

A. GREEN.  
ELECTROMAGNET.

APPLICATION FILED NOV. 14, 1901.

NO MODEL.

Figure 1.

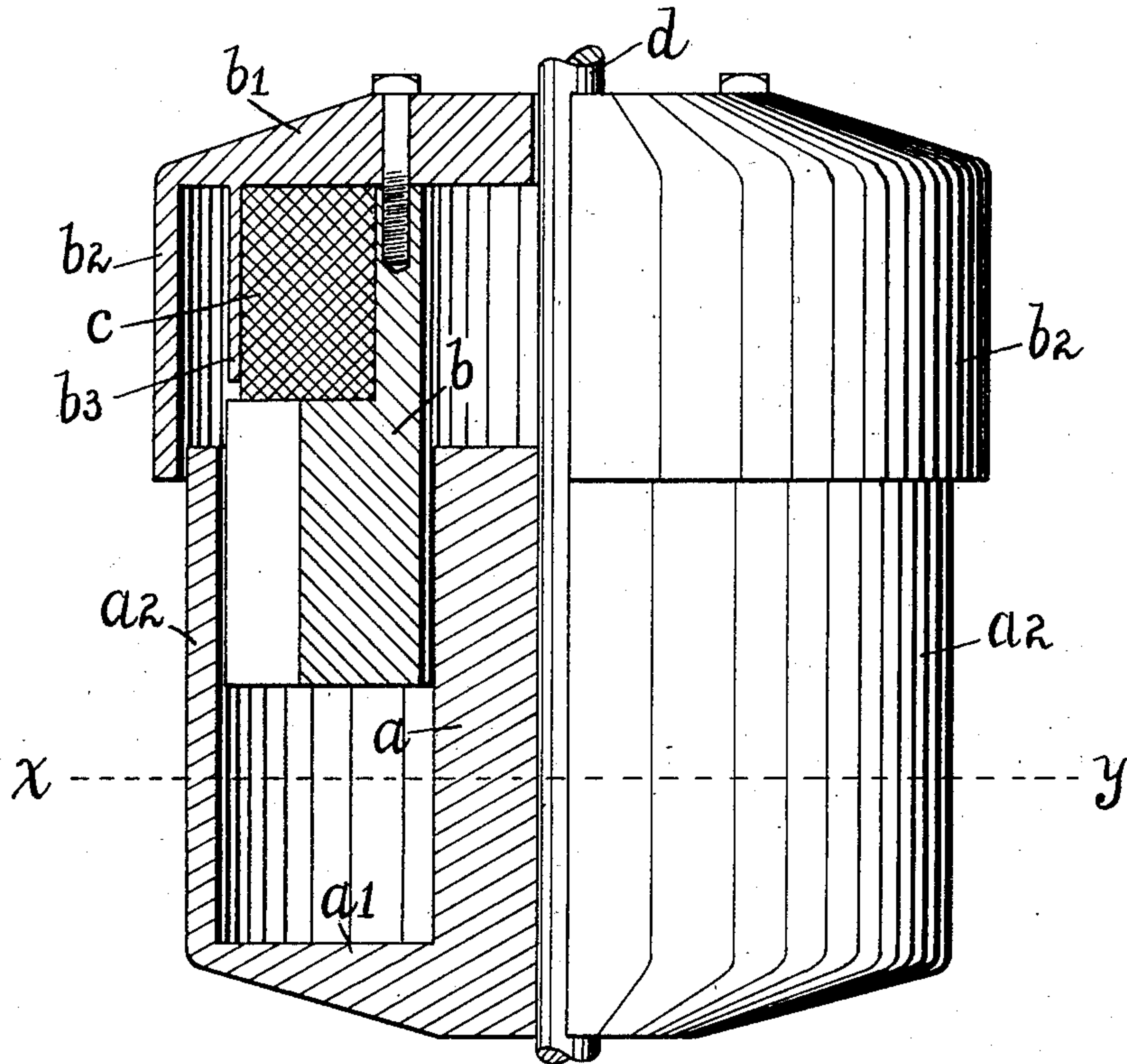
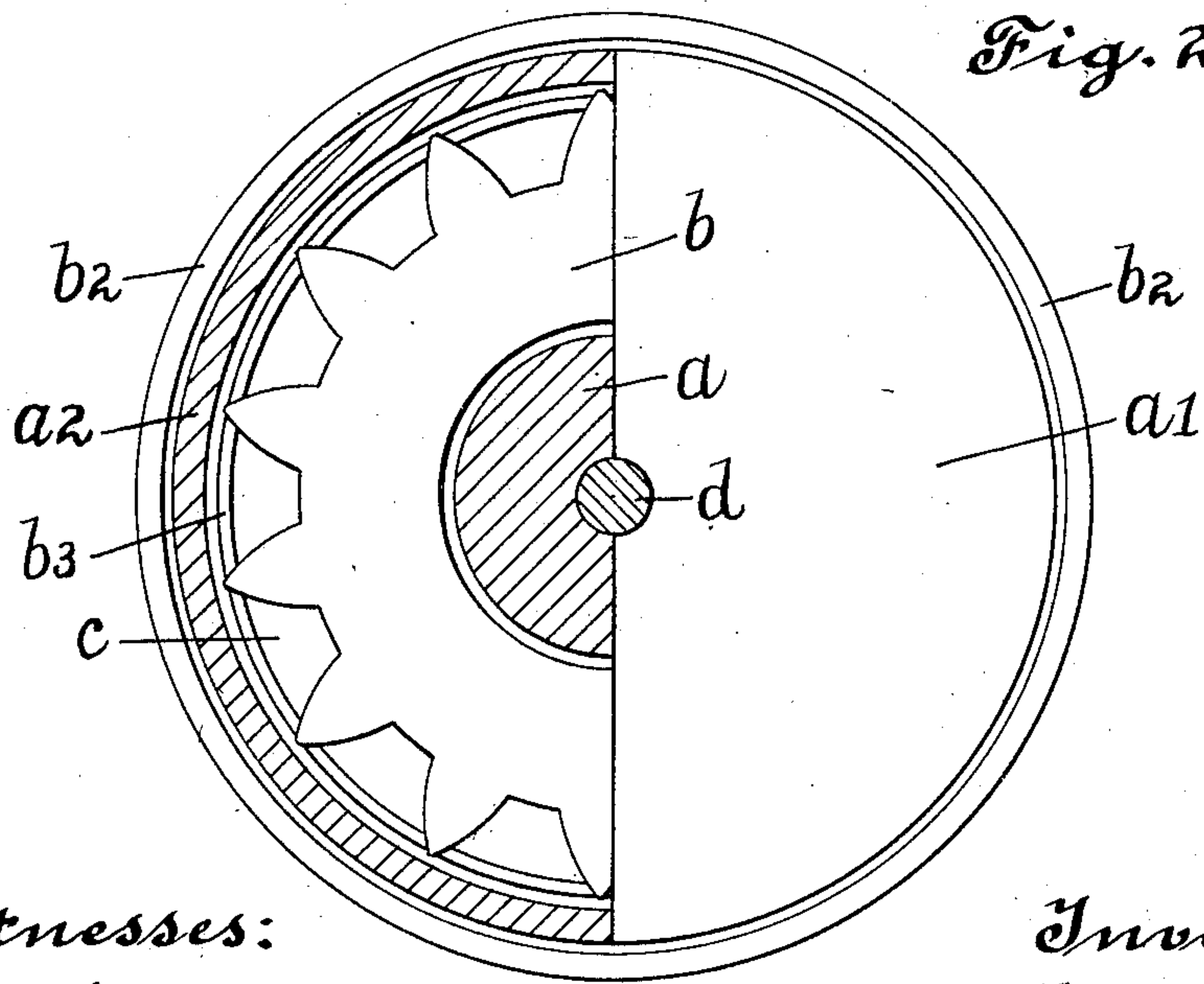


