(No Model.) 5 Sheets—Sheet 1.

F. E. KINSMAN.

ELECTRIC CAR LIGHTING SYSTEM.

No. 506,237. Patented Oct. 10, 1893.

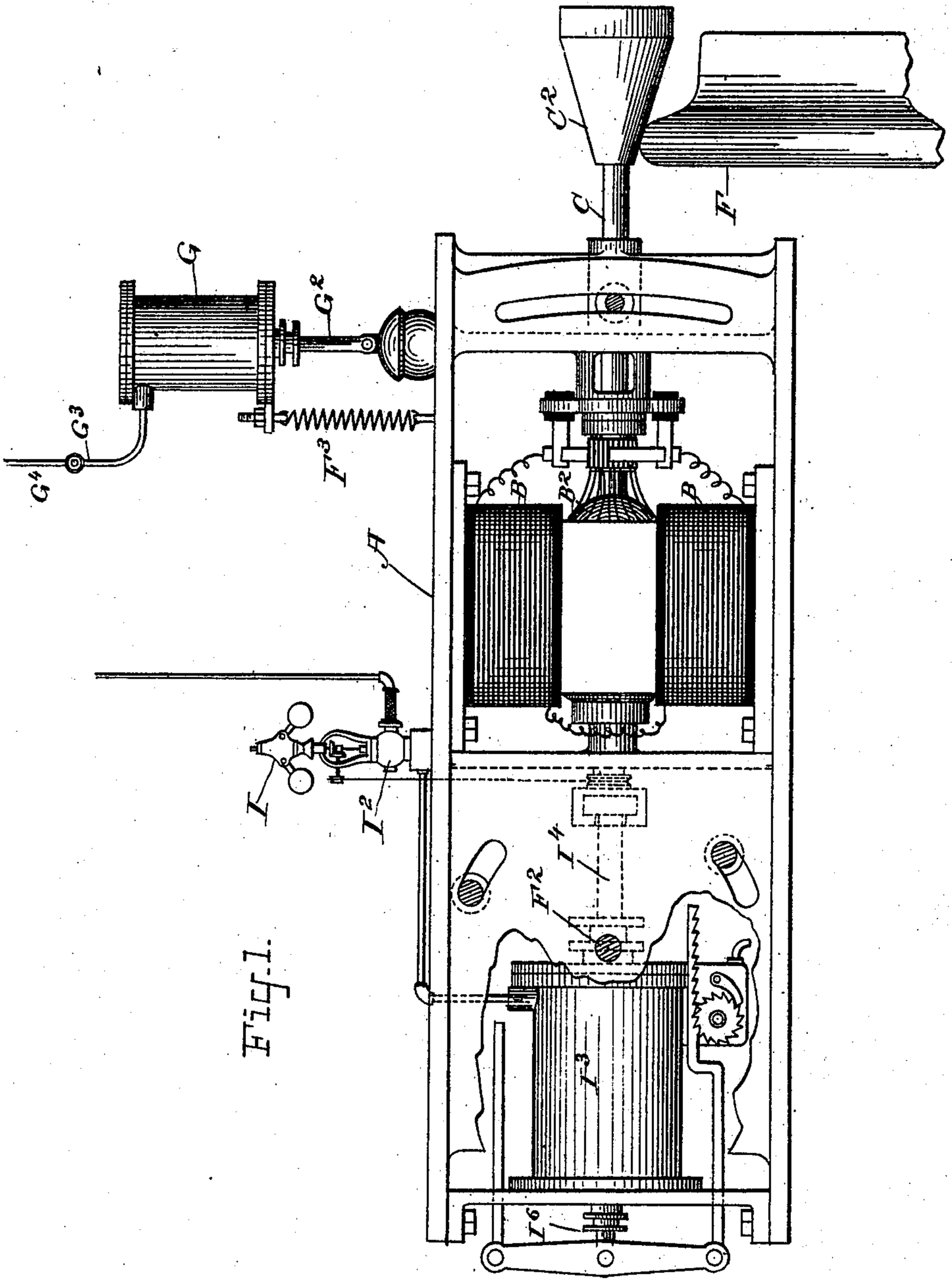


Fig. 1.

ATTEST
J. A. Wurdle
Wm. H. Capel.

INVENTOR:
Frank E. Kinsman
By N. C. Townsend
Attorney

(No Model.) 5 Sheets—Sheet 2.

F. E. KINSMAN.

ELECTRIC CAR LIGHTING SYSTEM.

No. 506,237. Patented Oct. 10, 1893.

Fig. 2.

