

(No Model.)

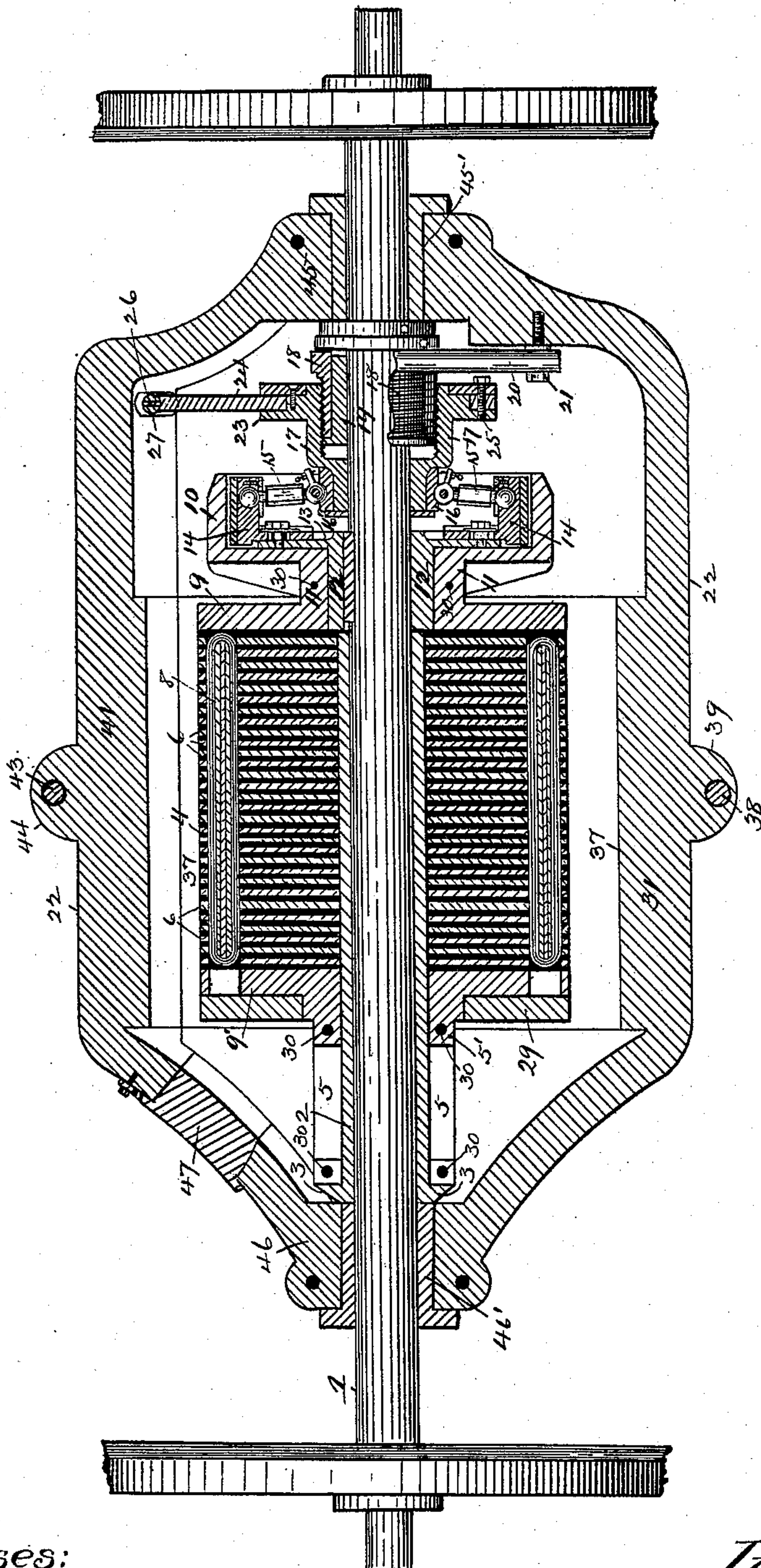
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J. F. McLAUGHLIN.  
ELECTRIC LOCOMOTIVE.

No. 570,945.

Patented Nov. 10, 1896.

