

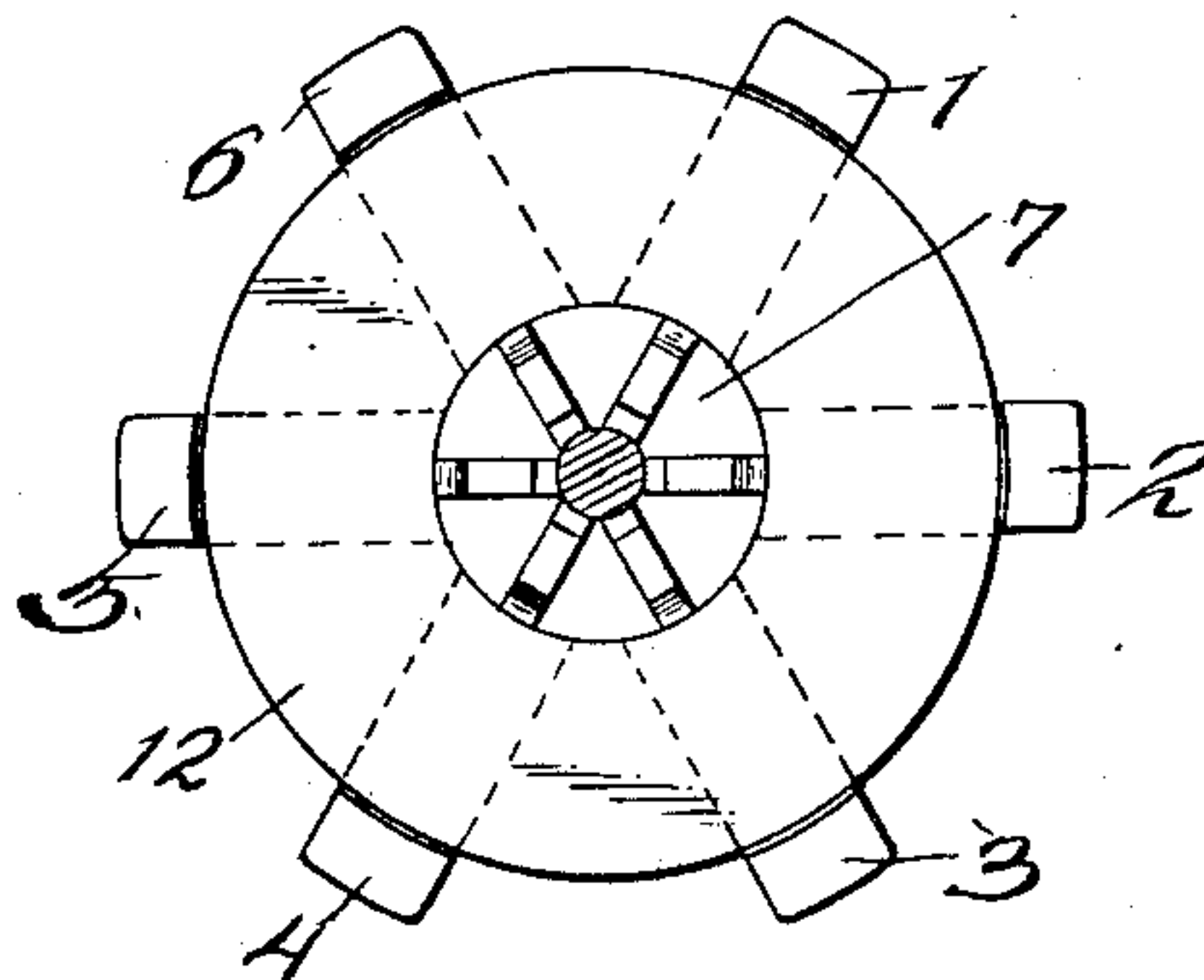