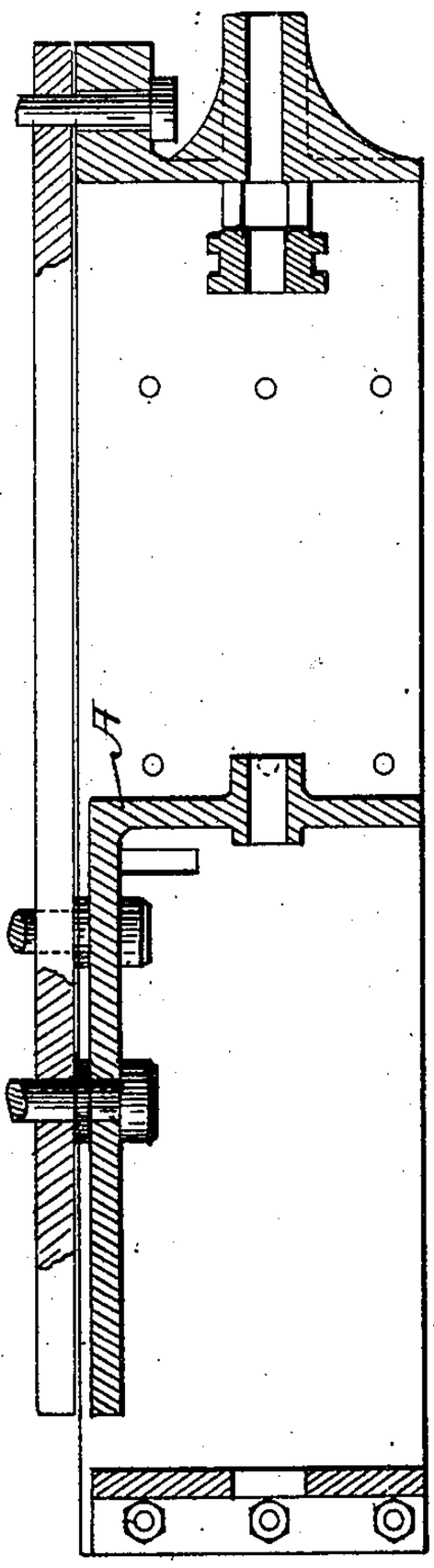


Fig. 3.

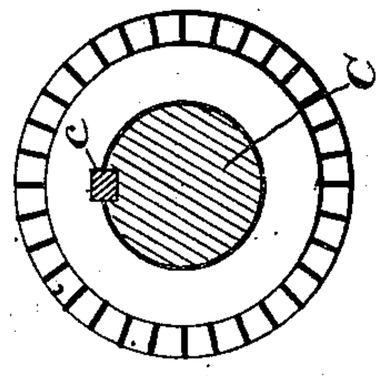
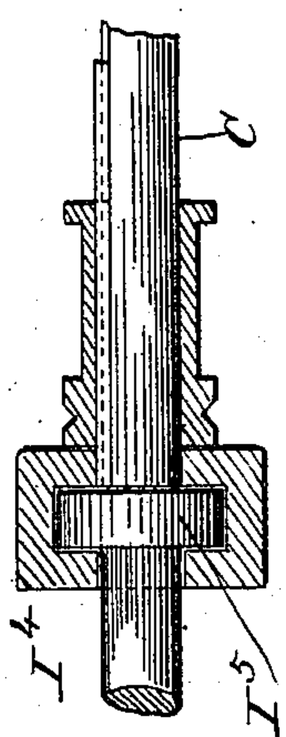


Fig. 4.



ATTEST:
J. A. Windle
Wm. H. Capel

INVENTOR:
Frank E. Kinsman
By H. C. Townsend
Attorney

(No Model.)

5 Sheets—Sheet 3.

F. E. KINSMAN.

ELECTRIC CAR LIGHTING SYSTEM.

No. 506,237. Patented Oct. 10, 1893.