*Fig. 1*



Witnesses:

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*C. E. Marshall.*

Inventor:

*James F. McLaughlin.*  
By *Joseph Lyons.*  
att'y.



(No Model.)

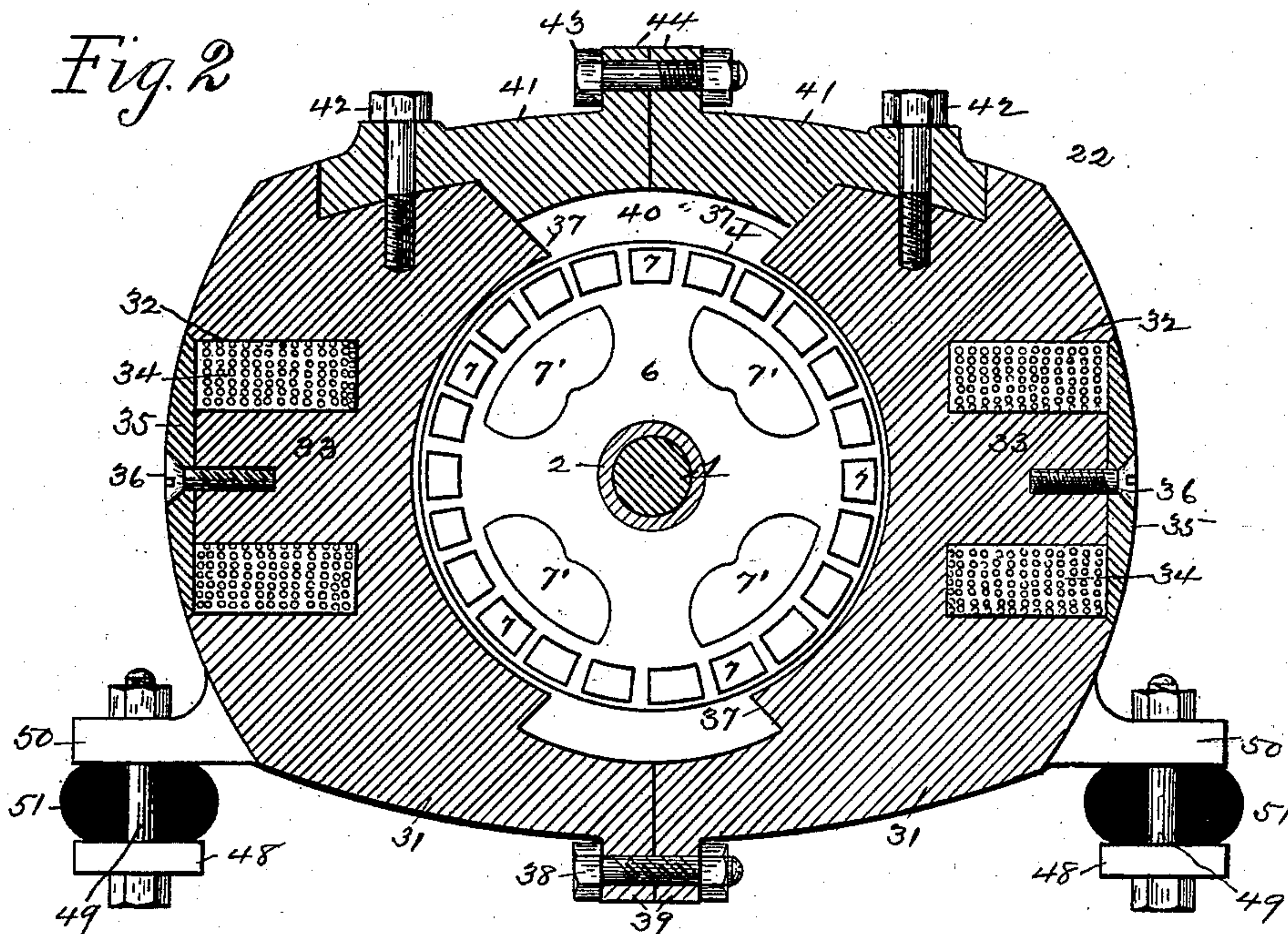
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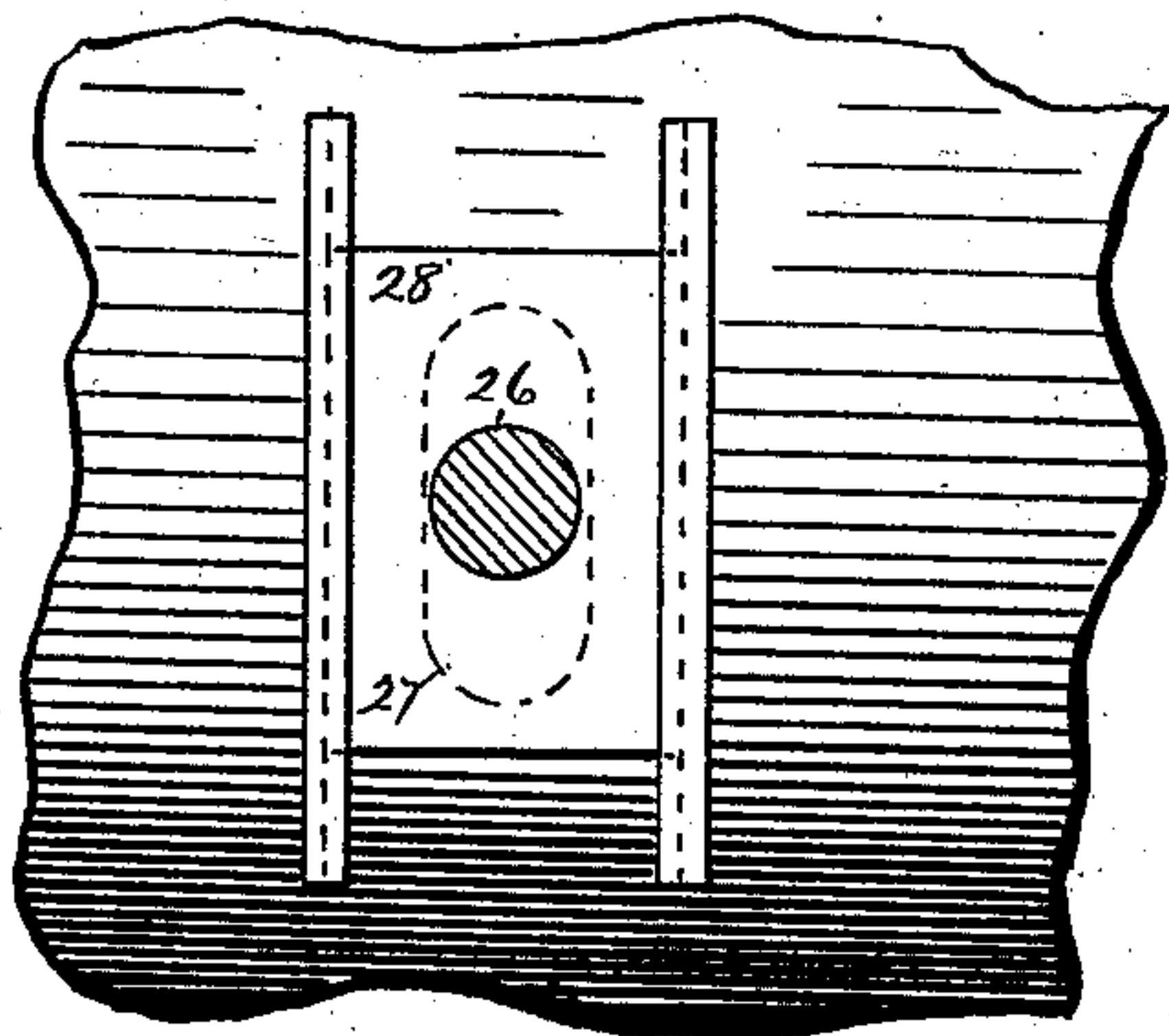
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*Fig. 2*



