No. 725,675. PATENTED APR. 21, 1903.

P. J. COLLINS.

DRIVING MECHANISM FOR SELF PROPELLED VEHICLES.

APPLICATION FILED AUG. 29, 1902.

NO MODEL. 3 SHEETS—SHEET 1.

Fig. 1.

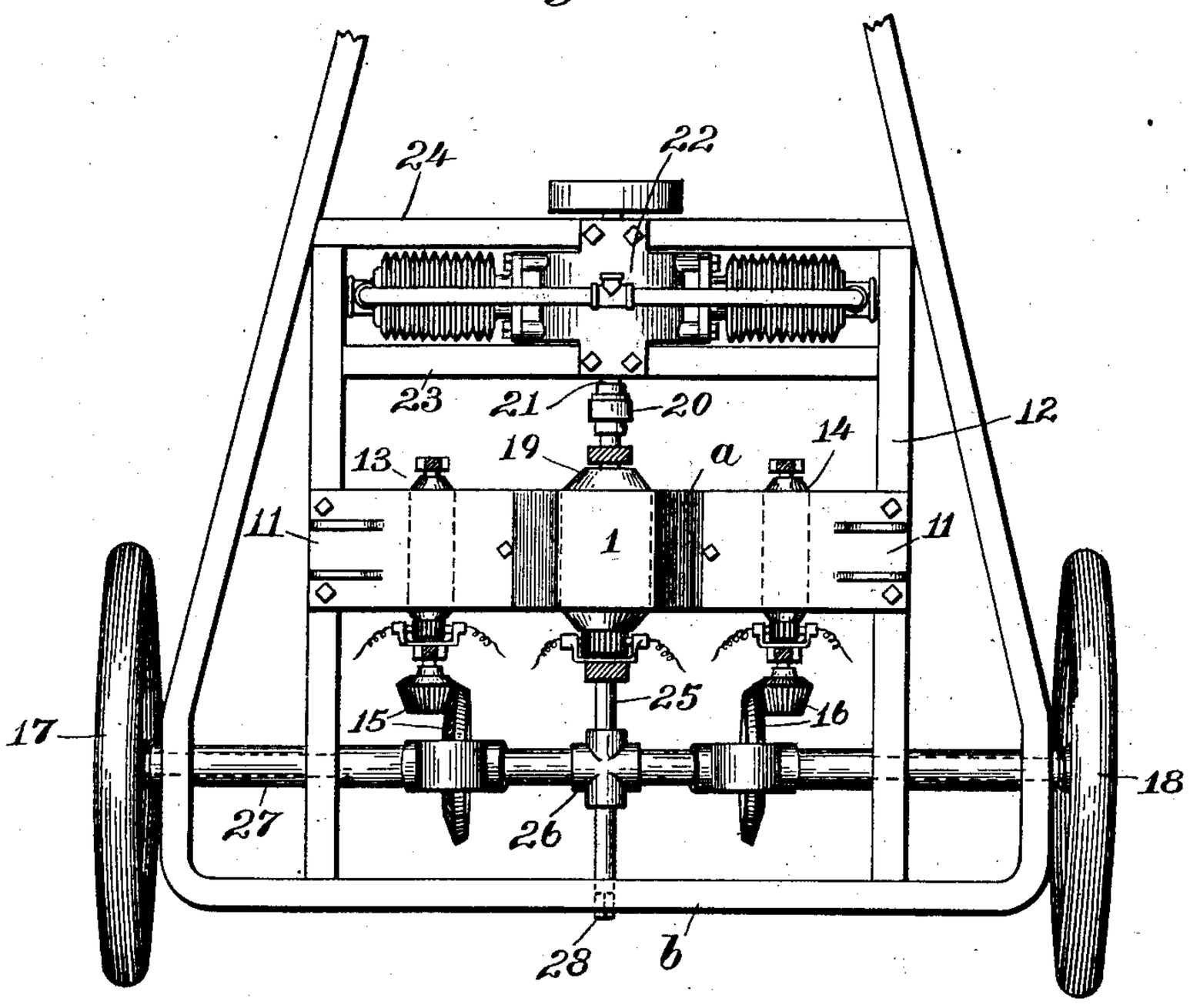
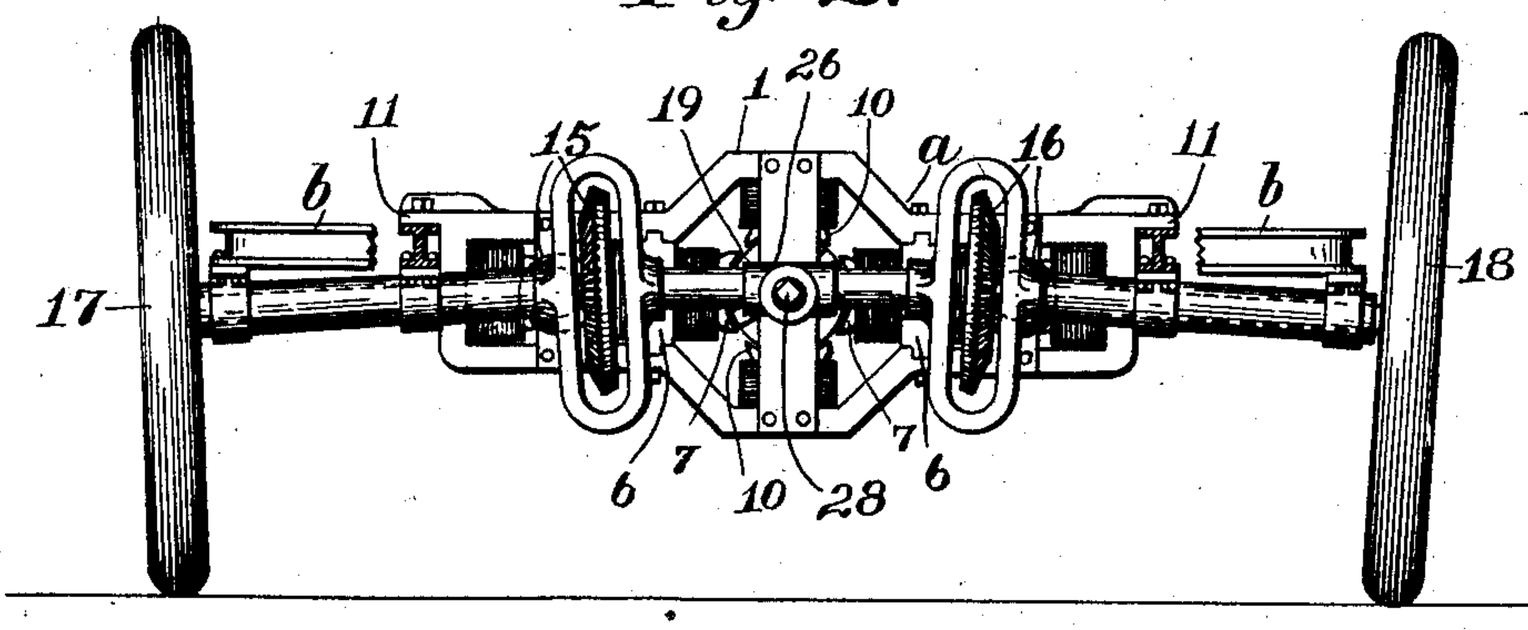


