

(No Model.)

2 Sheets—Sheet 1.

J. F. McLAUGHLIN.
ELECTRIC CLUTCH.

No. 432,209.

Patented July 15, 1890.

Fig. 1.

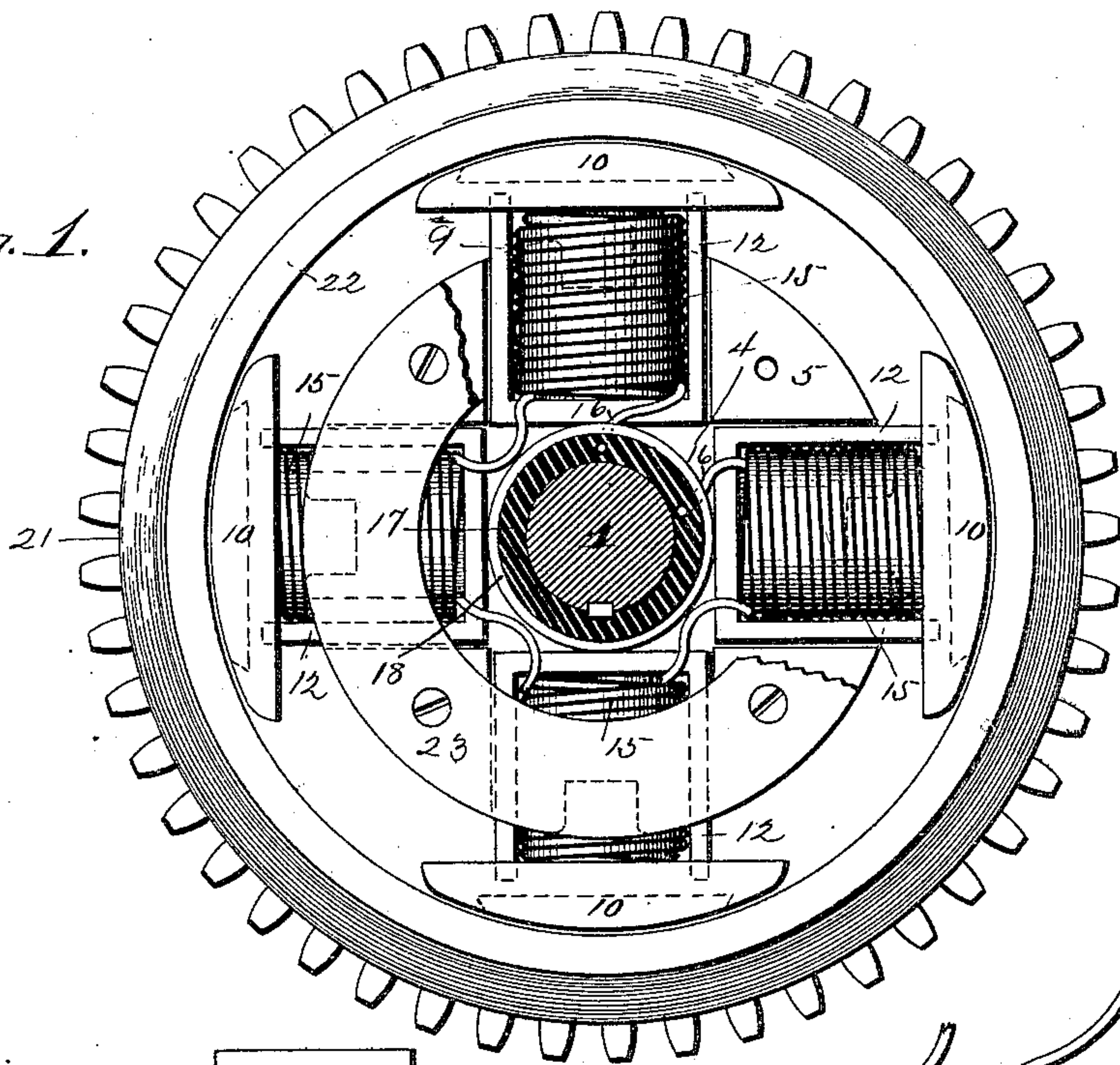
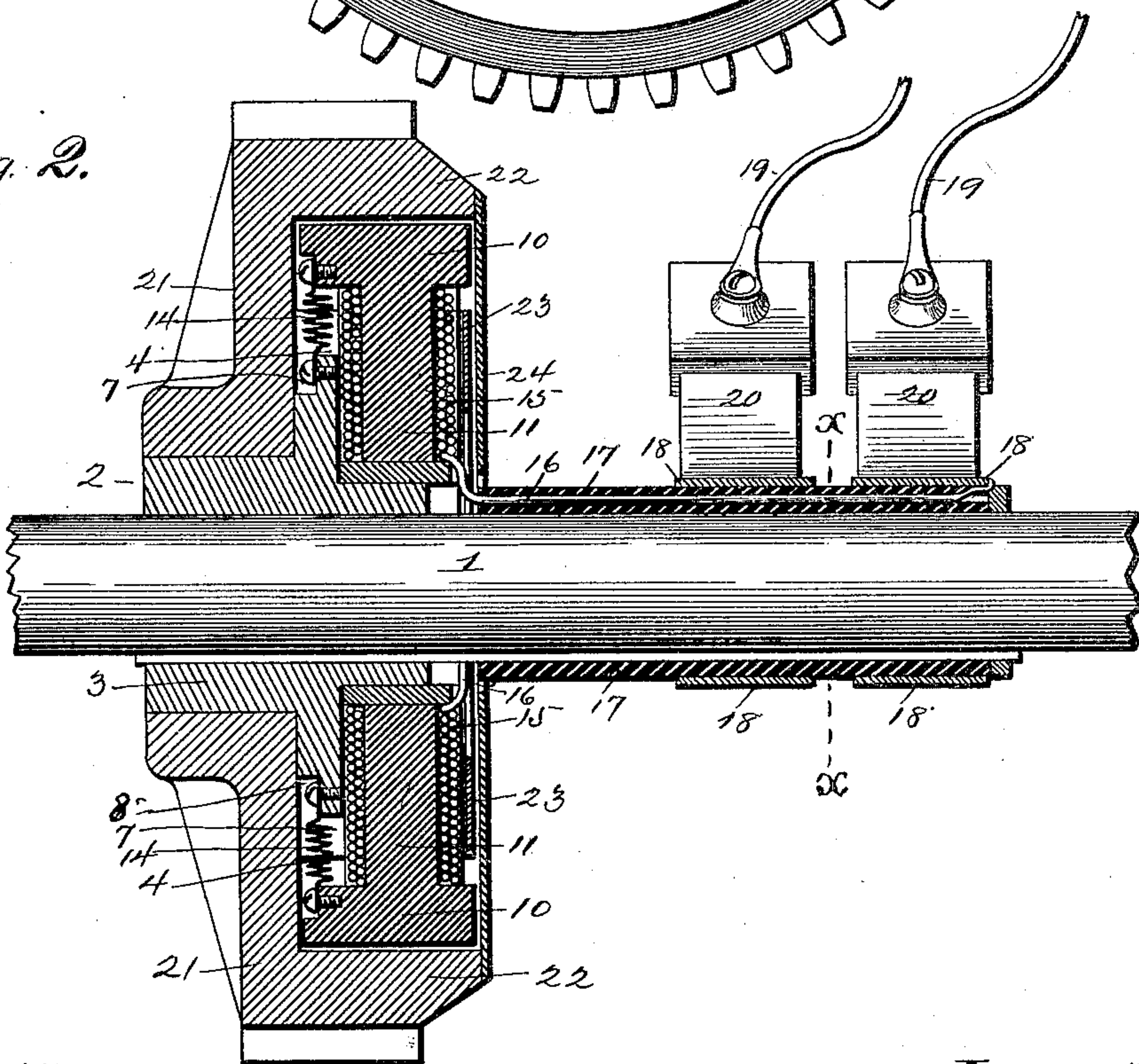


Fig. 2.



