

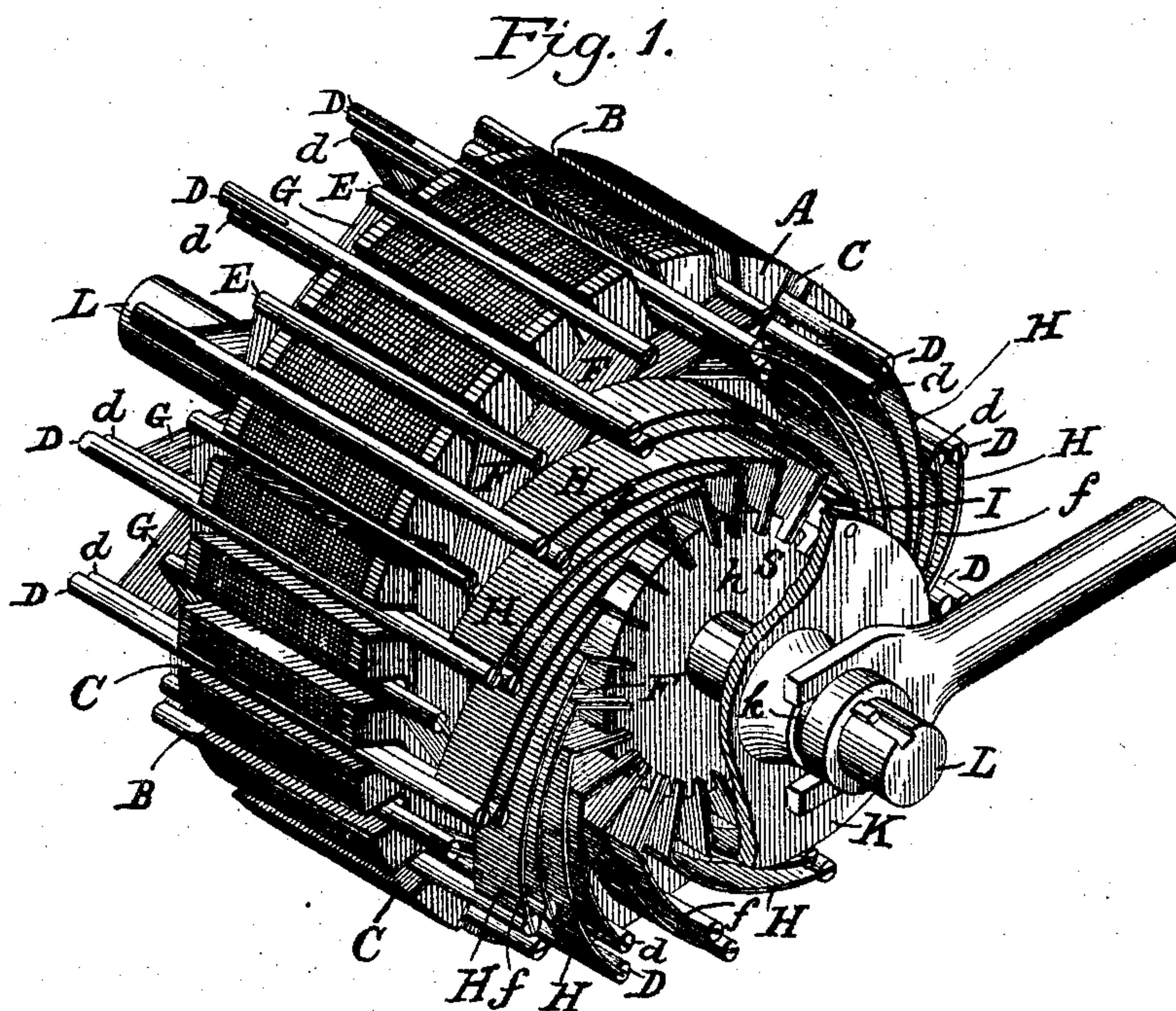
(No Model.)

2 Sheets—Sheet 1.

A. L. CUSHMAN.  
ARMATURE FOR INDUCTION MOTORS.

No. 554,617.

Patented Feb. 11, 1896.