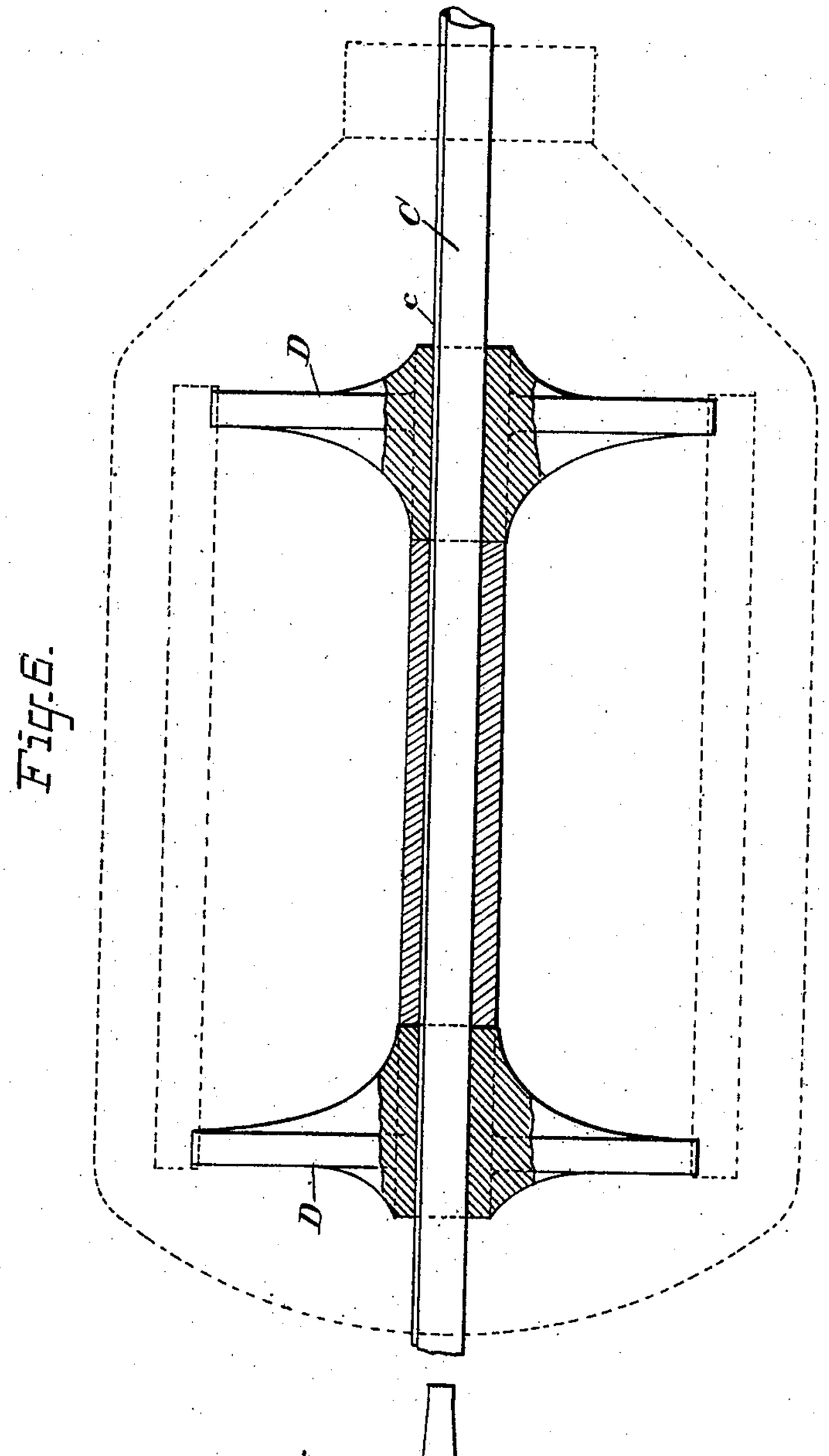


Fig. 6.

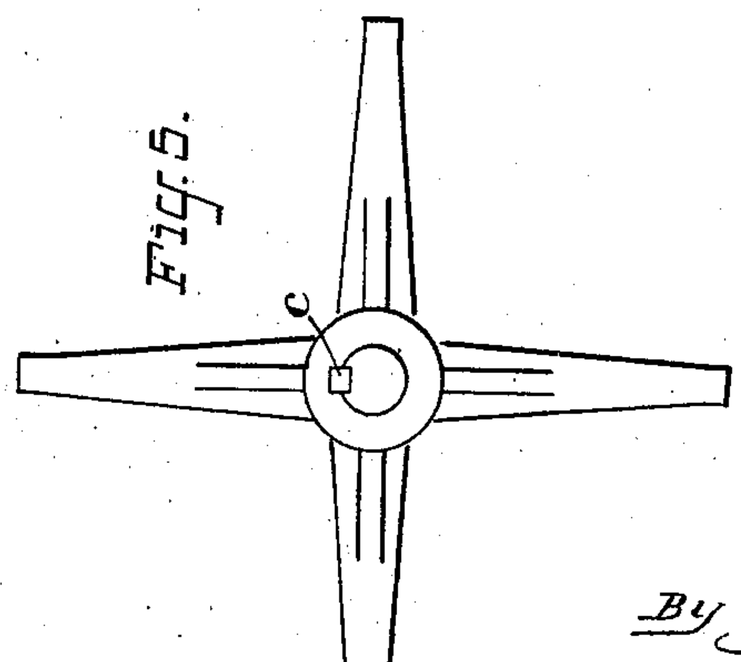


Fig. 5.

ATTEST:

J. A. Hurdle

Wm. H. Coaffee

INVENTOR:

Frank E. Kinsman

By H. L. Townsend

Attorney

(No Model.) 5 Sheets—Sheet 4.

F. E. KINSMAN.

ELECTRIC CAR LIGHTING SYSTEM.

No. 506,237. Patented Oct. 10, 1893.

Fig. 8.