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2 Sheets—Sheet 2.

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Fig. 3.

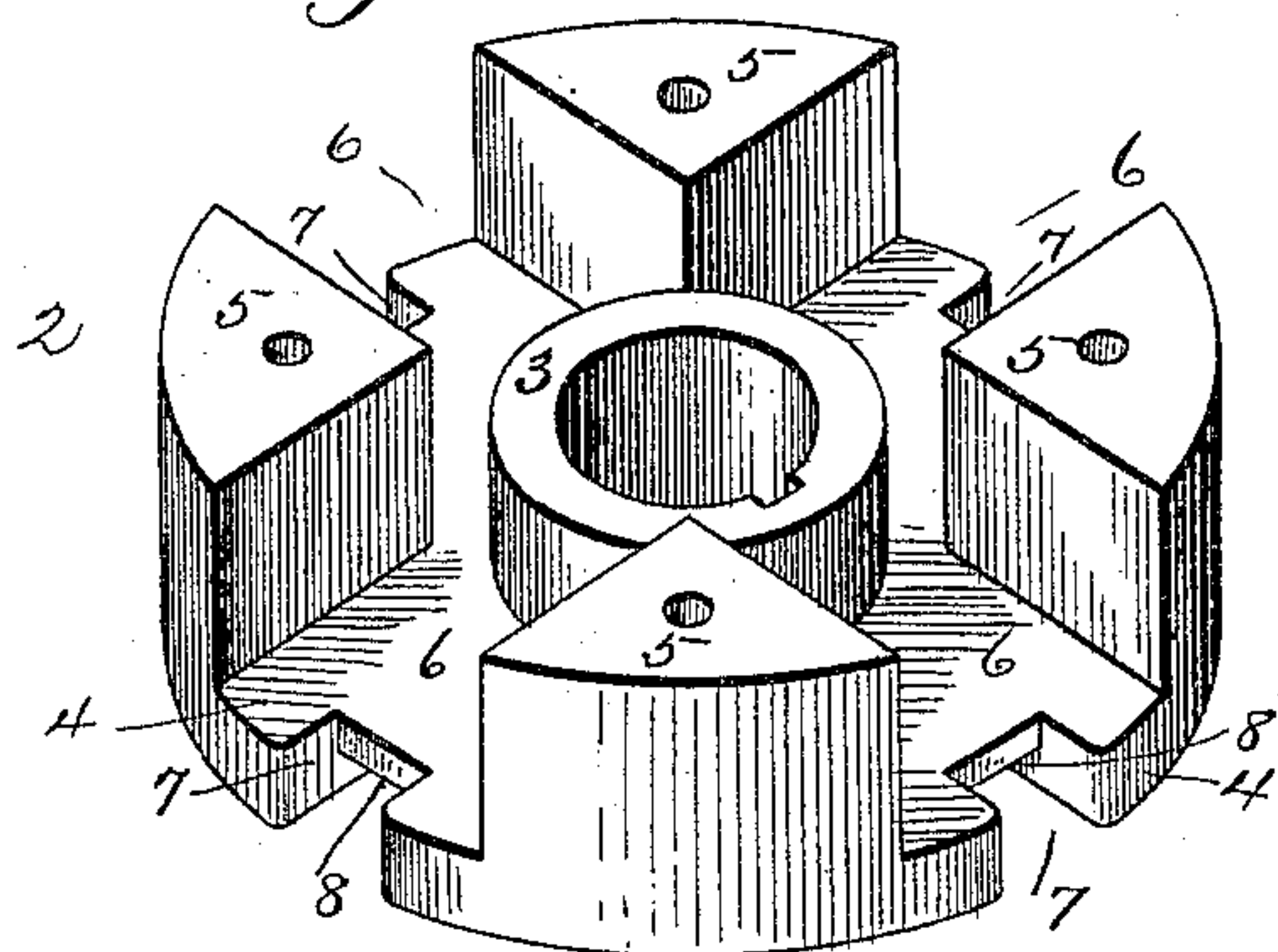


Fig. 4.