Witnesses.  
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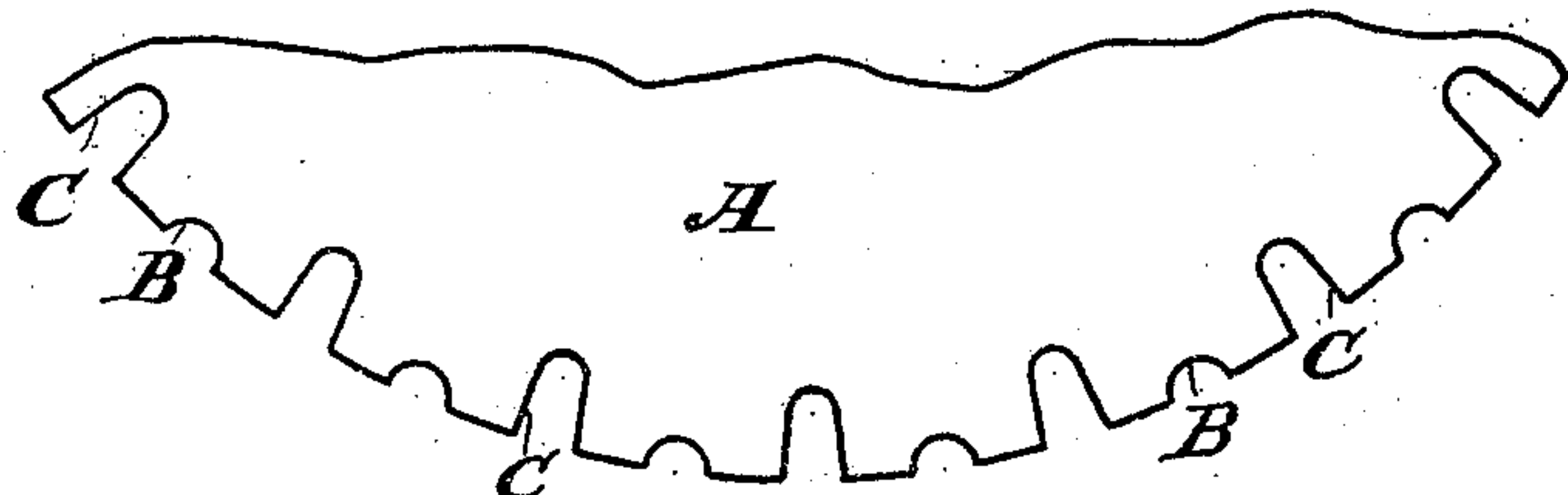
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