Fig. 2.



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NO MODEL. 3 SHEETS—SHEET 2.

Fig. 3.

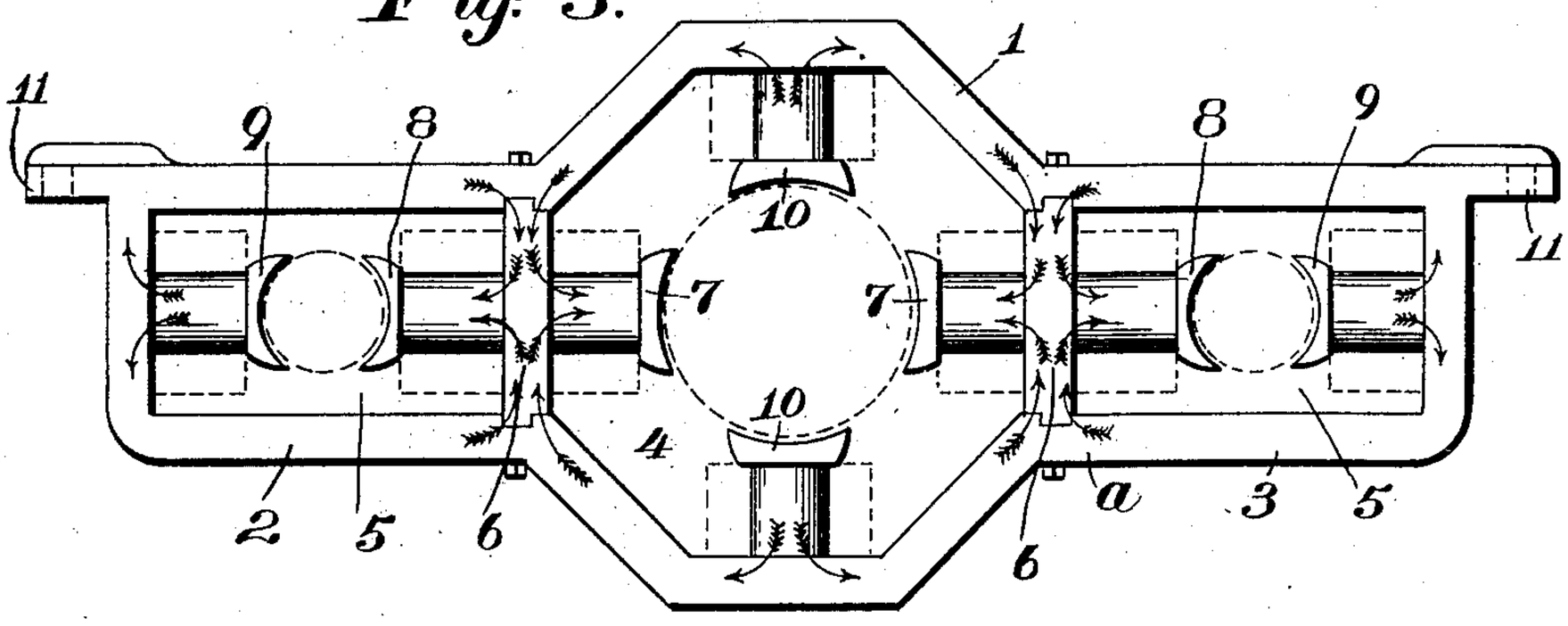


Fig. 4.