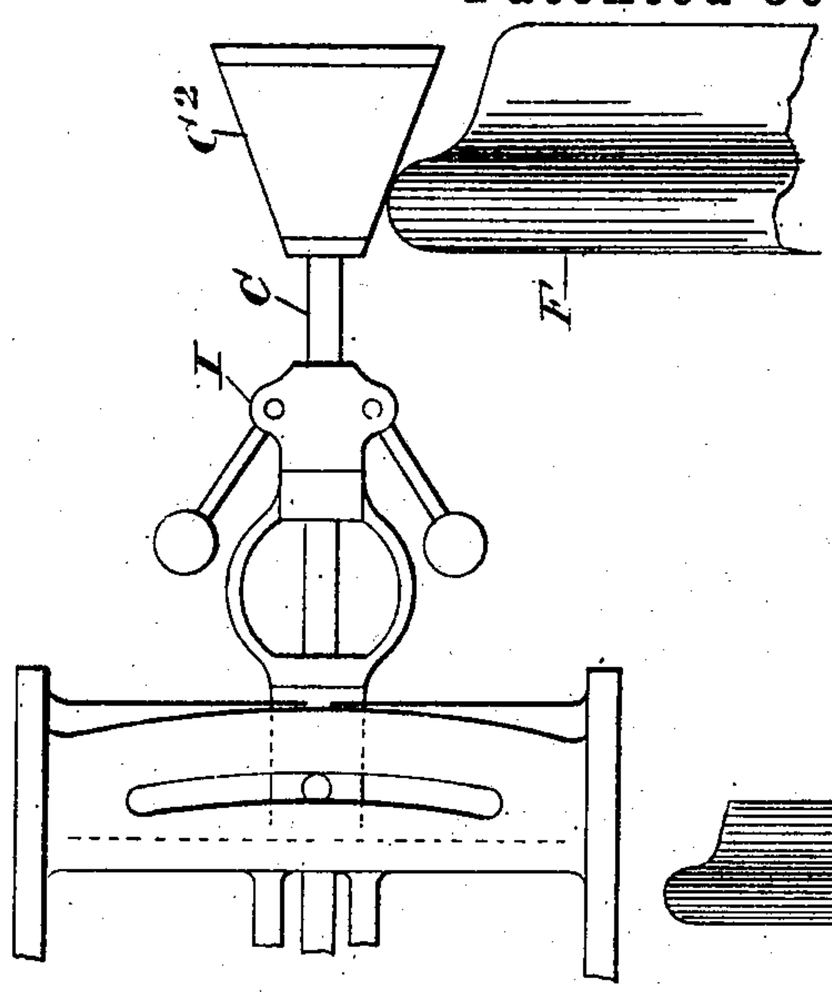


Fig. 10.

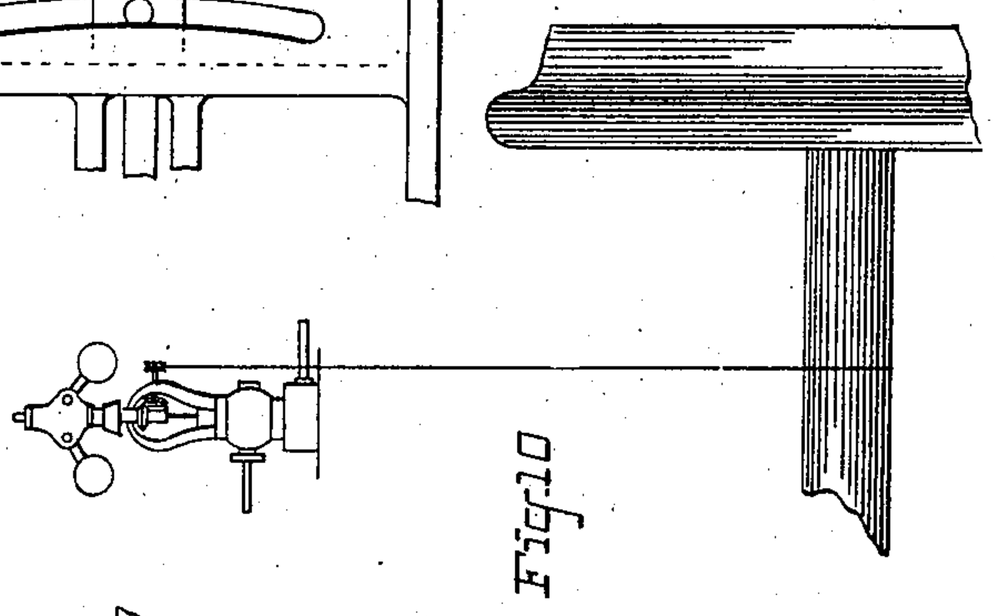
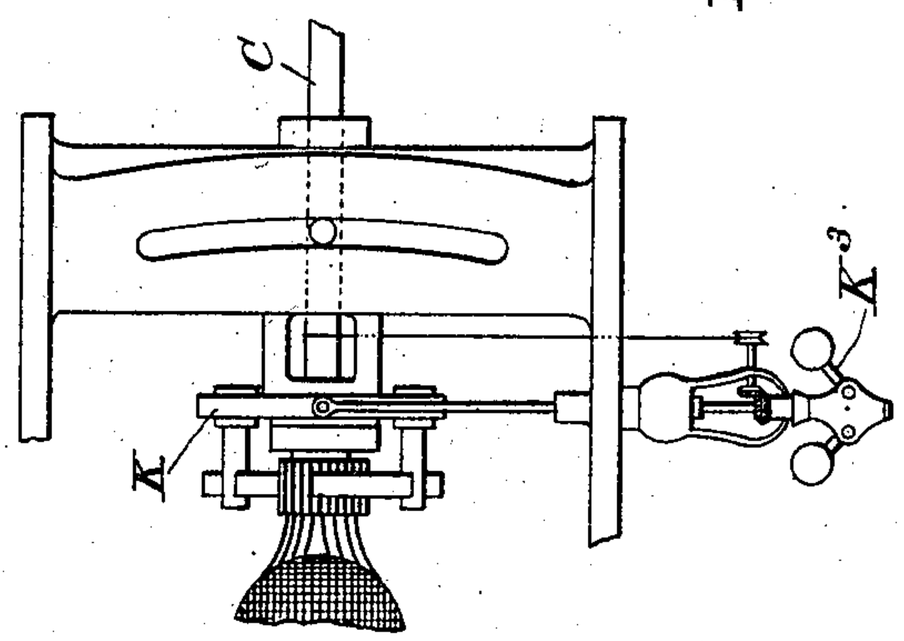