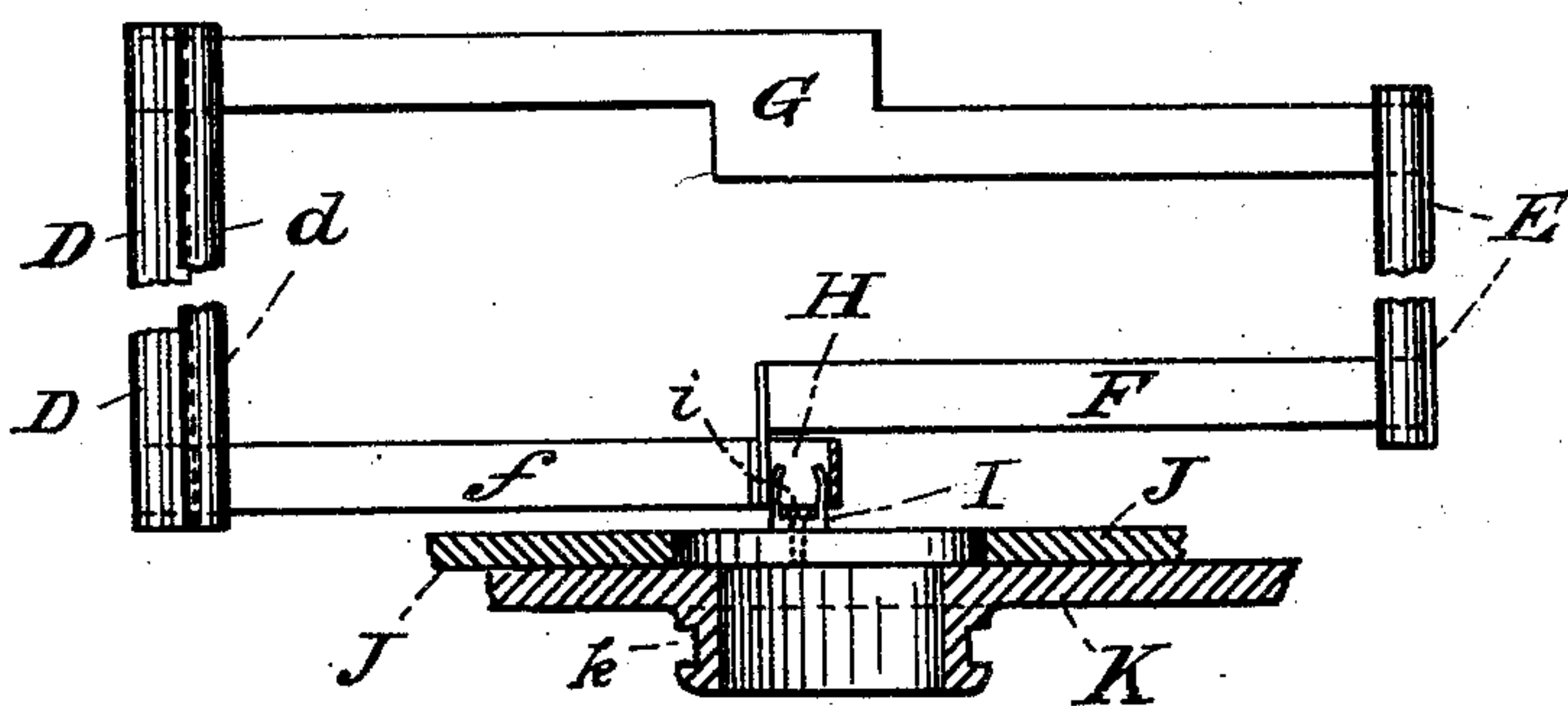
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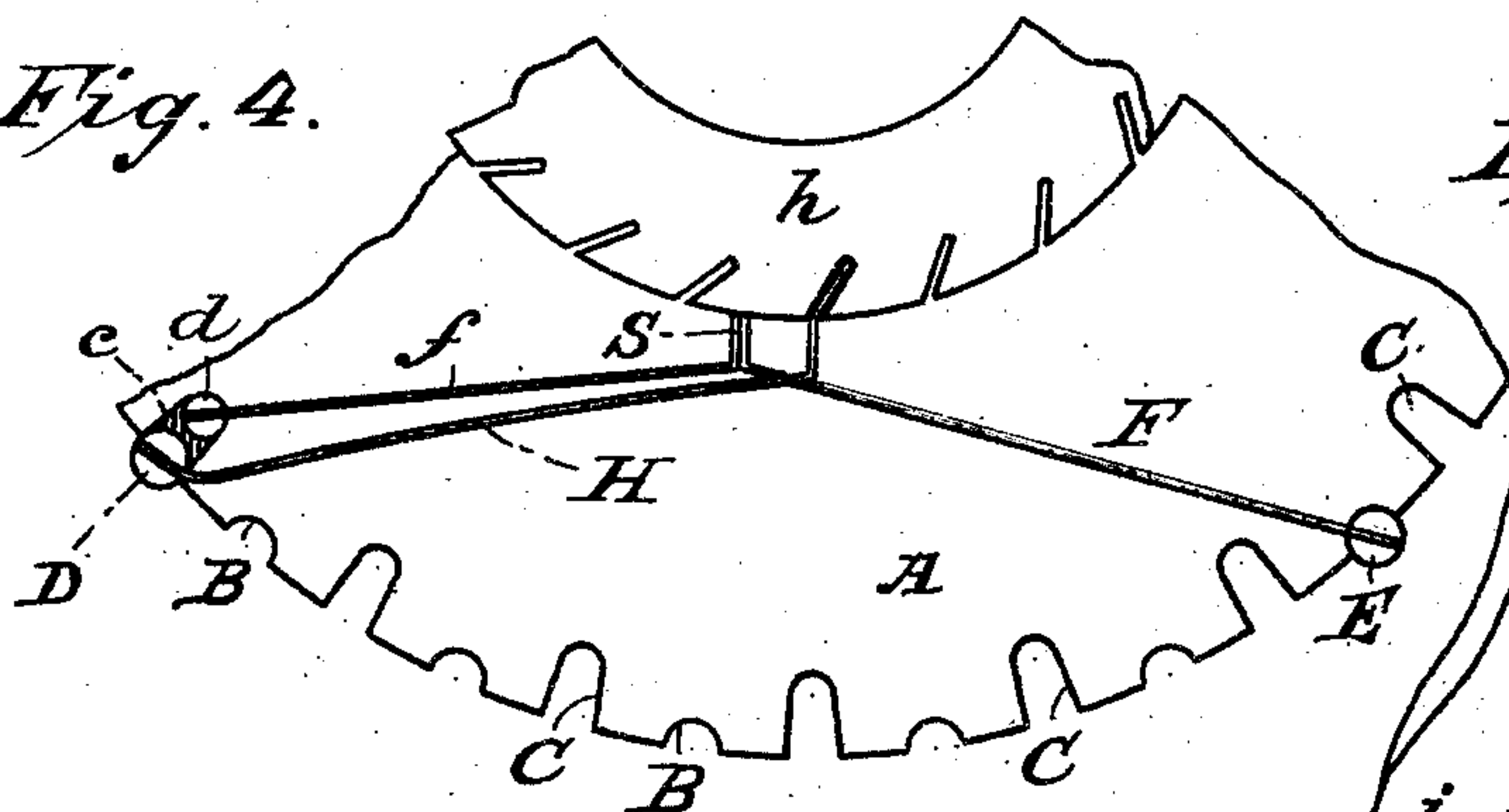
*Fig. 2.*



