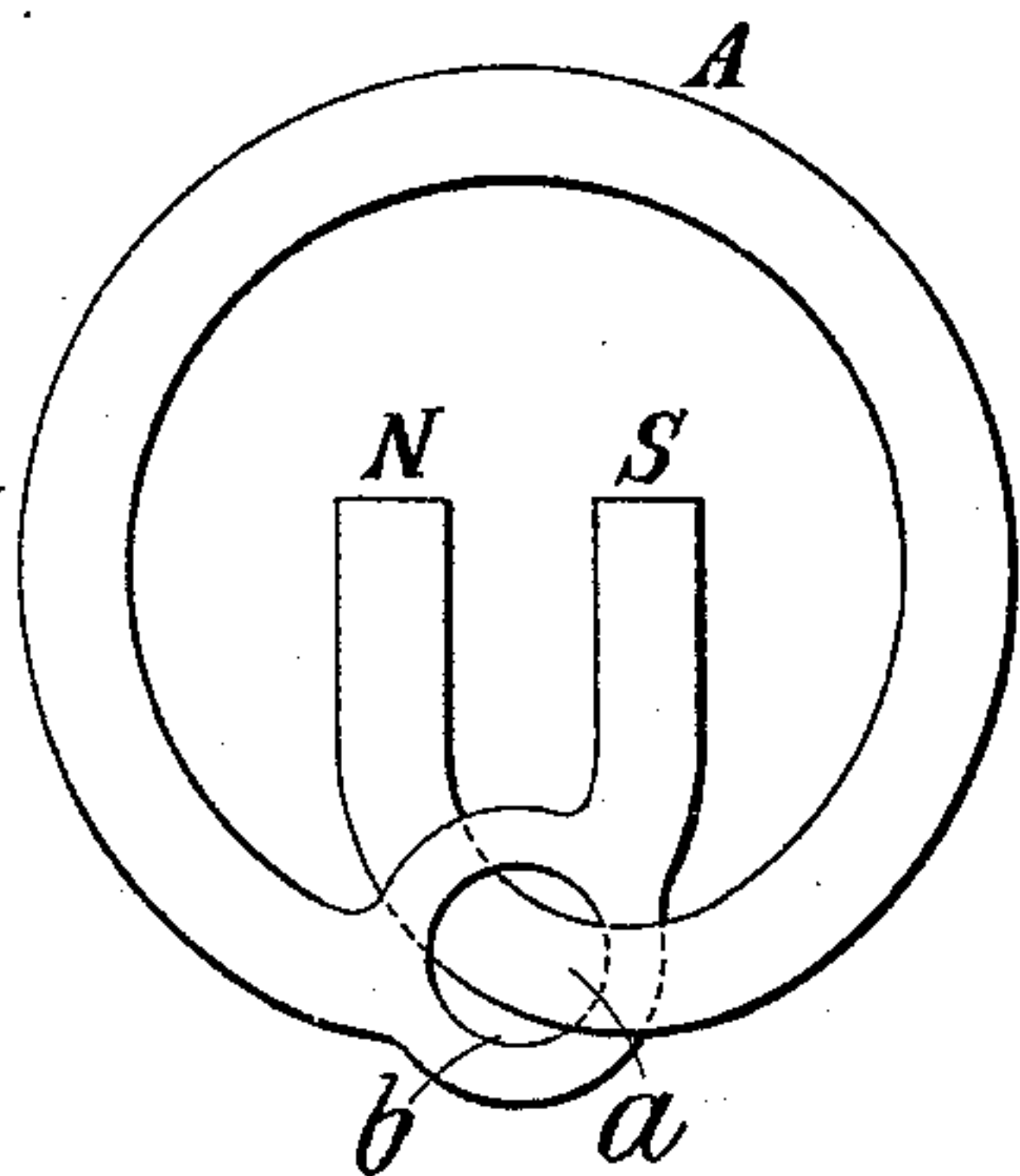
*Fig. 3.*



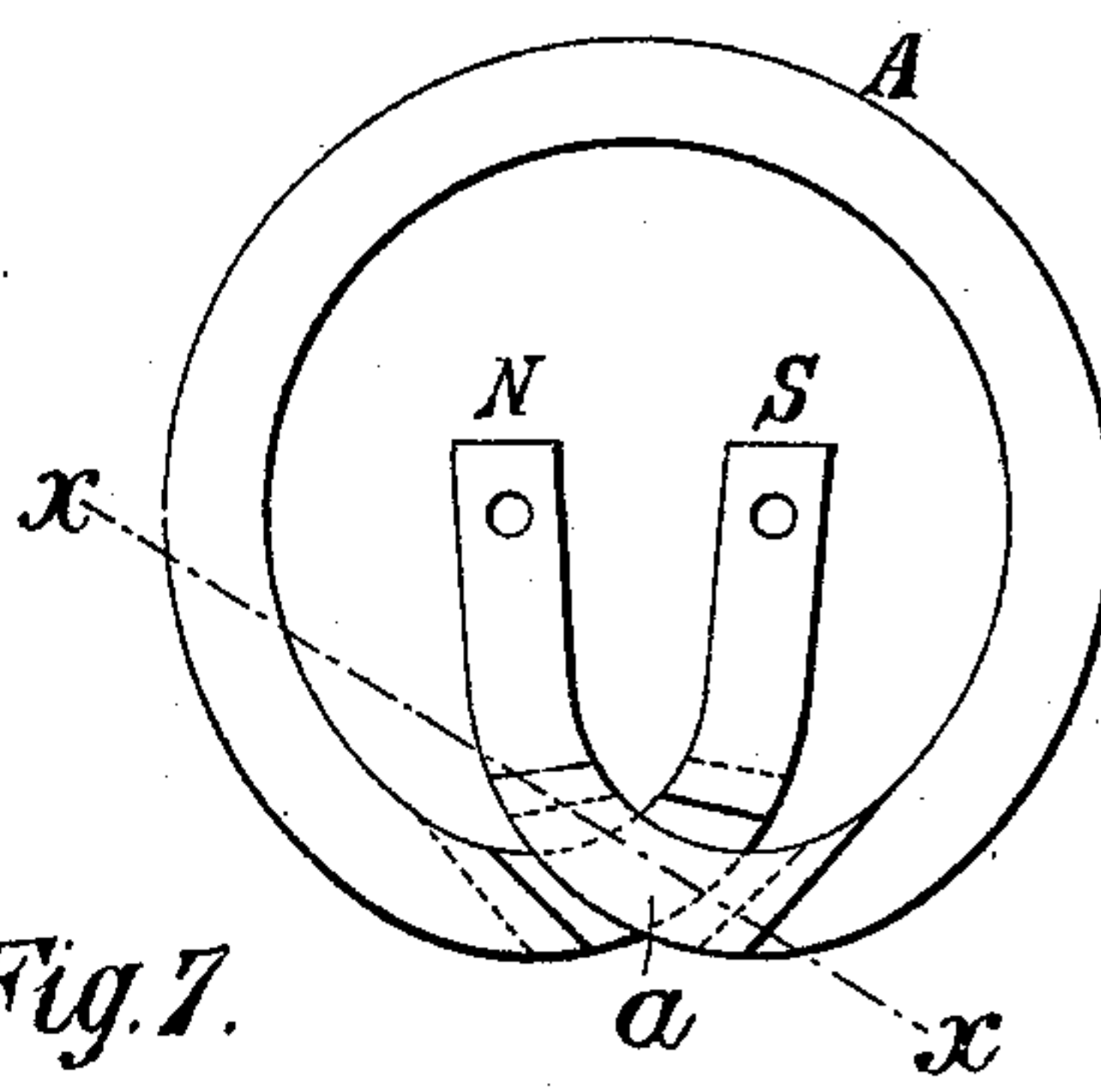
*Fig. 4.*



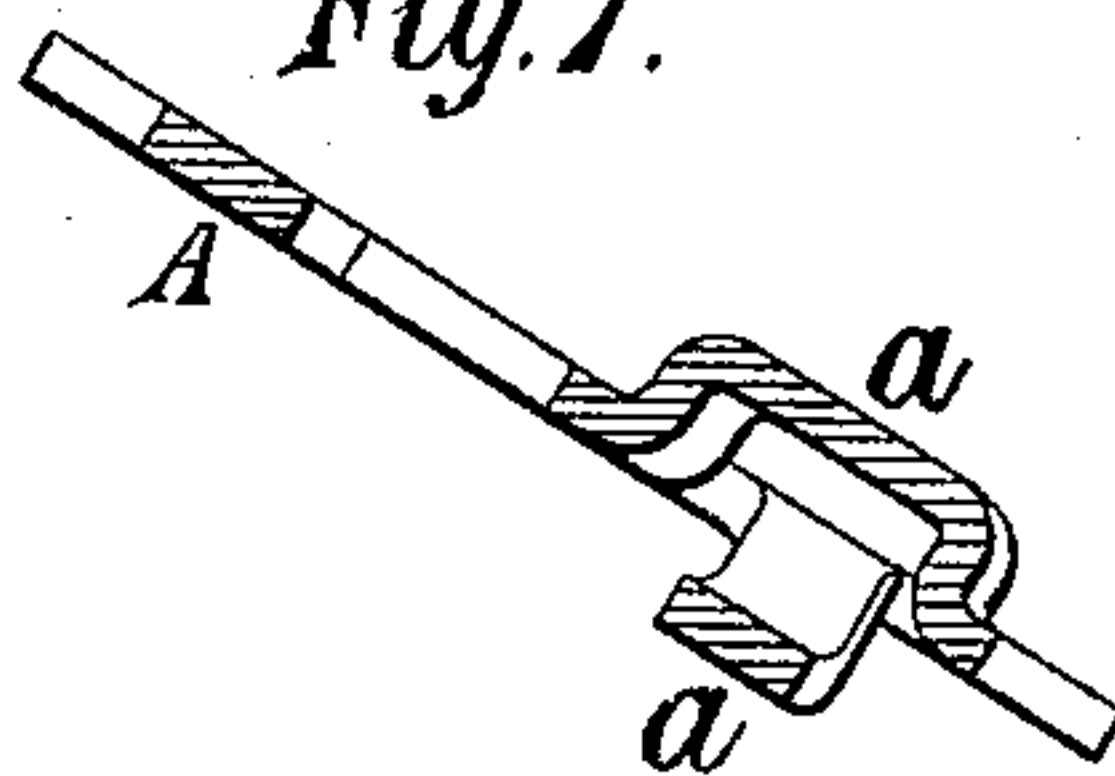
*Fig. 5.*



*Fig. 6.*



*Fig. 7.*



Witnesses;  
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J. A. Saul.

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# UNITED STATES PATENT OFFICE.

ARTHUR THOMAS COLLIER, OF ST. ALBANS, ENGLAND, ASSIGNOR TO THE  
AMERICAN BELL TELEPHONE COMPANY, OF BOSTON, MASSACHUSETTS.

## PERMANENT MAGNET.

SPECIFICATION forming part of Letters Patent No. 518,092, dated April 10, 1894.

Application filed January 8, 1894. Serial No. 496,057. (No model.)

*To all whom it may concern:*

Be it known that I, ARTHUR THOMAS COLLIER, electrician, a subject of the Queen of Great Britain, residing at St. Albans, in the county of Herts, England, have invented an Improved Permanent Magnet, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 is a face view of one form of my improved magnet. Fig. 2 is a face view, and Fig. 3 an edge view, showing another form of my improved magnet. Fig. 4 is an edge view of a laminated magnet made in accordance with my invention. Fig. 5 is a face view of another form or modification of my improved magnet. Fig. 6 is a face view, and Fig. 7 a section on the line  $x, x$ , Fig. 6, showing a further modification of my improved magnet.

This invention has for its object to provide a new and improved permanent magnet; and to this end it consists in a magnet composed of a bar or bars formed as a loop or coil having the ends crossing each other, and both extending inward toward the interior of the loop or coil to constitute two poles.