Fig. 7.



ATTEST:
J. A. Mundy
Wm. H. Capel

INVENTOR:
Frank E. Kinsman
By H. C. Townsend
Attorney

(No Model.)

5 Sheets—Sheet 5.

F. E. KINSMAN.

ELECTRIC CAR LIGHTING SYSTEM.

No. 506,237. Patented Oct. 10, 1893.

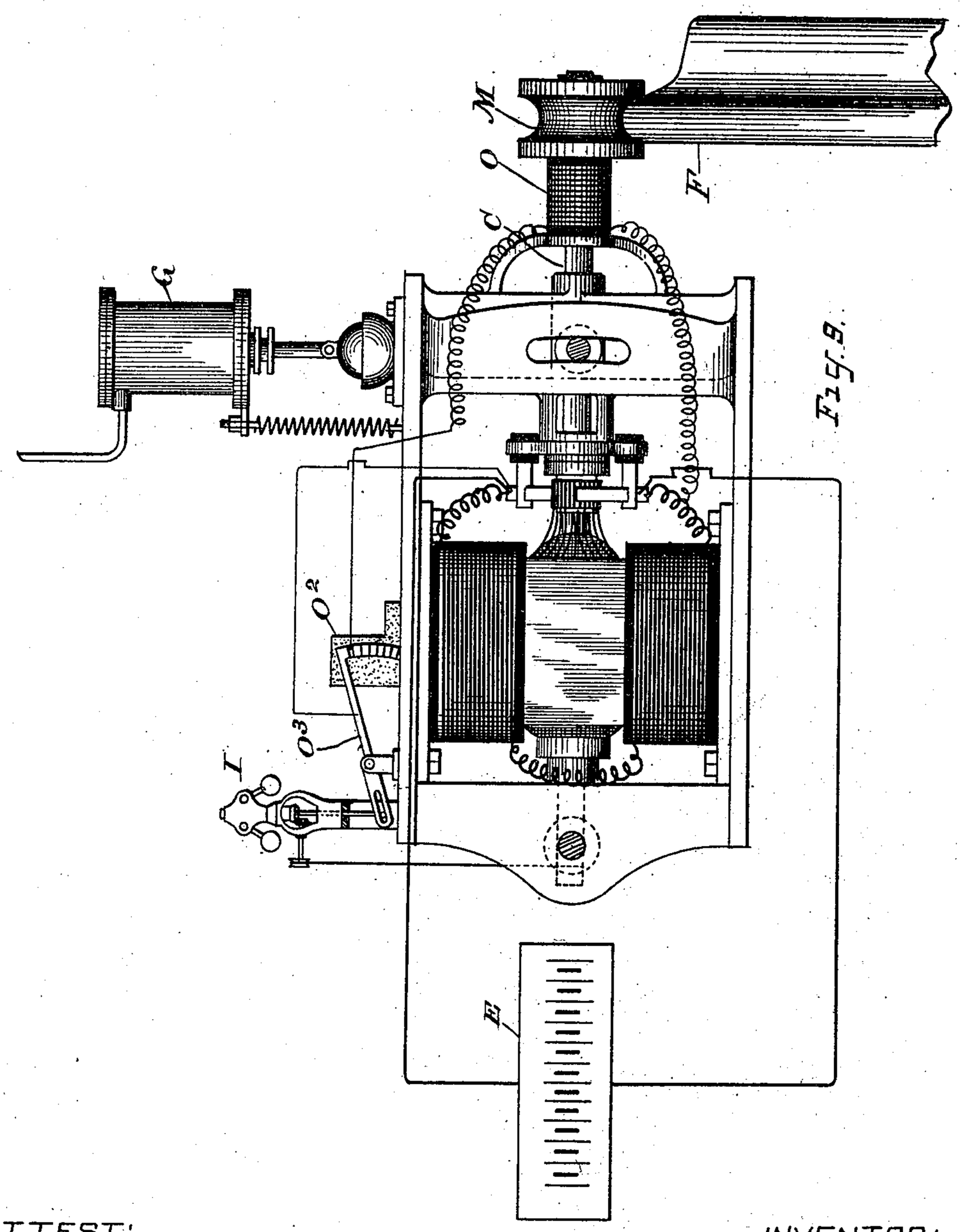


Fig. 9.