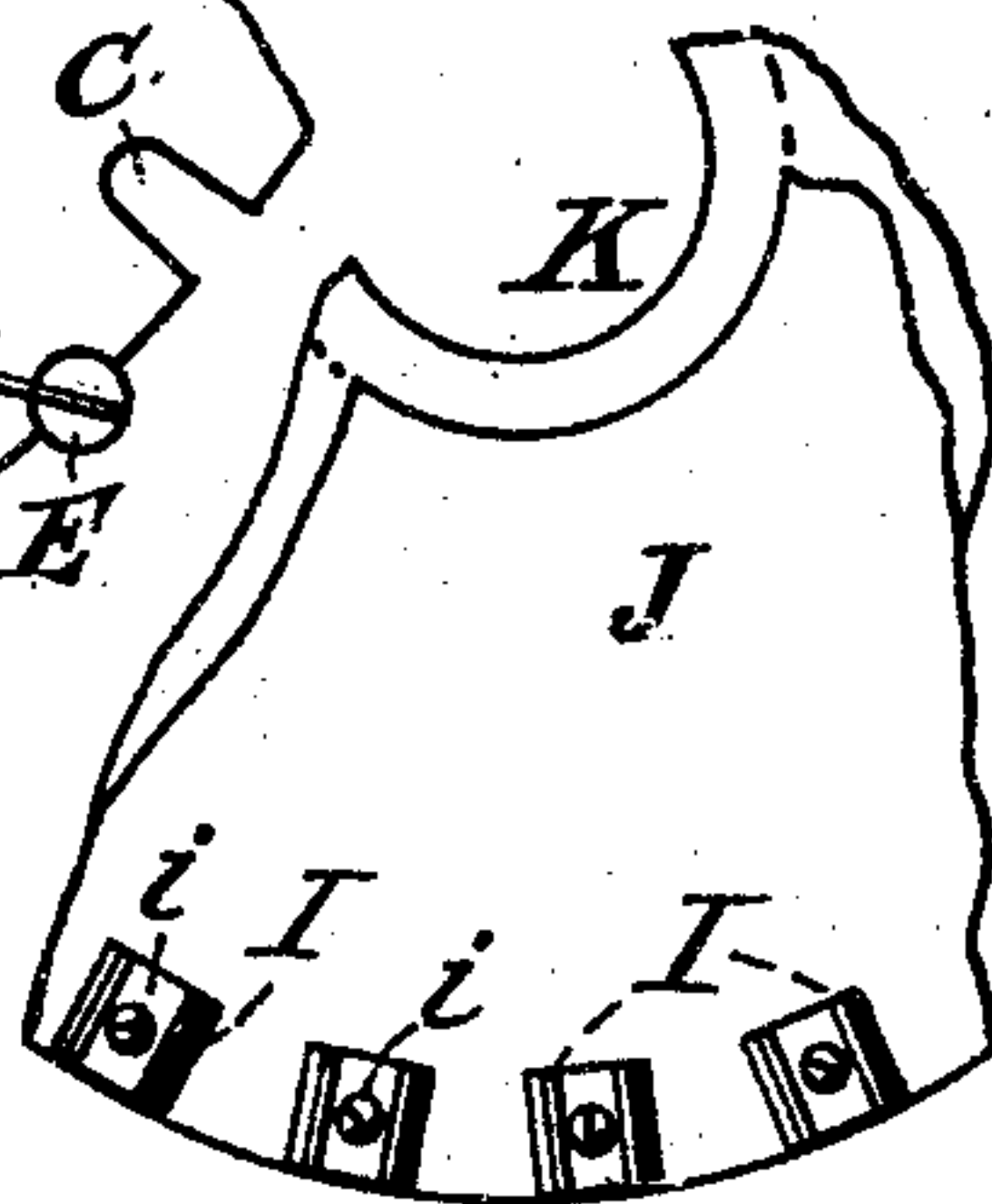
*Fig. 3.*



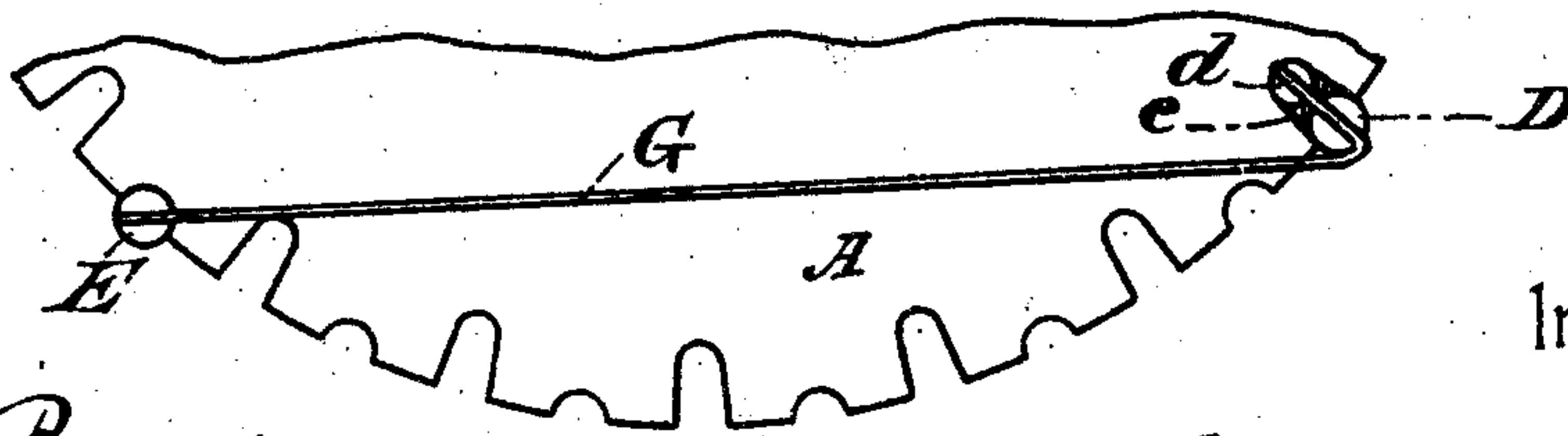
*Fig. 4.*



*Fig. 5.*



*Fig. 6.*



Witnesses

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By his Attorney *J. B. Thurston*



# UNITED STATES PATENT OFFICE.

ABE L. CUSHMAN, OF CONCORD, NEW HAMPSHIRE.

## ARMATURE FOR INDUCTION-MOTORS.

SPECIFICATION forming part of Letters Patent No. 554,617, dated February 11, 1896.

Application filed March 30, 1895. Serial No. 543,785. (No model.)

*To all whom it may concern:*

Be it known that I, ABE L. CUSHMAN, a citizen of the United States, residing at Concord, in the county of Merrimac and State of New Hampshire, have invented certain new and useful Improvements in Armatures for Induction-Motors; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to armatures for induction-motors, which combine resistance-coils for securing a good starting torque.

The objects of my present invention are to provide a good starting torque and to control the speed and power of motors of this character in as simple a manner as possible.

To this end my invention consists essentially in providing an armature with coils, each containing one German-silver or low-resistance bar and one copper bar connected in series, all said bars being active elements in the coils, and means for cutting out the German-silver or low-resistance bars.

As far as I am aware, my present invention differs from any other motor in which resistance is employed for the reason that my resistance forms part of the regular armature-windings.

The accompanying drawings show an embodiment of my invention.