Fig. 2.



Witnesses:

Albert C. Bell.

Etha M. Smith.

By his Atty.

Inventor

Alfred Green.

Wm. H. Cooley.



## UNITED STATES PATENT OFFICE.

ALFRED GREEN, OF ROCHESTER, NEW YORK.

## ELECTROMAGNET.

SPECIFICATION forming part of Letters Patent No. 735,755, dated August 11, 1903.

Application filed November 14, 1901. Serial No. 82,290. (No model.)

*To all whom it may concern:*

Be it known that I, ALFRED GREEN, a citizen of the United States, residing at Rochester, in the county of Monroe and State of New York, have invented a new and Improved Electromagnet, of which the following is a specification.

I have found in some cases where one element of an electromagnetic system moves in close proximity to, but not in contact with, another element of the same system that by corrugating or forming teeth or ridges on one of such elements practically parallel with the direction of motion between the elements superior results are secured—that is, results measurably superior to what I have been able to obtain by the use of a plain smooth surface. I have tried such electromagnets with the surfaces of the members plain or smooth, and then after cutting teeth in one of such members in the manner described have secured results far superior to what were secured by the use of smooth surfaces, and then, again, after cutting off the teeth a material decrease in the attractive force of the electromagnet was noticed. These experiments have been confined thus far to cylindrical constructions, and after trying a number of proportions such an arrangement and proportioning of the parts as shown in the accompanying drawings has been able to secure the most satisfactory results.

The accompanying drawings, illustrating an electromagnet constructed in accordance with my invention, are as follows:

Figure 1 shows to the right of the vertical central line such an electromagnet in side view, while to the left of such central line the magnet is seen in a vertical sectional view. Fig. 2 shows to the right of the vertical central line a view of such an electromagnet from the bottom, while to the left of the central line in this figure there is seen a sectional view of the left-hand half of such an electromagnet, taken along the line  $xy$  of Fig. 1.

Referring to the drawings, the movable element of my electromagnet is constituted by the cylindrical member  $a$ , rigidly secured to the vertical sliding rod  $d$ , which may receive any suitable guides. (Not shown.) Integral

with this cylindrical member  $a$  is seen the end section  $a'$  and the outer cylindrical section  $a^2$ . The fixed member of my electromagnet consists in the cylindrical member  $b$ , bolted, as indicated, to the end section  $b'$ , which may receive any suitable support (not shown) and having formed integral therewith the outer and inner cylindrical sections  $b^2$  and  $b^3$ . This cylindrical element or member  $b$  is turned off at its upper end so as to form a shoulder or seat for retaining and supporting the energizing-coil  $c$ . The lower enlarged portion of this member  $b$  has teeth cut on its outer periphery, as indicated in the drawings. The outer section  $a^2$  of the movable element of the electromagnet as it moves upward travels in the annular space between the outer periphery of the energizing-coil  $c$  and the inner periphery of the section  $b^2$  of the fixed element of my electromagnet. The cylindrical section  $a$  of course moves freely within the section  $b$  as the movable element of my electromagnet travels upward. When the coil  $c$  is energized, the member  $a$  is drawn upward within the member  $b$  until this member  $a$  contacts with the lower surface of the disk-like end section  $b'$ . At the same time the upper surface of the outer cylindrical extension  $a^2$  contacts with the under surface of this same member  $b'$ .

I have found that the use of a member such as shown at  $b$  and having teeth substantially such as shown in Fig. 2 secures a greater range of operativeness and greater pull than I have been able to secure when using in place of the member  $b$  a plain cylindrical member with the outer periphery smooth instead of toothed, whether of a diameter the same as that of the outer points of the teeth shown on this member  $b'$  or of a diameter such as would be secured by the entire removal of the teeth or of the same diameter as the upper portion contained within the coil  $c$ .

I prefer to so proportion the parts  $b^2$ ,  $b^3$ , and  $a^2$  that a considerable proportion of the lines shall be caused to pass between the elements  $b^3$  and  $a^2$ . Hence by the use of the member  $b^3$  I secure first an attraction between members  $a^2$  and  $b^3$  in the direction, or nearly so, of the motion of the movable member and then

an increased path for the rapidly-increasing density which takes place with the upward travel of the members  $a$ ,  $a'$ , and  $a^2$ .

What I claim is—

- 5 1. In an electromagnet, two cylindrical cup-shaped elements, the outer cylindrical portion of one arranged to slide freely within that of the other, the inner one of such elements having also an inner cylindrical member between  
10 which and its outer cylindrical member there is arranged to freely slide a coil-supporting member secured to the other cup-shaped element and having teeth or corrugations formed on its outer periphery.  
15 2. In an electromagnet, two cylindrical cup-

shaped elements, the outer cylindrical portion of one arranged to slide freely within that of the other, the inner one of such elements having also an inner cylindrical member between which and its outer cylindrical member there  
20 is arranged to slide freely a coil-supporting member secured to the other cup-shaped element and having teeth or corrugations formed on its outer periphery, and encircled throughout some portion of its length by the energiz-  
25 ing-coil of such electromagnet.

ALFRED GREEN.

Witnesses:

W. O. INGLE,

FRANK J. VICK.