ATTEST:
J. A. Hurdle
Wm. H. Capel.

INVENTOR:
Frank E. Kinsman
By H. B. Townsend
Attorney

UNITED STATES PATENT OFFICE.

FRANK E. KINSMAN, OF PLAINFIELD, NEW JERSEY.

ELECTRIC CAR-LIGHTING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 506,237, dated October 10, 1893.

Application filed September 18, 1890. Serial No. 365,315. (No model.)

To all whom it may concern:

Be it known that I, FRANK E. KINSMAN, a citizen of the United States, and a resident of Plainfield, in the county of Union and State of New Jersey, have invented certain new and useful Means for Charging Storage-Batteries from Moving Vehicles, &c., of which the following is a specification.

My invention relates to apparatus wherein means are provided for driving a dynamo machine from a moving wheel or axle of a vehicle such for instance as a railway car or a locomotive, or from any other wheel driven or rotated by a steam engine or other machine of variable driving power used for other work besides operating such dynamo, and the current generated by such dynamo is employed for charging a storage battery or for any other purpose. My invention is, however, especially useful in train lighting when the current from the dynamo supplies the lights directly, alone or in combination with the storage battery, or feeds the battery alone as in systems of train lighting well known in the art.

My invention consists in providing means whereby the dynamo may be connected and disconnected from its driving wheel at pleasure in accordance with the steam or other pressure employed in propelling the vehicle or turning the wheel so that when the pressure rises above that required for turning the wheel at the desired speed, the surplus power may be utilized for operating the dynamo.

My invention consists further in automatically regulating the electrical efficiency of the dynamo in accordance with changes in the speed of the wheel so that the current employed in charging the storage battery or in running the lamps, or in other ways, may be kept normally at an adjusted or constant strength and may not rise to a point where it would damage or derange the apparatus. To prevent the back flow of current from the battery through the dynamo when the speed falls or the dynamo comes to rest, any of the usual devices employed in the art may be used.

My invention consists further in the special combinations of devices and organization of parts whereby I am enabled to produce a simple, strong and effective apparatus adapted to drive a dynamo-machine from a locomotive drive wheel or car wheel or axle, or from other moving wheel kept in operation by a steam or other engine or driving machine of variable power.

The invention consists also in certain special details of construction and combinations of devices that will be hereinafter more fully described and claimed.

For the purpose of varying the output of the dynamo in accordance with changes in the speed of the vehicle, I may vary such output either by changing the speed of the dynamo itself, by shifting its commutator brushes, by changing the strength of its field, or by other means known to electricians.

The connection and disconnection of the dynamo with the driving wheel may be brought about at will by the locomotive engineer when he observes that he has a greater pressure of steam than is necessary for driving the locomotive at the required speed or may be, and is preferably, performed automatically by using the steam pressure itself to effect the mechanical coupling and uncoupling of the dynamo to the wheel. Such steam pressure may operate either directly or indirectly to move a member of the clutching devices.

In the accompanying drawings, I have shown in Figure 1, in side elevation, an organization of apparatus embodying my invention. Fig. 2 is a longitudinal section through the frame supporting the dynamo and other parts. Fig. 3 is a cross section of the armature shaft in proximity to the commutator. Fig. 4 is a longitudinal section through the devices which connect the armature shaft with means for imparting longitudinal movement thereto. Fig. 5 is an end view of the spider or frame which supports the armature on the shaft. Fig. 6 is a side elevation thereof, the parts being shown in longitudinal section. Figs. 7 and 8 illustrate modifications in the ways of varying the output of the dynamo machine. Fig. 9 shows a modification in the devices for gearing the dynamo to the vehicle wheel, and for changing the speed. Fig. 10 illustrates a further modification of my invention.

A, indicates a suitable frame in which the various parts of the apparatus are mounted in proper position.

B, B, are the field magnets of the dynamo machine, the armature of which is indicated at B^2.

C, is the shaft of the armature, which shaft is provided with a spline *c*, that engages with a groove in a tube or cylinder carrying the spider D, of the armature for the machine. The heads of the spider D, or the ends of the tube carrying them engage with cross pieces on the frame A, so that the armature may not have any longitudinal movement, but the shaft C, is capable of longitudinal movement through the spider, by devices to be presently described, for the purpose of changing the speed of rotation of the armature and thereby varying the output of the dynamo. The dynamo may be of any suitable character as well understood by electricians, and the circuits thereof are not herein shown in detail or described as they are well understood by electricians and may be largely varied.