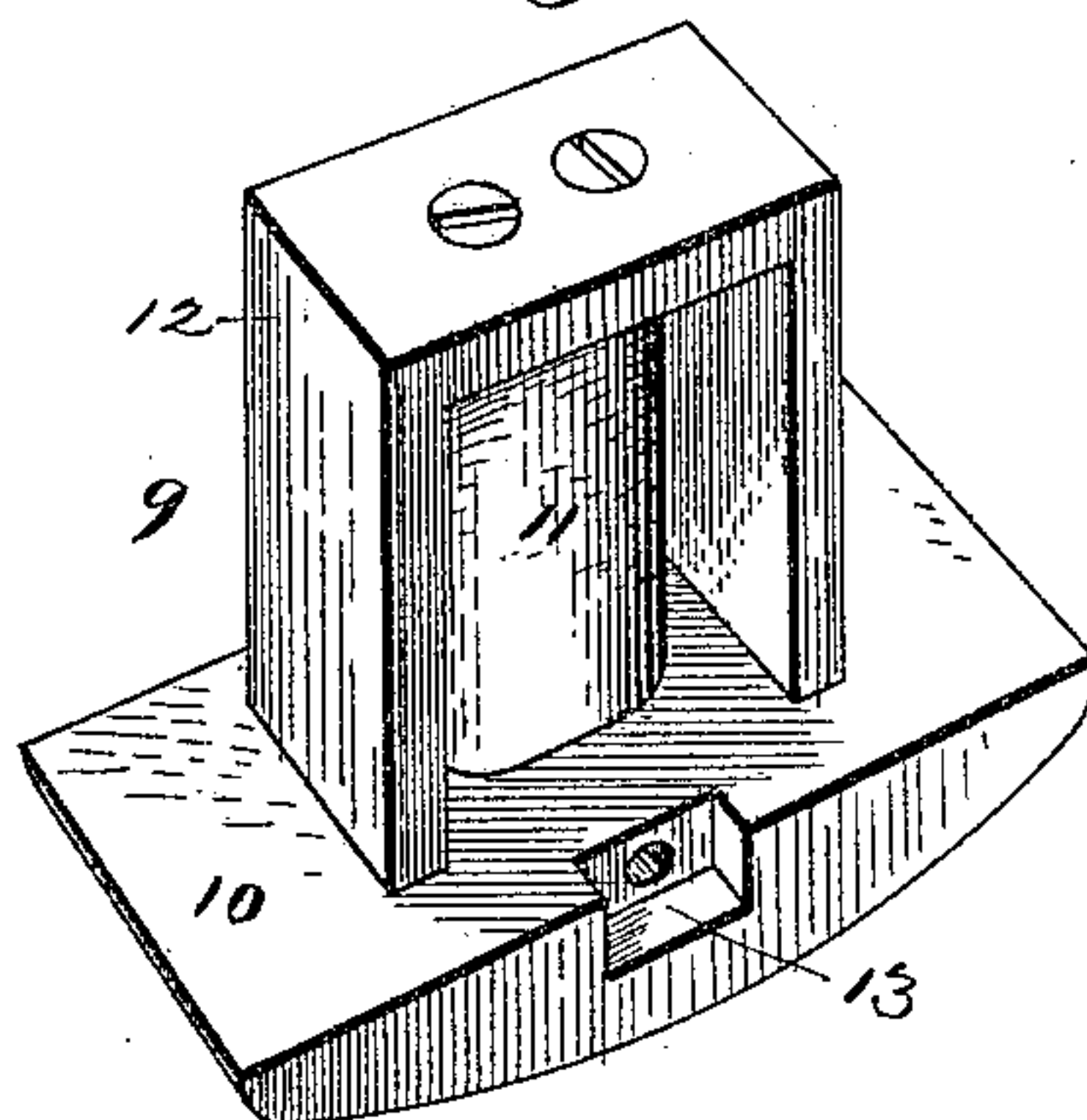