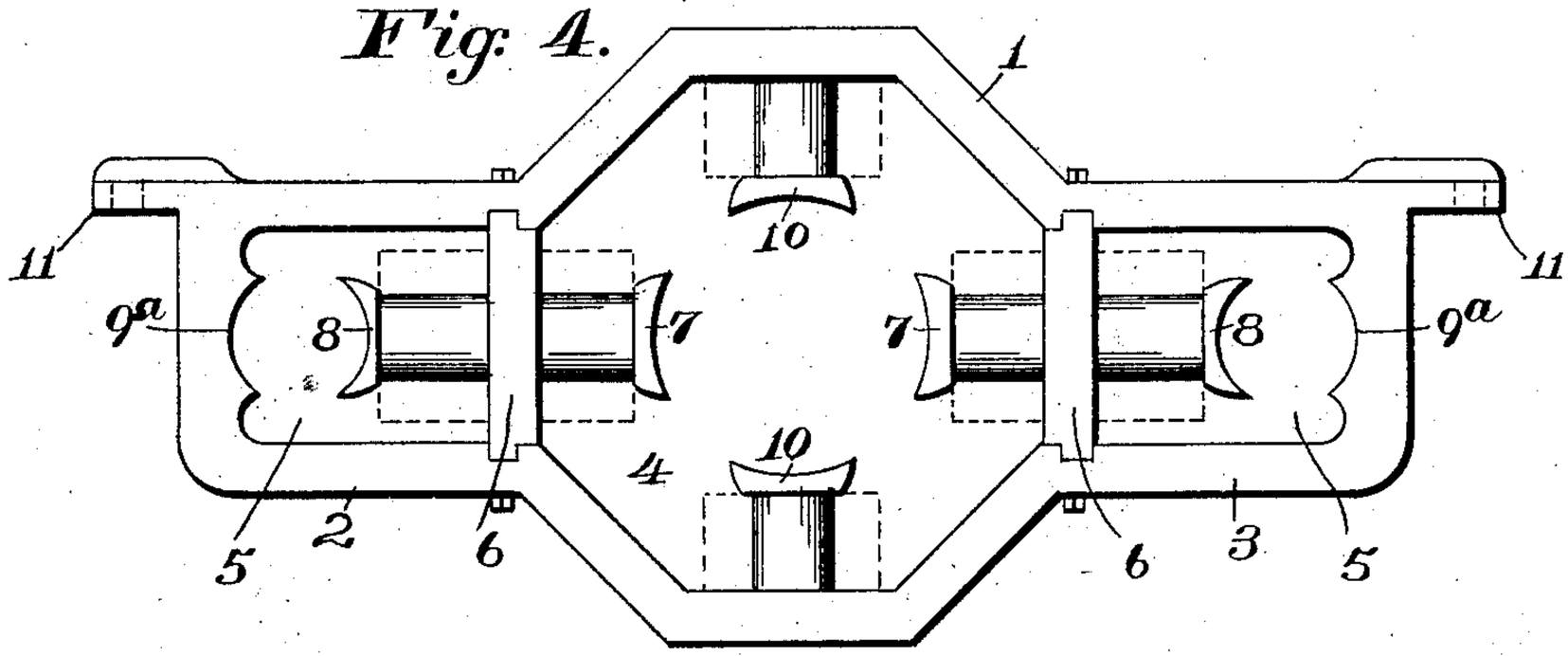
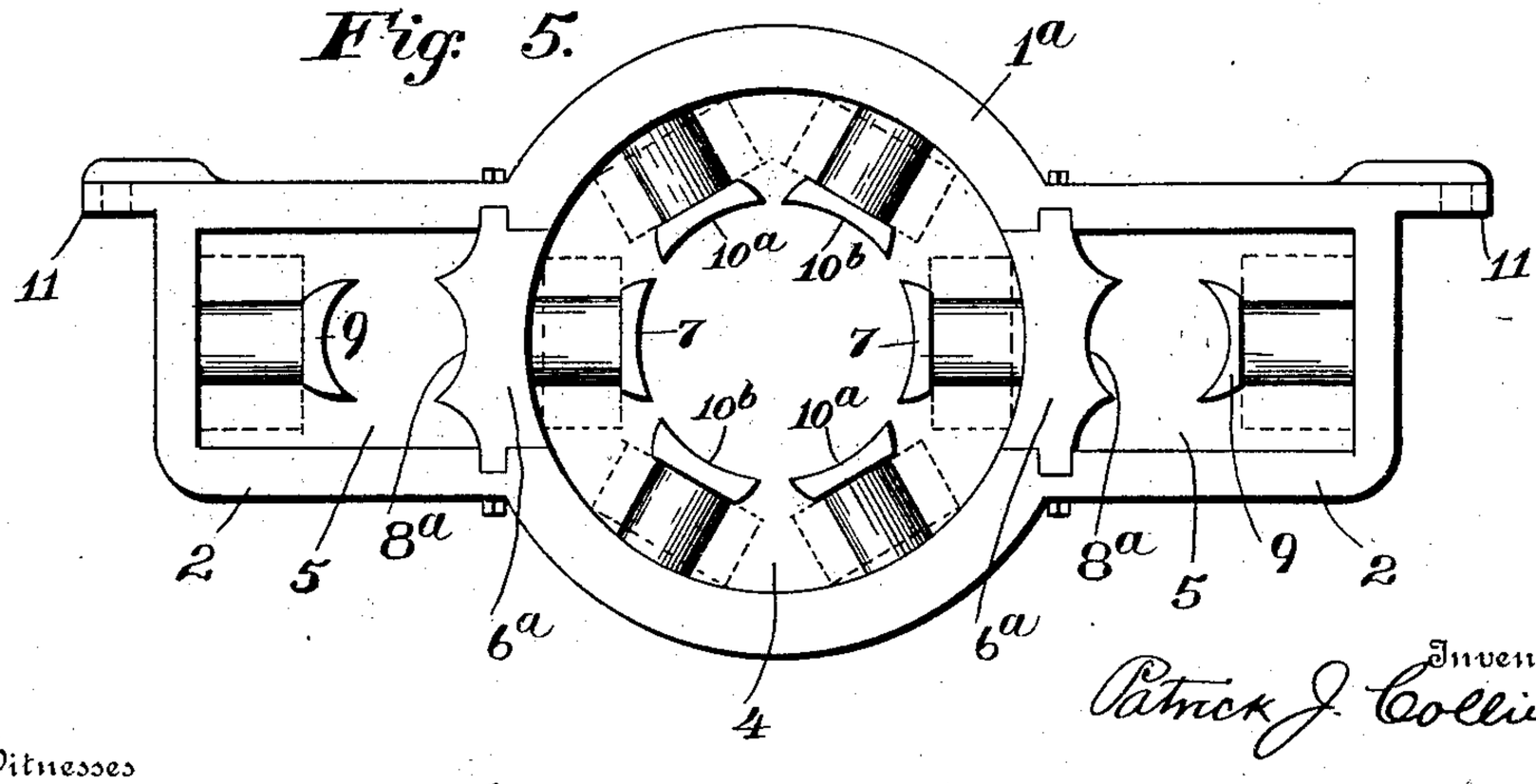