E, indicates a storage battery to be charged from the dynamo and connected therewith in any suitable manner upon the vehicle.

F, indicates a wheel of the vehicle upon which the dynamo is carried. The wheel F, is preferably the drive wheel of a locomotive. The apparatus is mounted so that the shaft C, is practically parallel to the vehicle wheel shaft and such shaft C, carries a cone friction wheel C^2, adapted to engage with the edge of the wheel F, as shown. As will be obvious, when the shaft C, is moved inward, a larger diameter of the cone comes into engagement with wheel F, and the speed of the armature will be thereby diminished. Conversely, on a movement of the cone C^2 and shaft C, in the opposite direction, the speed will be increased. This device constitutes a well known form of changeable speed gear, and in place of it other changeable speed gears might be employed without departing from my invention.

By arranging the parts so that the friction wheel C^2, may be moved away from the edge of the wheel F, a simple friction clutch device is provided whereby the dynamo may be, at pleasure, thrown out of operation or may be thrown into operation so as to be driven by the vehicle wheel when desired. The frame A, in order to permit this movement to be produced is properly pivoted at the point F^2, as indicated and is guided by suitable pins and slots as shown when it swings around the center F^2. A spring F^3, tends to swing the frame so as to uncouple the dynamo from wheel F, to move the clutch in the opposite direction or into gear. I provide a cylinder G, the piston of which carries a rod G^2, through which movement is communicated to the frame A, as shown. The cylinder G, connects at its upper end by a pipe G^3, with any suitable source of air, steam or other fluid or liquid under pressure, and in said pipe G^3, a cock G^4, may be interposed for the purpose of controlling the fluid pressure. The cock G^4, should be any suitable form of three way cock so that the pressure on the piston may be produced or may be relieved as desired. Preferably, I connect the pipe G^3, with the boiler space of the locomotive so that the steam pressure will act directly on the piston though this is not absolutely necessary, my invention consisting, so far as the automatic operation of the devices is concerned, in governing or controlling the movement of the clutching devices C^2, or other clutches by means of the variations in the steam pressure employed in propelling the vehicle. When the pipe G^3, connects directly with the boiler steam space the spring F^3, should be in effect a weighing spring that will hold the clutch C^2, disengaged until the steam pressure rises above a certain predetermined amount for which the spring F^3, may be set. Normally the spring F^3, will hold the parts disengaged and the armature shaft will be at rest but when the pressure reaches the predetermined amount the spring F^3, will be overcome and the dynamo shaft will be coupled to the driving wheel F, so that the surplus power may be now utilized in driving a dynamo and storing energy in the secondary battery or performing other work. It is obvious that the wheel F, might be any wheel kept in rotation by variable driving power, such for instance, as a steam engine, though my invention is of especial utility when the driving wheel F, is a locomotive drive wheel.

In order that the output of the dynamo may remain practically constant, despite changes in speed of the vehicle while the dynamo is charging the battery, I provide means for adjusting the speed of the armature shaft with relation to that of wheel F, which devices are controlled by a ball governor I, or other speed responsive device driven by or connected to the armature shaft in any suitable manner. The ball governor I, is here shown as driven by a belt taken from the armature shaft and is made to control a valve indicated at I^2, placed in a pipe or passage leading from any source of pressure to a cylinder I^3, for the purpose of operating a piston therein. The piston of cylinder I^3, connects with the shaft C, and imparts the longitudinal movement thereto required for changing the speed in the manner before described. The piston carries a rod I^4, as shown in Fig. 4, which is coupled to the armature shaft C, by a head I^5, engaging with a revolving sleeve or barrel I^6, attached to shaft C. By this means free rotation of the shaft may take place at all times without rotation of the rod I^4. A suitable spring I^6, connects to the piston rod of the piston at I^3, for the purpose of returning the same to normal position after any movement thereof produced by pressure introduced through valve I^2. When the speed rises above the normal the ball governor I, opens the valve I^2, and causes the piston in I^3, to move

the shaft longitudinally so as to adjust the changeable speed gear device C^2, in a manner to cause decrease of speed of the armature shaft. Conversely, when the speed falls, an opposite adjustment takes place to keep the speed at practically normal.

In Fig. 7, I have shown how the output of the machine might be adjusted by setting or adjusting the brushes of the commutator in the well known manner. In this instance the yoke K, that carries the commutator brushes connects with a ball governor K^3, which is driven by any suitable belt connected to the armature shaft C. The operation is substantially the same as already described, an increase of speed causing an adjustment of the devices through the operation of the ball governor so as to cut down the output and conversely, a decrease of speed moves the adjusting devices back in a direction to increase the output just as in the case of Fig. 1, the movement of the changeable speed devices was such as to operate in the direction of increasing or decreasing the output by changing the relative speed under the conditions described so as to keep the output practically constant.