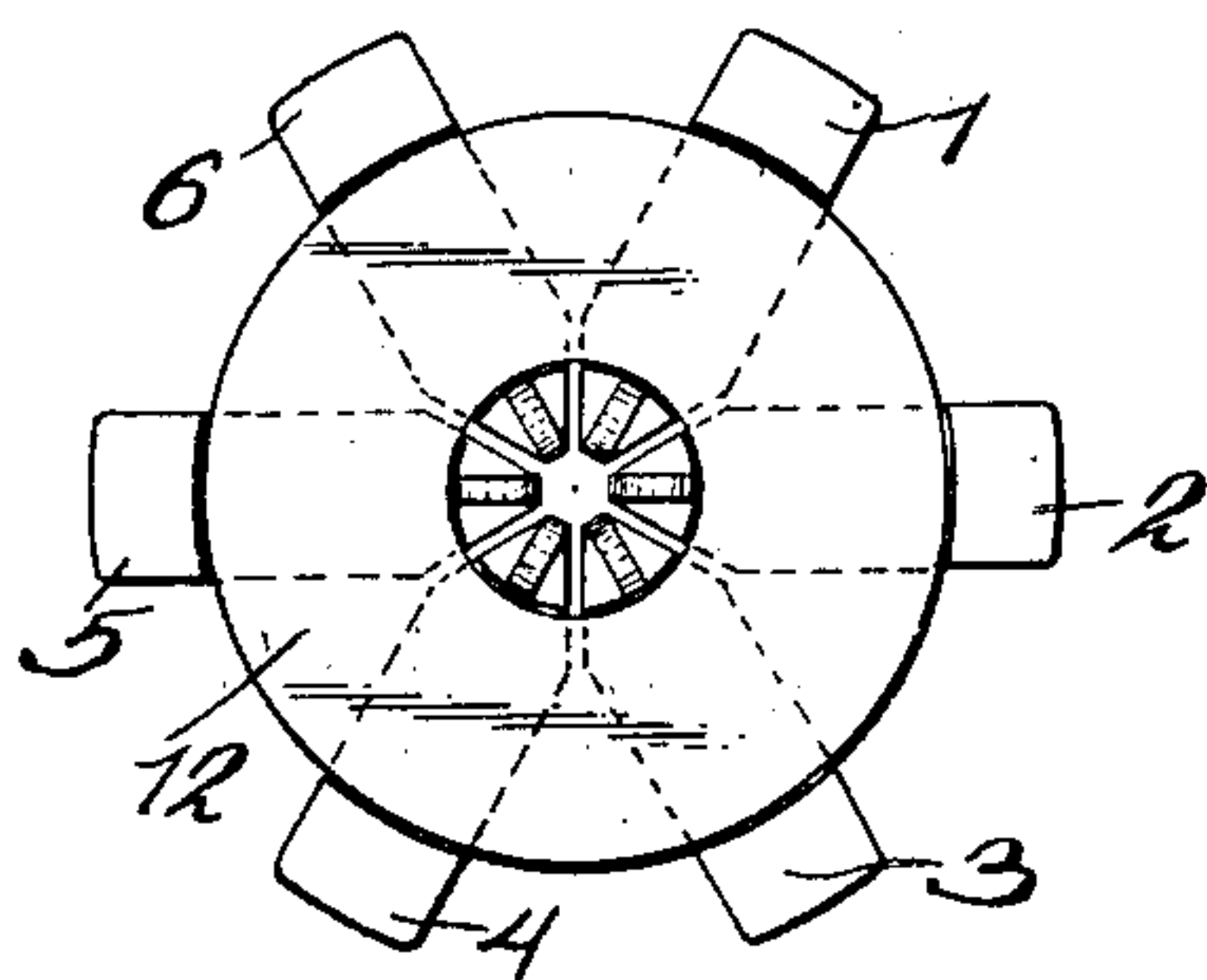
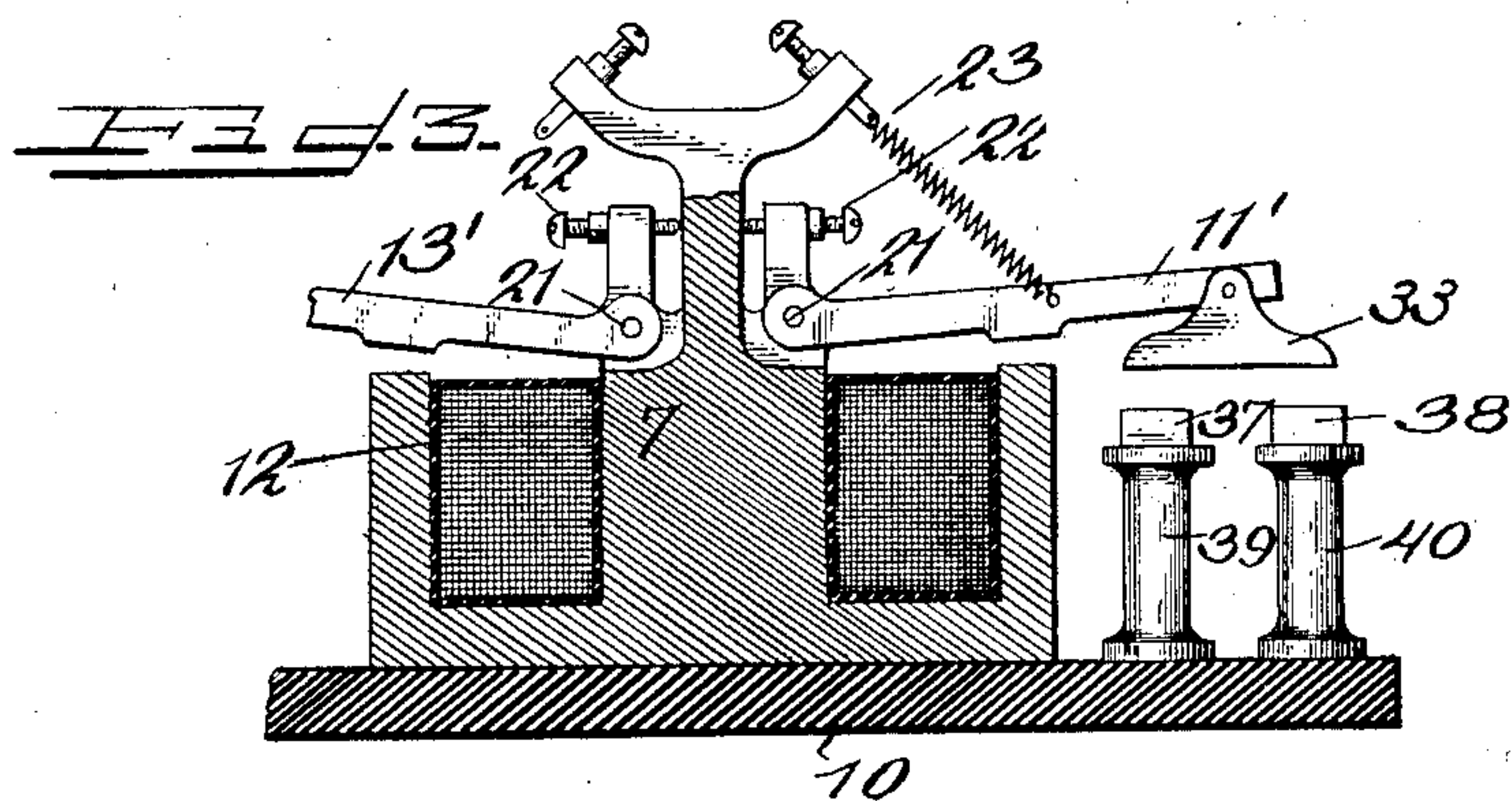