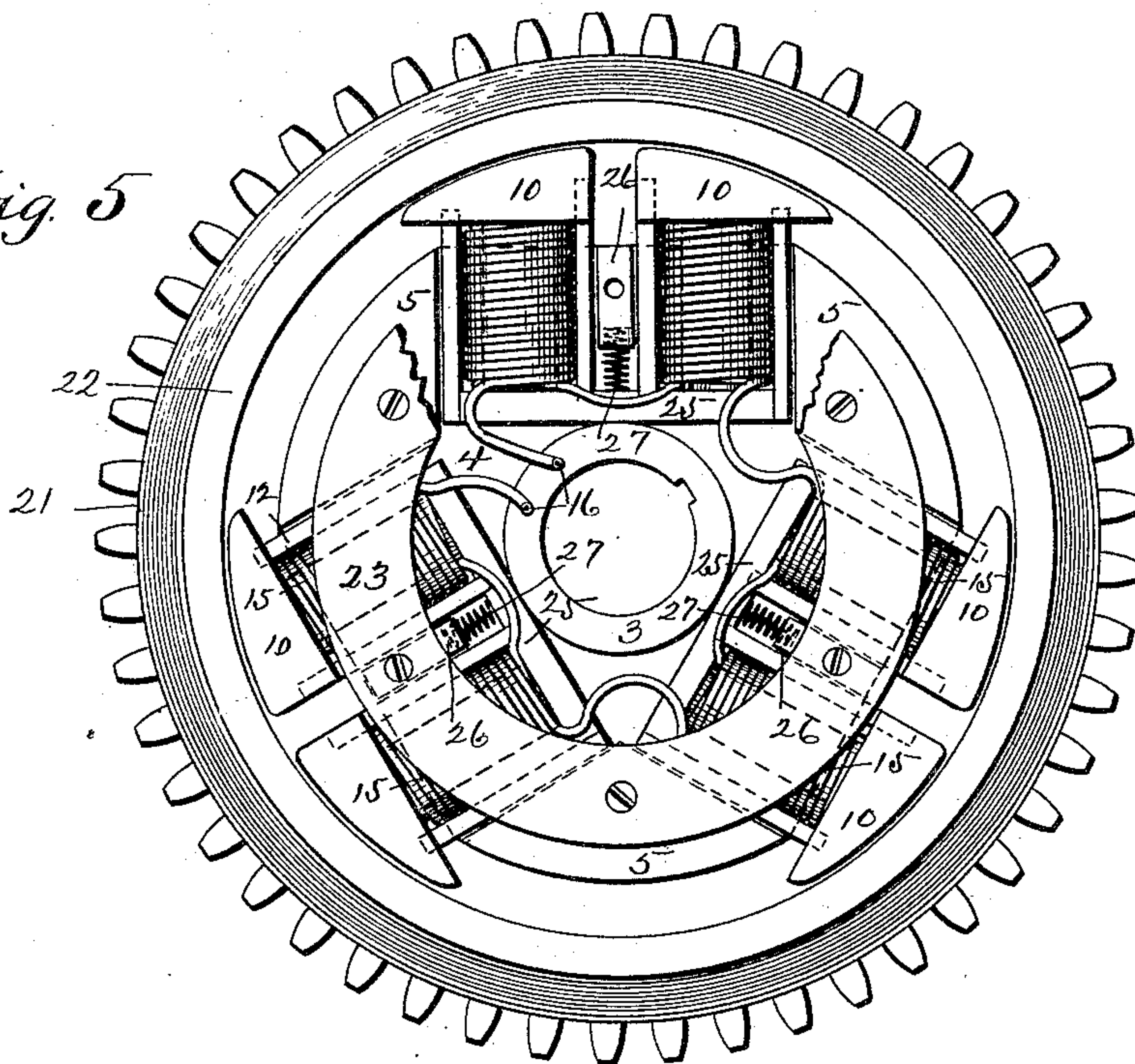