It is well known to scientists that steel bars of great length in proportion to their transverse-sectional area, are capable of being more highly and uniformly magnetized and also of retaining their magnetism for a longer period than bars of similar metal whose length is small compared with their transverse sectional area.

Now the object of my invention is to provide a magnet of great strength in proportion to the space which it occupies, and one which will retain its magnetism for a long period. For this purpose I make the bar or bars from which the magnet is to be made, in the form of a loop or coil the ends of the said bar or bars being curved or turned inward or toward the center of the said loop or coil in such a manner that the limbs of the magnet cross each other. I thus make a magnet of great length in proportion to its weight, and one which has a central field and which, being approximately circular and having its limbs crossed, occupies but a small space in propor-

tion to the length of its bar or bars. The said bar or bars may be bent to the required shape, or they may be stamped to approximately the required shape and then bent so that the two limbs of the magnet cross each other. A further advantage gained by the crossing of the limbs of the magnet as above described is, the alternate arrangement of the polarities of the different parts of the magnet, each pole being situated between the other pole and the bow of the corresponding limb of the magnet. Neutralization of the magnetism and consequent demagnetization of the magnet are thus avoided.

Referring to the accompanying drawings, A is a bar of steel from which the magnet is made. N and S are the poles of the said magnet.

In the magnet shown in Figs. 1, 2 and 3, the bar A is curved approximately in the form of a circle with the two ends curved or turned inward so as to cross each other at  $a$ , a suitable intervening space being left at that point to prevent undue magnetic leakage between the two limbs of the magnet. It is obvious that this and the other forms of my improved magnet hereinafter described may be made laminated, as shown, for example, in Fig. 4.

In Fig. 5 I have shown a magnet in which the end of one of the limbs is passed through an aperture  $b$  formed in the other limb.

Figs. 6 and 7 show another method of forming the bar or bars A so as to arrange the same as much as possible in one plane. For this purpose each limb is formed with an outward bend or curve at the point  $a$  where the limbs cross each other. In this manner a magnet is formed which adapts itself more readily to attachment to any flat surface.

My improved magnet may be very advantageously employed in any apparatus in which a strong permanent magnet is required having a central field.

It is obvious that the form of my improved magnet may be still further modified without departing from the nature of my said invention, which consists in so constructing the magnet that it has the form of a loop or coil,



the two limbs thereof being curved or turned inward or toward the center of the said loop or coil so that they cross each other.

What I claim is—

- 5 A magnet consisting of a bar or bars formed as a loop or coil having the ends crossing each other and both extending inward toward the

interior of the loop or coil to constitute two poles, substantially as described.

ARTHUR THOMAS COLLIER.

Witnesses:

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