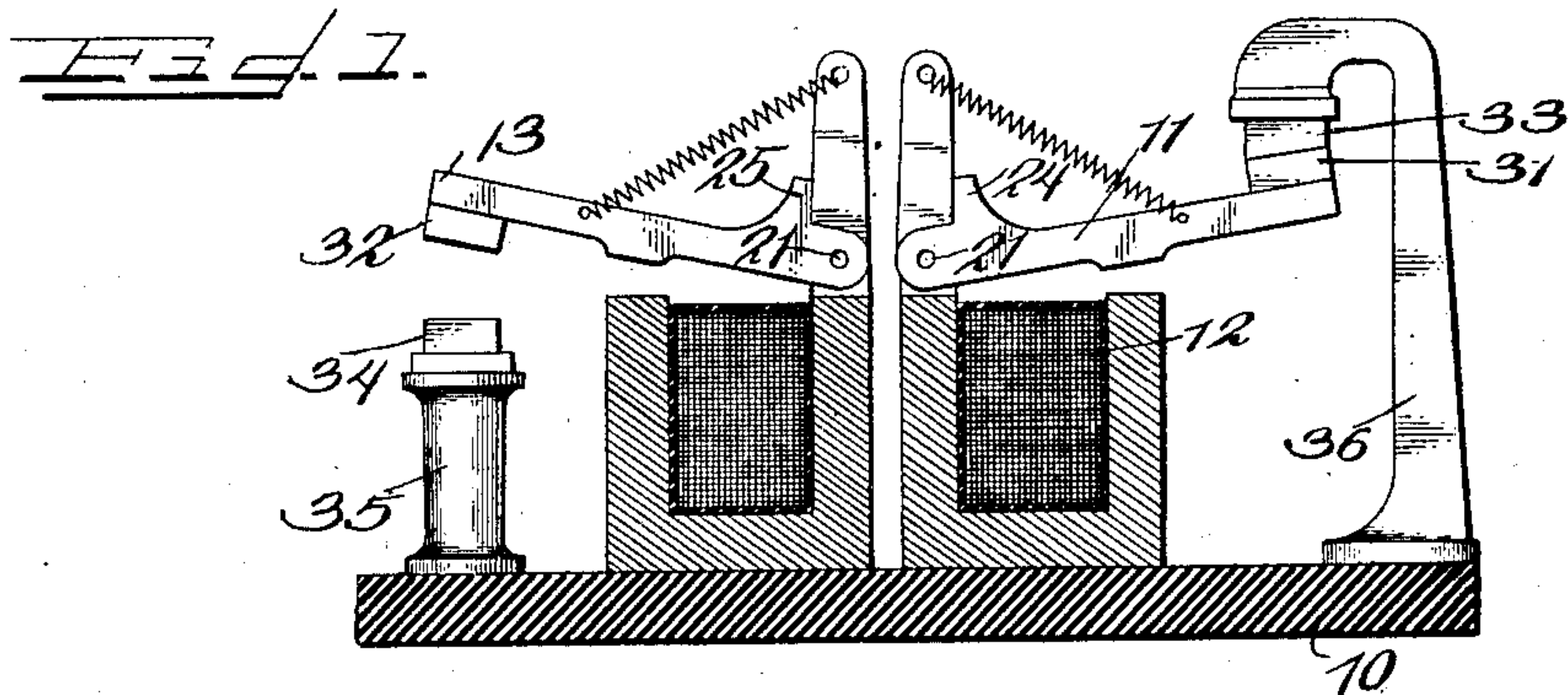
No. 731,741.