Fig. 5.



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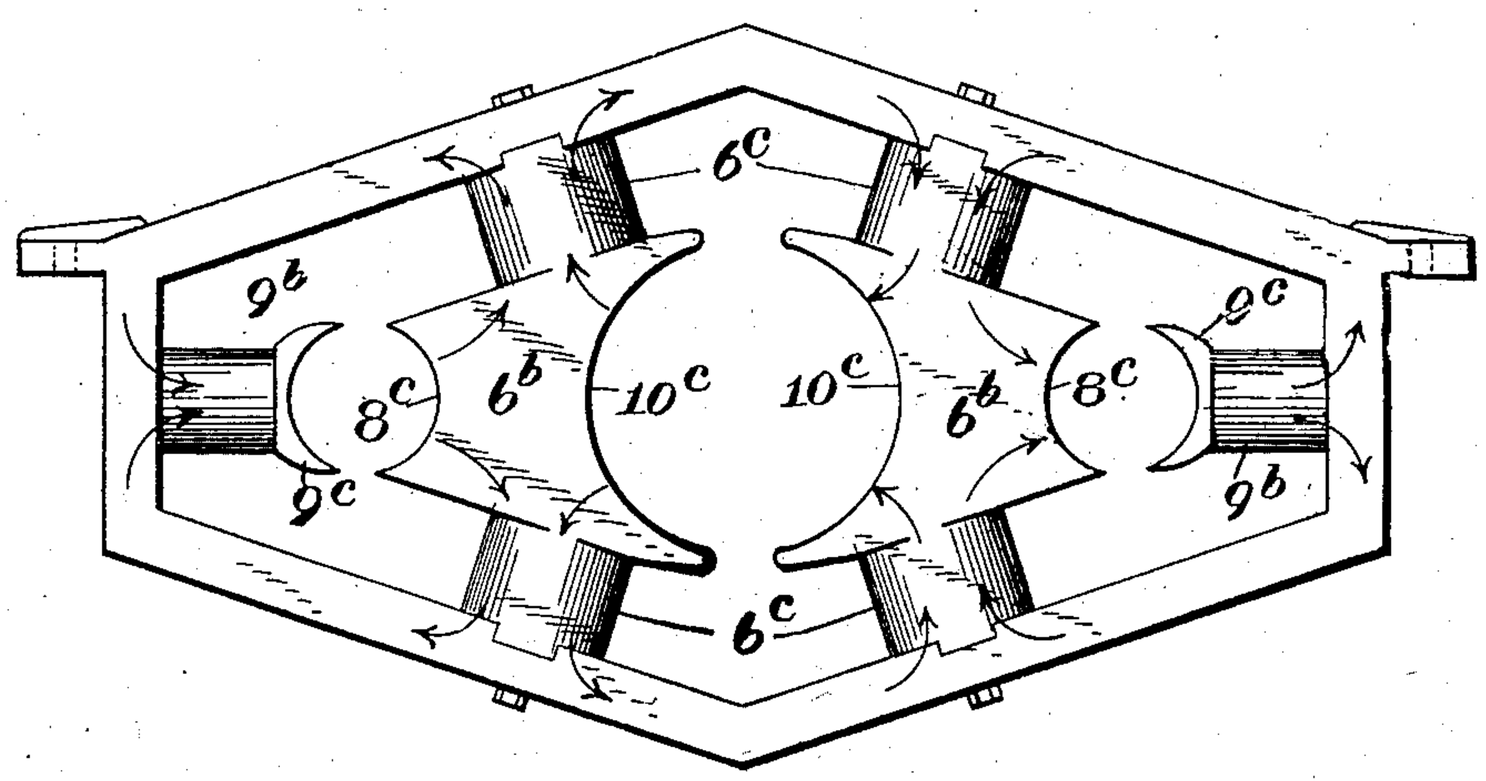
NO MODEL. 3 SHEETS—SHEET 3.