Fig. 5.



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UNITED STATES PATENT OFFICE.

JAMES F. McLAUGHLIN, OF PHILADELPHIA, PENNSYLVANIA.

ELECTRIC CLUTCH.

SPECIFICATION forming part of Letters Patent No. 432,209, dated July 15, 1890.

Application filed April 26, 1890. Serial No. 349,605. (No model.)

To all whom it may concern:

Be it known that I, JAMES F. McLAUGHLIN, a citizen of the United States, and a resident of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Electric Clutches, of which the following is a specification.

This invention has reference to that class of friction-clutches in which a number of shoes mounted upon one part of the machine are caused to couple the same to another part of the machine; and the object of the invention is to effect such coupling magnetically, thereby avoiding complicated connections, such as are used in ordinary mechanical friction-clutches.

In the practical embodiment of the invention the clutch-shoes are formed of electro-magnets movable to and from the part to be coupled, which latter is constructed of iron, so that on the passage of a suitable current through the magnets the shoes will be drawn into firm magnetic and frictional contact with the part to be clutched.

In the annexed drawings, forming part of this specification, there are shown two forms of clutch embodying my invention, and it is to be distinctly understood that I am in no manner confined to such identical structures, as the same may be varied without departing from the principle of the invention.

Figure 1 is a face view of a clutch for coupling a shaft and a gear or pulley, the shaft being shown in cross-section on the line $x x$, Fig. 2, and parts being removed and broken away to expose the interior construction of the clutch. Fig. 2 is a central section of the clutch shown in Fig. 1. Fig. 3 is a perspective view of the shoe-carrying hub. Fig. 4 is a perspective view of one of the clutch-shoes with the magnet-coil removed, and Fig. 5 is a face view of a modified form of clutch with parts removed and broken away to expose the interior construction thereof.

Referring to the drawings, there is shown a shaft 1, which may either be a drive-shaft, or, if so desired, it may be the driven shaft. On this shaft is keyed a clutch-carrier 2, constructed of brass or other non-magnetic material, and consisting of a central hub 3, pro-

vided with a flange 4, from one face of which latter rise spacing-blocks 5. The adjacent sides of these spacing-blocks are parallel to each other, so as to leave guide passages or channels 6 between them for the reception of the clutch-shoes, to be hereinafter described. The flange 4 has notches or recesses 7 formed in its periphery between the spacing-blocks 5, each notch being undercut, as shown at 8, on the face of the flange opposite that from which the spacing-blocks rise. The guide passages or channels 6, it will be observed, are radially disposed on the flange 4, and seated in them are the shanks of clutch-shoes 9, which consist, essentially, of an expanded iron head 10, a cylindrical iron stem 11, formed integral with the head and projecting from one face thereof, and a frame 12, constructed of brass or other non-magnetic material, with its ends mortised into the head 10, as indicated by dotted lines in Fig. 1, inclosing and secured to the said stem by screws or otherwise.

On one side of each head 10 there is formed a recess 13, in which is secured one end of a strong helical spring 14, the other end of which is secured in the undercut portion 8 of one of the notches 7, into which the spring extends when the respective clutch-shoe is seated with its frame 12 in one of the channels 6, the purpose of the spring being to draw the clutch-shoe toward the axis of the clutch-carrier. The stem 11 of each clutch-shoe is surrounded by a magnetizing-coil 15, and the coils of the several clutch-shoes are shown connected in series, although they may be coupled in multiple, and they receive the energizing electric currents by conductors 16, extending through perforations in an insulating-sleeve 17, surrounding the shaft 1. These conductors 16 are connected, respectively, to metallic rings 18, mounted a distance apart on the outside of the said insulating-sleeve 17. Electric currents coming from a suitable source are conveyed to the rings 18 by conductors 19 and brushes 20, the latter bearing directly on the said rings.

Each clutch-shoe, it will be observed, is an electro-magnet, the head 10 forming an expanded pole-piece for the same, while the frames 12 are of such size that they slide

loosely in the channels 6 of the clutch-carrier and protect the coils 15 from injury by contact with the latter.