PATENTED JUNE 23, 1903.

W. BAXTER, JR.
ELECTROMAGNET.

APPLICATION FILED NOV. 21, 1902.

NO MODEL.



WITNESSES.

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ELECTROMAGNET.

SPECIFICATION forming part of Letters Patent No. 731,741, dated June 23, 1903.

Application filed November 21, 1902. Serial No. 132,222. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM BAXTER, Jr., a citizen of the United States, and a resident of Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Electromagnets, of which the following is a specification.

My invention relates to improvements in electromagnets, and has for its object to provide a simple and cheap construction of such electromagnets as are used where several can be energized by one coil. There are many places where such magnets can be used—as, for example, in operating a plurality of switches for turning on and off lights or for cutting out the starting resistance of electric motors.

Another object of my invention is to construct electromagnets with short magnetic paths and to arrange them so that they can be energized by a small coil, thus gaining great efficiency.

I attain these objects in the construction and arrangement of parts herein set forth.

Referring to the accompanying drawings, Figure 1 represents in sectional elevation a preferred arrangement of my magnets. Fig. 2 is a plan view of the same with the switch-arms and contacts left off. Fig. 3 represents in sectional elevation a modification of this device, and Fig. 4 a plan view of the modification shown in Fig. 3.

Referring to the drawings, similar figures of reference indicate corresponding parts in the various figures.

10 represents a base, preferably of some insulating material.