Figure 1 is a perspective view of my improved armature, showing a portion of the short-circuiting sleeve broken away. Fig. 2 is a broken elevation of the laminated core, in which are shown the grooves in which are placed the coils. Fig. 3 is a detached broken plan view of one of the windings, showing means for cutting out the resistance-windings. Fig. 4 shows the connections for one coil-winding at that end in which the resistance is placed. Fig. 5 is a detached broken elevation of a disk which carries the contact points or plates for cutting out the resistance. Fig. 6 is a broken elevation of the laminated core, showing the connection for one of the windings at that end opposite to that shown in Fig. 4.

Similar letters denote corresponding parts throughout the several views.

A is a laminated core, having grooves B C,

in which are placed the coils or bars D, *d*, and E, which are connected in sets at their ends, as shown, each pair, D *d*, being connected with a bar E, distant about one-fourth the circumference of the core, which forms one coil or winding. At one end the connection is made as seen in Figs. 1, 3, and 4, and the other as seen in Figs. 3 and 6 and by dotted lines in Fig. 1. The coil-bar E at one end is connected to the coil-bar *d* by the end connections F *f*, the bar F being composed of copper and the bar *f* of German silver, or other material possessed of high electrical resistance, and soldered or otherwise firmly secured, as at S, while the opposite end is provided with an end connection G, which is formed of copper and connects one end of both bars D *d* with the bar E direct, thus forming a coil or winding comprising within itself a resistance, as has been shown. Now in order after starting and having attained the desired speed to cut out the resistance I may attach one end of a bar H to that end of the bar D which is adjacent to the resistance *f*, carrying its free end to a suitable ring or collar *h*, (composed of insulating material,) to which it may be attached, as shown.

The German-silver coil or bar *d* being connected by the connections *f*, F and G with the coil-bars D E a resistance is combined with each coil of the armature, and to cut out the resistance after starting the motor it is only necessary to bring the connections F H at one end of each coil in contact, and a simple means for accomplishing this is shown in the drawings, which consists in the contact plugs or points I, attached by screws or rivets *i* to a ring J, formed of some insulating material and carried upon a collar K, which may be mounted and arranged to move horizontally upon the arbor or shaft L of the armature.

It is obvious that the free end of the bar H may be carried to a convenient point for contact with the bar F in other ways than I have shown, and so also may the contact-points I, which are shown for making the electrical connection between the connecting-bars F H, be otherwise arranged and still retain the essential features of my invention. Hence in order to prevent complications and to present



the important points of my invention in as clear a manner as possible I have shown and described but one means of reducing my invention to practice.

- 5 The collar K may be moved toward and away from the bars F and II (automatically, if desired) by any suitable means applied to its groove k, the latter being shown in Figs. 1 and 3.
- 10 The general features in the construction of my improved armature may be briefly expressed as follows: The core is provided with longitudinal grooves formed deep and shallow alternately and coil-bars placed therein,  
15 the shallow grooves containing one bar and the deeper grooves containing two bars, one of copper and the other of German silver or any higher resistance, insulated from each other and connected at one end by copper  
20 and at the other by copper and German-silver bars, as follows: To one end of the German-silver bar *d* is attached a German-silver strip *f*, the opposite end of which is secured to one end of a copper strip F, so as to form  
25 a good electrical contact. The opposite end of the said strip F is connected to the bar E, which forms a circuit through the German-silver bar *d*, copper strip G, copper bar E, copper strip F, and German-silver strip *f* in  
30 starting the motor. When the desired speed has been attained, the German-silver bar *d* and German-silver strip *f* are cut out of the circuit, which is then formed through the  
35 copper bars D E and their copper connections F G II by short-circuiting the strips F

II by any well-known mechanism, or by such as shown at I & J, Fig. 5.

Having described my invention, what I claim is—

1. In an armature for induction-motors, a 40 coil composed of an active high-resistance portion and two or more low-resistance portions, the high-resistance portion and one of the low-resistance portions being constantly in series, and means for cutting out the high 45 resistance, substantially for the purpose described.

2. In an armature for induction-motors, coils composed of an active high-resistance portion and two low-resistance portions, the 50 high-resistance portion and one of the low-resistance portions being constantly in series, and a switch so arranged as to connect the second low-resistance portion in multiple with the high-resistance portion. 55

3. An armature for induction-motors having coils or windings composed of active high-resistance portions and low-resistance portions, one of the high-resistance portions and one of the low-resistance portions being constantly in series, and suitable means for connecting the low-resistance portions in multiple with the high-resistance portions. 60

In testimony whereof I affix my signature in presence of two witnesses.

ABE L. CUSHMAN.

Witnesses:

J. B. THURSTON,  
JOHN KELLY.