*Fig. 3.*



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# UNITED STATES PATENT OFFICE.

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## ELECTRIC LOCOMOTIVE.

SPECIFICATION forming part of Letters Patent No. 570,945, dated November 10, 1896.

Application filed June 24, 1891. Serial No. 397,336. (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 Locomotives, of which the following is a specification.

My invention has reference to electric locomotives of the kind in which the electric propelling-motor is placed axially with reference to the car-axle, the object of the improvement being to simplify the construction by connecting the rotating armature, which is normally loose upon the car-axle, directly with the latter by means of a friction-clutch whenever it is desired to start the car, so that no gearing, and especially no reducing-gearing, is interposed between the armature and the car-axle.

A further object of my improvement is to protect the armature and field-coils against the admission of dust and against injury by mechanical violence, and for this purpose the field-magnet is shaped to form an inclosing shell around the armature, while the energizing-coils of the field-magnet are lodged in recesses, so that they are not accessible except for inspection and repair.

A further object of my invention is to so construct the electric propelling-motor that it can be placed centrally upon the driving-axle after the wheels have been shrunk or otherwise secured to the same, and for this purpose I construct the armature and connected friction-clutch in two separable halves, and the same construction is also adhered to in the case of the field-magnet.

In carrying out my invention I make use of the friction-clutch patented to me on May 5, 1891, No. 451,653, and I also make use of the armature shown and described in my pending application, Serial No. 394,225, filed May 26, 1891, although I am not necessarily limited to these constructions.

In the accompanying drawings, which form a part of the specification, my invention is illustrated by one of the preferred forms which the same may assume, but it will be understood that the details of construction may be varied without departing from my invention.

Figure 1 represents an elevation of a driving-axle of an electric locomotive with the wheels mounted thereon and the electric motor in central vertical section. Fig. 2 is a transverse section of the electric motor, and Fig. 3 illustrates a portion of the field-magnet shell with the clutch-operating rod entering the same and the slide to prevent the accession of dust.

Like numerals of reference indicate like parts all throughout the drawings.

Upon the car-axle 1 is a sleeve 2, which is headed or flanged at one end, as indicated at 3, and which sleeve turns loosely upon the axle and has secured to it the armature 4 and the commutator 5. The main body of the armature consists of alternate magnetic laminæ 6 6, separated from each other by non-magnetic laminæ, as indicated in Fig. 1, and each of these laminæ has a circular series of segmental perforations 7 7, which form channels to receive the armature-coils 8, which are thus safely housed within the body of the armature proper. A number of openings 7' are also formed in each lamina to reduce the weight of the armature. One end of the armature is formed by a head 9, and integral with said head there is a shell 10, which constitutes the driving member of the friction-clutch for connecting the armature with the car-axle. The cylindrical portion 11, by which the head 9 is connected with the shell 10, has a loose bearing upon the sleeve 12, which is keyed to the car-axle, and from this sleeve extends at one end a disk 13, upon which the clutch-shoes 14 are mounted in such a manner as to be moved radially in engagement and out of engagement with the inner cylindrical surface of the shell 10. This movement of the clutch-shoes is effected by the toggles 15, which with their inner ends are mounted upon a sleeve 16, which is loose upon the outer reduced end of the thimble 17, the inner expanded end of which is screw-threaded, as indicated, and is screwed upon a screw-threaded sleeve 18, which in turn is loose upon a boss 19, which may be either keyed upon the car or may also be loose upon the same.

From the screw-threaded sleeve 18 extends an arm 20, which is secured by screws 21 or in any other way to the body of the field-



magnet shell 22. Upon the flange 23, formed at the extended end of the thimble 17, is mounted a ring-lever 24, which may be adjusted to different positions by a screw 25, which passes through one of a series of holes formed in the ring of the ring-lever and into the screw-threaded hole formed for this purpose in the flange 23. This clutch is operated by a rod 26, connecting with the lever end of the ring-lever, all as clearly set forth in my aforesaid Letters Patent No. 451,653, of May 5, 1891. For the purpose of this case it is only necessary to know that the rod 26 passes through a slot 27, formed in the field-magnet shell, and is secured to a slide-plate 28, mounted upon the outside of the shell, as is clearly shown in Fig. 3. It will thus be seen that during the operation of the clutch-rod 26 the slot 27 is always closed. At the other end of the armature there is a head 9', corresponding to the head 9, and this head has also a number of perforations corresponding in size and position to the perforations 7 and 7' in the laminae, and the commutator 5 is mounted on a hub 5', formed on the head 9'. The perforations in the head 9' are closed by sectoral plates 29. The construction of the armature is clearly described in my pending application, Serial No. 394,325, above referred to, and in the same application the iron and insulating laminae are described as circular disks, as are also the heads 9 and 9'. For the purposes of my present improvement I prefer to make the whole armature, as well as the commutator, together with the driving member 10 of the friction-clutch, in two semicircular parts, so that these parts may be assembled upon the car-axes after the wheels have been placed thereon. These semicircular parts are then locked together by pins, bolts, or screws passing through holes 30 30, (indicated in the drawings in Fig. 1,) although my invention is not limited by this particular feature.