1, 2, 3, 4, 5, and 6 represent the cores of the magnets placed radially about a common center. 12 is a coil of wire placed around these cores, so as to energize them all simultaneously. 11, 13, 11', and 13' are switch-arms and constitute the armatures of these magnets. They are pivoted at 21 21. They carry contact-pieces of carbon or other suitable material, as shown at 31, 32, and 33. These switch-arms are kept normally in the open position shown in the drawings by means of springs, or when desired, can be kept in this position by gravity by inverting the position of the apparatus. At the left of Fig. 1 is shown an arrangement used when it is de-

sired to have this magnet close a contact. The post 35, which is fastened to the base 10, carries a contact-block 34, which is so placed as to complete a circuit when the armature 13 is attracted by the magnet and contact 32 brought down against the contact-block 34. At the right of Fig. 1 is shown an arrangement for opening a circuit. In this case the base 36 is so shaped that its contact-block 33 touches a contact-piece 31 when the switch-arm is in its normal or open position. Whenever the arm is attracted to its core, it will separate these contacts 31 33. If it is desired to break one circuit and also make another with the same switch-arm, it is evident that this can be readily accomplished by adding another contact to the under side of the arm 11 and placing a post like that shown at 35 directly under it.

In Figs. 3 and 4 I have shown another modification of this device. In this case the cores of the several magnets are made in one piece with a common central core 7 and radial arms 1, 2, 3, 4, 5, and 6. The arrangement of the magnetizing-coil in this case is the same as that last described. In Fig. 3 I have shown the contact-piece 33 pivotally attached to the armature 11' to insure good contact and arranged to close a circuit between two contacts 37 and 38, mounted on separate posts 39 and 40. I have shown at 22 22 set-screws for adjusting the upward movement of the switch-arms 11' 13' and at 23 an adjustable spring for controlling its downward movement. By these means the arms 11' and 13', &c., can be so adjusted that they will be operated successively and progressively according to the variations in the magnetic effect of the current passing through the coils of the magnet 12. This effect is desirable to obtain when this device is used for cutting out the starting resistance of electric motors. Another way this result can be obtained is by regulating the air-gap in the magnetic circuits.

In both the arrangement shown in Fig. 1 and that shown in Fig. 3 I have made the switch-arms 11, 13, 11', and 13', &c., form a part of the magnetic circuits. This is a desirable feature, as a very short air-gap, as well as a short magnetic circuit, is thus obtained. The air-gaps between these arms and their respective cores can be readily adjusted

by the set-screws 22 22. In this way the several switch-arms may be so adjusted that different strengths of current in the coil 12 will be required to attract them. In case it is not
 5 desired to have these air-gaps adjustable they can be made of the desired length and the arms provided with fixed stops, as shown at 24 25.

The cores shown in Fig. 1 are of what is
 10 known as the "horseshoe" type. Those shown in Fig. 3 are similar; but in this case the central arms of all the magnets are united in one common core. By arranging the magnets radially the magnetizing-coil, which sur-
 15 rounds one arm of each magnet in Fig. 1 or the common core 7 in Fig. 3, can be circular in form, so that the wire required will be of the shortest possible length. When separate
 20 cores are used, I prefer to make the inner arms, or those which go inside of the magnetizing-coil, of such shape that they will go together closely, so as to utilize space within the coil and enable me to use a coil with as
 25 small an inside diameter as possible. It is evident that this arrangement with short magnetic paths and the shortest length of wire required in the magnetizing-coil gives great efficiency.

Having thus described my invention, what
 30 I claim as new, and desire to secure by Letters Patent, is—

1. The combination of two or more switch-arms arranged in radial lines, each arm piv-
 35 oted to a support and forming part of a magnetic circuit, the magnetizing-flux in the several switch-arms being induced by one magnetizing-coil, substantially as described.

2. The combination of two or more switch-arms arranged in radial lines, each arm piv-
 40 oted to a support and forming part of a magnetic circuit, the magnetic flux in the several switch-arms being induced by one circular magnetizing-coil, means for holding said arms against the attraction of the magnets, sub-
 45 stantially as described.

3. The combination of two or more switch-arms arranged in radial lines, each arm piv-
 50 oted to a support and forming part of a magnetic circuit, the magnetic flux in the several switch-arms being induced by one circular magnetizing-coil adjustable means for holding said arms against the attraction of the magnets, substantially as described.