Loosely mounted upon the hub 2 there is an iron gear-wheel or pulley 21, provided with an annular flange 22, extending over and enclosing the clutch-shoes, as clearly shown in Fig. 2, the heads 10 of said shoes having their outer faces shaped concentric with the inner face of said flange. The construction is such that when the clutch-shoes are in the retracted position the outer face of the pole-pieces are within a short distance of the inner face of the flange.

When it is desired to couple the shaft and gear-wheel, so as to transmit power from one to the other, an electric current is passed through the magnets, thus energizing them, and as they are movable toward the flange 22 of the gear-wheel they will immediately be drawn against the action of the springs toward the flange 22, until their pole-pieces are in magnetic and frictional contact with the said flange, thus coupling the shaft and gear. The clutch will remain in operation so long as the current is passing through the magnets; but when the circuit is broken the magnets are de-energized and the springs will immediately return them to the retracted position, thus uncoupling the shaft and gear.

The clutch-shoes are held in the channels 6 of the shoe-carrier by means of an annular guard plate or ring 23, constructed of brass or other non-magnetic material and secured to the spacing-blocks 5 by screws or otherwise. The working parts of the clutch are protected from dust and dirt by a plate 24, secured to the flange 22, provided with a central opening for the shaft 1 and surrounding sleeve 17.

To prevent undue wear of the clutch-shoes, facing-plates of wood or of other suitable material may be seated in suitable recesses formed in the clutching-face of the said clutch-shoes, as indicated in dotted lines, Fig. 1.

The facing-plates, if used at all, should be as thin as practicable, in order that the effective pole-faces of the magnets may be as close as possible to the rim 22 of the wheel or pulley, which is in effect the armature of the magnets. It is, however, not necessary to use such non-magnetic facing-plates, since a sticking of the magnets to the wheel after the energizing-circuit has been broken is effectually prevented by the retractile springs 14, which easily and promptly overcome the attraction due to residual magnetism.

In the modification shown in Fig. 5 each clutch-shoe is formed of two coils 15 with

their cores 11 connected at one end by a yoke-piece 25 and having the heads both in operative relation to the clutching-face of the flange 22, the coils being wound in the manner practiced with horseshoe electro-magnets, so that the heads 10 of each clutch-shoe will be of opposite polarity. In this construction the passages 6 are appropriately formed to receive a modified form of clutch-shoe, and on the flange 4 are formed lugs 26, so located as to extend between the two coils of the clutch-shoe, and between this lug and yoke 25 there is interposed a normally-compressed helical spring 27, the function of which is to maintain the clutch-shoe in the retracted position. The operation of this modified form of clutch is essentially the same as that described with reference to the other figures.

Having now fully described my invention, I claim and desire to secure by Letters Patent—

1. An electro-magnetic clutch composed of two members, one of which is of magnetic material and both rotating in the same plane concentric with relation to each other, and a series of electro-magnets mounted upon the non-magnetic member so as to be movable into and out of operative relation to the magnetic member and circuit-connections, substantially as described.

2. An electro-magnetic clutch composed of a gear or pulley of magnetic material, a series of radial electro-magnets movable into operative relation to said gear or pulley, and a carrier for the magnets, on which the gear or pulley is mounted, substantially as described.

3. An electro-magnetic clutch composed of a gear or pulley of magnetic material, provided with a circumferential flange, a series of electro-magnets radially movable toward and from the flange of the gear or pulley and having expanded pole-pieces for engagement with said flange, and a carrier for the magnets, substantially as described.

4. An electro-magnetic clutch composed of a flanged gear or pulley of magnetic material, a series of electro-magnets with expanded pole-pieces in operative relation to the flange of the gear or pulley, and a carrier for the magnets, provided with bearings for the said gear or pulley, substantially as described.

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

JAMES F. McLAUGHLIN.

Witnesses:

HERBERT P. KER,
EDWIN F. GLENN.