The field-magnet 22 is shaped as an enveloping shell entirely closing the armature, the commutator, and the clutch mechanism. It consists of two magnetic and two non-magnetic sections. The magnetic sections 31 31 are each formed on the outside with an elongated annular recess 32, and the core 33 of this annular recess forms the core of the field-magnet coil 34, which is protected against the accession of dust and other impurities by a cap 35, fitted over the coil and screwed into the core 33 and secured in place by screws 36, passing into the core. Internally each magnetic section of the field-magnet has a polar projection 37, which is hollowed out and conforms to the size and shape of the armature, and the two magnetic sections are secured together by bolts and nuts 38, applied to lugs 39, formed on the magnetic sections for this purpose. These two magnetic sections when fastened together do not entirely inclose the armature, but leave a considerable gap 40, which is bridged by two

non-magnetic sections 41 41, each fitted to one of the magnetic sections and bolted thereto by screws 42, and finally bolted together by screw-bolts and nuts 43, applied to lugs 44, formed for this purpose on the non-magnetic section.

The magnetic and non-magnetic sections of the field-magnets are at each end tapered down and are there swelled, so as to form hubs 45 46, which have their bearings upon sleeves 45' 46', respectively, which sleeves are secured upon the car-axle. At the commutator end of one of the non-magnetic sections there is a swinging door 47 for admission to the commutator-brushes, which latter, however, are not shown in the drawings for the sake of simplicity of illustration.

It will now be seen that in this construction not only is the whole armature with its accessory parts and the friction-clutch housed within the field-magnet, but that the field-magnet coils themselves are housed within the body of the magnets, so that none of the operative parts of the motor are exposed to injury or disturbance. The armature, as well as the field-magnets, is loose upon the car-axle and centrally mounted upon the same; but the field-magnets are prevented from rotation by connection with some fixed portions 48 48 of the car-body, this connection being shown in this instance to be effected by means of bolts 49, passing through lugs 50, formed for this purpose on the field-magnet shell, with elastic buffers interposed between the lugs 50 and the fixed portions 48 of the car-body.

It will be understood that an electric locomotive thus equipped is operative by allowing the armature to run loose and that the car is started by clutching the armature directly with the car-axle, which is effected by a partial rotation of the screw-threaded thimble by means of the ring-lever 24 and the rod 26, which latter, it will be understood, is connected with an operating-lever within convenient reach of the motorman.

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

1. An electric motor comprising a field-magnet shell with inwardly-projecting pole-pieces and outwardly-opening recesses for receiving the field-energizing coils, an armature and commutator inclosed within the field-magnet shell, and a clutch for coupling the armature to the work, also inclosed within the field-magnet shell, substantially as described.

2. In an electric locomotive, the combination with the driving-axle of the car; of an electric motor composed of a two-part armature and field-magnet, the latter completely inclosing the former; and a two-part friction-clutch for connecting the armature with the car-axle, substantially as described.

3. In an electric locomotive, the combination of an electric motor and friction-clutch



combined mounted upon a car-axle and having all operative parts inclosed by a field-magnet shell, with a slot in said shell; a slide covering said slot and a clutch-operating rod 5 connected with the slide and passing through the slot, substantially as described.

4. In an electric motor, a field-magnet having in its body outwardly-opening annular recesses, and energizing-coils upon the cores 10 within the recesses, substantially as described.

5. In an electric motor, a field-magnet shell completely enveloping the armature, said

shell having in its body outwardly-opening annular recesses, and energizing-coils upon the cores within the recesses, substantially as 15 described.

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

JAMES F. McLAUGHLIN.

Witnesses:

H. F. REARDON,  
W. C. McCURDY.