4. The combination of two or more electro-
 55 magnets of the horseshoe type, mounted on a base, arranged with one arm of each magnet within a common circular magnetizing-coil, the other arms of said magnets arranged radially from the center of said coil, an arma-
 60 ture for each magnet carrying contact-pieces which work in conjunction, with other contact-pieces mounted on standards which are attached to said base substantially as described.

5. The combination of two or more electro-
 65 magnets of the horseshoe type, mounted on a base, arranged with one arm of each mag-

net within a common circular magnetizing-coil, the other arms of said magnets arranged radially from the center of said coil, an arma-
 70 ture for each magnet-carrying contact-pieces which work in conjunction, with other contact-pieces mounted on standards which are attached to said base, means for independ-
 75 ently adjusting the armatures, substantially as described.

6. An electromagnet having a plurality of magnetic circuits all going through a common central core, an energizing-coil surrounding said central core, a plurality of cores, extend-
 80 ing radially from said central core, switch-arms pivoted to said central core and arranged to form a part of each magnetic circuit, substantially as described.

7. An electromagnet having a plurality of
 85 magnetic circuits all going through a common central core, a circular energizing-coil surrounding said central core, a plurality of cores, extending radially from said central core, a plurality of arms, pivoted to said cen-
 90 tral core and arranged to operate electric switches, and means for independently adjusting said arms, substantially as described.

8. In a multiple magnet the combination of two or more movable switch-arms each form-
 95 ing part of a magnetic circuit and a magnetizing-coil, the magnetic flux in the several switch-arms being induced by said coil, substantially as described.

9. In a multiple magnet the combination of
 100 two or more movable switch-arms each forming part of a magnetic circuit and a magnetizing-coil, the magnetic flux in the several switch-arms being induced by said coil, and means for normally holding said arms against
 105 the attraction of the magnet, substantially as described.

10. In a multiple magnet the combination of two or more movable switch-arms each forming part of a magnetic circuit and a mag-
 110 netizing-coil, the magnetic flux in the several switch-arms being induced by said coil, and adjustable means for holding said arms against the attraction of the magnets, substantially as described.

11. The combination of two or more mag-
 115 nets of the horseshoe type, arranged with one arm of each magnet within a common circular magnetizing-coil, stationary contact-pieces, an armature for each magnet carrying con-
 120 tact-pieces, which act in conjunction with said stationary contact-pieces.

12. The combination of two or more elec-
 125 tromagnets of the horseshoe type mounted on a base, arranged with one arm of each magnet within a common circular magnetizing-coil, contact-pieces mounted on standards which are attached to said base, an armature for each magnet carrying contact-pieces which act in conjunction with said stationary con-
 130 tact-pieces.

13. An electromagnet having a plurality of magnetic circuits all going through a common core, an energizing-coil surrounding said com-

mon core, a plurality of cores extending from said common core, switch-arms pivoted to said common core and arranged to form part of each magnetic circuit.

5 14. An electromagnet having a plurality of magnetic circuits all going through a common central core, an energizing-coil surrounding said central core, a plurality of cores extend-
10 ing from said central core, a plurality of arms pivoted to said central core and arranged to operate electric switches and means for inde-
pendently adjusting said arms.

15 15. An electromagnet having a plurality of magnetic circuits all going through a common core, an energizing-coil surrounding said com-
mon core, a plurality of movable arms ar-
ranged to form part of each magnetic circuit
and each arranged to short-circuit a part of
the magnetic flux.

20 16. An electromagnet having a plurality of magnetic circuits all going through a common core, an energizing-coil surrounding said com-

mon core, a plurality of movable arms ar-
ranged to form part of each magnetic circuit,
each arranged to short-circuit a part of the 25
magnetic flux, and electric switches operated
by said arms.

17. An electromagnet having a plurality of
magnetic circuits all going through a common
core, an energizing-coil surrounding said com- 30
mon core, a plurality of movable arms ar-
ranged to form part of each magnetic circuit,
each arranged to short-circuit a part of the
magnetic flux, electric switches operated by
said arms, and means for independently ad- 35
justing said arms.

In testimony whereof I have signed my
name to this specification in the presence of
two subscribing witnesses.

WILLIAM BAXTER, JR.

Witnesses:

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ERNEST W. MARSHALL.