Fig. 6.



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UNITED STATES PATENT OFFICE.

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DRIVING MECHANISM FOR SELF-PROPELLED VEHICLES.

SPECIFICATION forming part of Letters Patent No. 725,675, dated April 21, 1903.

Application filed August 29, 1902. Serial No. 121,515. (No model.)

To all whom it may concern:

Be it known that I, PATRICK J. COLLINS, a citizen of the United States, residing at Scranton, in the county of Lackawanna and State of Pennsylvania, have invented certain new and useful Improvements in Driving Mechanism for Self-Propelled Vehicles, of which the following is a specification.

This invention relates to improvements in self-propelled vehicles of the kind in which a constantly-operated engine and dynamo, carried by the vehicle, are employed to supply power to one or more electric motors, the armatures of which are geared to the driving-wheels of the vehicle. The advantage of such a combination of devices by which mechanical energy is converted into electrical energy and again into mechanical energy is that engines, such as explosive-engines, which have a high efficiency, but which cannot be readily varied in speed or direction of motion, may be availed of for supplying power only, while the movement of the vehicle may be very readily controlled by a controlling-switch connected and arranged to effect variations in speed and direction of rotation of the motor-armatures. These advantages, however, are very largely offset by the additional weight added to the vehicle when electric machines of the ordinary construction are interposed between the engine and the driving-wheels and by the loss in efficiency occasioned by the double conversion of power. To overcome these disadvantages, I have provided a dynamo-electric machine on which a generator-armature and a pair of motor-armatures are arranged within a field-casing common to all of said armatures, every part of this casing forming a part of the magnetic circuit of the machine. With this construction the weight of the combined machine is brought very low without sacrificing efficiency. The generator-armature, which occupies the center of the casing and supplies current for both motor-armatures, is directly connected to a constant-speed explosive-engine, while the motor-armatures, which are arranged on either side of the generator-armature and parallel therewith, are independently connected to the driving-wheels. The parts of the combined apparatus are symmetrically arranged, and when placed upon the vehicle-frame in operative position the weight is evenly distributed between the opposite sides of the frame.

In the accompanying drawings, Figure 1 is a plan view of the rear portion of a motor-vehicle frame, showing my improvements applied thereto. Fig. 2 is a rear elevation of the same, the frame being partly broken away; and Figs. 3, 4, 5, and 6 are side views of the field-frames of various forms of my improved dynamo-electric machine.

Referring to Fig. 3 of the drawings, *a* indicates the field-frame of my improved machine, which, as shown in said figure, consists of a hollow casing comprising a central octagonal portion 1 and two quadrilateral portions 2 and 3, respectively, arranged on opposite sides of the central portion. The interior of the frame is divided into a central compartment 4 and two side compartments 5 by removable partitions 6, which partitions form sides for the adjoining compartments. These partitions, like the casing *a*, are made of iron or soft steel and form parts of the magnetic circuit for the field of the generator and motors. Each partition has a pole-piece 7 thereon projecting into the central or generator compartment 4 and a pole-piece 8 upon its opposite side projecting into the adjacent motor-compartment 5. Opposing pole-pieces 9 are arranged at the opposite ends of the compartments 5, and pole-pieces 10 are arranged within the compartments 4 between the pole-pieces 7. The pole-pieces 7 and 8 are preferably formed integral with the removable partitions 6, and the remaining pole-pieces are formed integral with the casing *a*. A multipolar field is thus formed in the central compartment, within which an armature may operate at a comparatively low speed, and bipolar fields are formed in the compartments 5, within which smaller armatures may operate independently at higher speeds. The paths of the magnetic flux are indicated by arrows in Fig. 3, and the armatures and field-coils are indicated by dotted lines in Figs. 3, 4, and 5.

In Fig. 4 the arrangement is the same as in Fig. 3, except that the cores of the field-poles 9 in Fig. 3 are omitted and consequent pole-pieces 9^a are formed on the frame opposite

the pole-pieces 8. The total length of the casing is thus shortened, bringing the motor-armatures closer together.

In Fig. 5 the motor-armatures are brought still nearer to one another by omitting the cores of the field-poles 8 in Fig. 3 and providing consequent poles 8^a upon the partitions 6^a, which are energized by the coils on the cores of the field-poles 9. The total length of the casing in Fig. 5 is substantially the same as that of the casing in Fig. 4. In Fig. 5 the central portion 1^a of the field-casing is circular, and six poles 7, 10^a, and 10^b are shown within this part of the casing.

In Fig. 6 I have shown a field-frame having six sides with partitions 6^b, each having a generator field-pole 10^c and a motor field-pole 8^c. In this instance the field-coils of the machine are to be wound on the cores 6^c, which form parts of the partitions, and upon cores 9^b, having poles 9^c opposite the poles 8^c on the partitions. This machine is bipolar throughout, and the generator-poles and adjacent motor-poles have cores and windings in common.

In Figs. 1 and 2, which show the parts for supplying motive power applied to a vehicle, *b* indicates the vehicle-frame, which may be of any suitable construction, and the dynamo-electric-machine casing *a* is supported transversely of the vehicle-frame by flanges 11 upon said casing, which rest upon longitudinally-extending supports 12. The motor-armatures 13 and 14 are independently geared, as shown, by beveled gearing 15 and 16 to the shafts of the driving-wheels 17 and 18, respectively. The generator-armature 19 is connected by a coupling 20 to the shaft 21 of an explosive-engine 22, which is supported by the transverse beams 23 and 24 centrally of the vehicle-frame. It will be seen by an inspection of Fig. 2 that this arrangement permits the driving-axles to be arranged at a suitable angle for giving the required set to the vehicle-wheels.

In operation the engine 22 runs constantly, driving the generator-armature 19, and the current from said armature is led to a controller and from thence direct to the motor fields and armatures in such a way as to control the speeds of said armatures. Any desirable arrangement of controller and controlling-circuits may be employed, and as the controller and circuits form no part of the present invention it is not necessary to illustrate or describe them. The generator portion of the machine being multipolar, the speed of the generator-armature may easily be low enough for direct connection to an engine of moderate speed without excessive weight. The motor-armatures revolve in bipolar fields and are designed for higher speeds. The motor-armatures may be varied in speed relatively to one another for the purpose of steering, and the separate connection of the motor-armatures to the axles will permit the wheels to turn at different speeds when the steering is accomplished in the usual way without the use of differential gearing. As the casing or frame of the electric machine contains no more iron than is essential for the magnetic circuits, the machine is very light on account of that fact, and the combined machines are very much lighter than if made separately. Furthermore, separate machines require separate supports, which add weight to the vehicle, whereas in the present machine it is only necessary to provide supports for the flanges 11 at the ends of the frame.

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

1. In an automatically-propelled vehicle, the combination with a suitable driving power of a dynamo-electric machine comprising a hollow field-frame having a central compartment and two side compartments, a generator-armature in the central compartment and connected to said driving power, and armatures in the side compartments geared to the driving-wheels of the vehicle.

2. In an automatically-propelled vehicle having independent driving-wheels, the combination with a dynamo-electric machine comprising a central generator and a motor on each side of the generator, said generator and motors having a common field-frame, of a suitable driving power connected to the generator-armature, and gears connecting the armatures of the motors to the driving-wheels.

3. A dynamo-electric machine for self-propelled vehicles, comprising a hollow field having three compartments separated by partitions which form parts of the magnetic circuits, said compartments having pole-pieces therein, and an armature within each compartment.

4. A dynamo-electric machine for self-propelled vehicles comprising a hollow field-frame divided into a central compartment and two side compartments by partitions which form parts of the magnetic circuits, the central compartment having more than two pole-pieces therein and the side compartments each having two pole-pieces only, and an armature within each compartment.

5. A dynamo-electric machine for self-propelled vehicles comprising a hollow field-frame having three compartments, partitions between said compartments forming parts of the magnetic circuit, each partition having pole-pieces on its opposite sides projecting into the adjoining compartments and an armature within each compartment.

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

PATRICK J. COLLINS.

Witnesses:
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M. F. SANDO.