Instead of employing a ball governor I, as shown in Fig. 1, to control another force which shall operate to move the changeable speed device, I might, as indicated in Fig. 8, employ a ball governor or other speed responsive or feed controlling mechanism attached to the shaft C, directly in proper manner to move the same longitudinally with the variations or tendencies to variation in the speed of the armature.

Instead of a coned changeable speed device, I might employ a changeable speed gear depending upon differences in friction as indicated in Fig. 9, where I have shown a wheel M, of some magnetic material bearing upon the wheel F, of the vehicle. The wheel M, is secured directly to the armature shaft and is provided with means for changing its magnetism so that the amount of friction between it and the wheel F, may be varied. A device suitable for so changing the magnetism is a coil O, on the iron shaft carrying the wheel M. The coil O, may be in a circuit taken from the armature circuit of the machine in any suitable manner and including a variable resistance the box of which is indicated at O^2. The variable resistance arm O^3, is operated by a ball governor I, driven from shaft C, in obvious manner, the movement being such that on increase of speed resistance will be interposed in the circuit of coil O, thereby cutting down the magnetism of M, and decreasing the friction so as to increase the slip and decrease the relative speed of the armature and its driving wheel F.

While I have shown the ball governor or speed responsive device I, as driven from the armature shaft C, I prefer to drive it from an axle of the vehicle as indicated in Fig. 10. The ball governor or other speed responsive device may be used in this case in any of the ways before described or in any other suitable way to regulate the output of the dynamo in accordance with the changes in the speed of the vehicle.

I do not limit myself to any particular form of ball governor or other device for regulating the output of the dynamo in the ways before described or in any other desired manner.

It is obvious that the speed of the armature shaft might also be governed by other forms of changeable speed mechanism without departing from my invention, and that other means for throwing the clutch into and out of gear by the action of the steam pressure might be employed. It is generally, preferable, however, to use a cylinder G, connected directly with the boiler space. The cylinder G, however, permits the employment of any fluid or liquid pressure properly governed by hand or otherwise for the purpose of bringing the dynamo into gear with a wheel or axle of the vehicle.

What I claim as my invention is—

1. The combination, substantially as described, with the armature, of a longitudinally movable shaft C, a changeable speed gear connected with said shaft, and a piston operating on the shaft to impart longitudinal movement thereto, as and for the purpose described.

2. The combination, substantially as described, of a storage battery, a charging dynamo therefor driven from the moving vehicle, and means for connecting and disconnecting the dynamo from the driving wheel, governed by the steam pressure used in propelling the wheel.

3. The combination, substantially as described, with a vehicle wheel, of a dynamo driven therefrom, a storage battery charged by said dynamo, and a clutch adjusted by steam pressure so as to disconnect or connect the dynamo with the driving wheel as the pressure rises and falls.

4. The combination, substantially as described, of a locomotive drive wheel, a dynamo machine, a clutch for mechanically connecting the armature of said motor to the locomotive drive wheel, a piston for operating said clutch, and means upon the locomotive for controlling the pressure on said piston while the locomotive is running and independently of the operation of the brakes, as and for the purpose described,

5. The combination with a locomotive drive wheel, of a dynamo machine mounted in a movable frame, an armature shaft carrying a wheel adapted to engage with the said drive wheel, a storage battery charged from such dynamo, and a piston bearing on the frame and having its cylinder connected with the locomotive boiler space.

6. The combination with the drive wheel, of a magnetic clutch, and means for decreas-

ing the magnetism of said clutch as the speed increases and vice versa, as and for the purpose described.

7. The combination, substantially as described, of a locomotive drive wheel, a dynamo machine the armature of which gears to said drive wheel, a storage battery charged from such dynamo, and means for connecting or disconnecting the armature mechanically with the drive wheel according to the changes in the steam pressure.

8. The combination of the dynamo, a storage battery charged thereby, a vehicle wheel driving the dynamo, a clutch, means for operating the clutch in accordance with the steam pressure which drives the vehicle, and devices for automatically adjusting the output of the dynamo in accordance with changes in the speed of the vehicle.

9. The combination with a locomotive drive wheel, of a dynamo machine, a storage battery charged therefrom, a clutch between the armature shaft and the drive wheel, a spring or retractor tending to disengage the clutch, and a cylinder connected with the steam space of the locomotive boiler and having a piston for causing the clutch to engage.

10. The combination with a dynamo machine driven from a moving vehicle wheel, of a storage battery charged from said dynamo, means for varying the action of the dynamo when the speed thereof varies, a speed regulator for adjusting the devices employed for varying the action of a dynamo, and devices for automatically connecting and disconnecting the dynamo as the driving power rises and falls in strength.

11. The combination, substantially as described, of a storage battery, a charging dynamo therefor driven from a suitable wheel, and means for connecting and disconnecting the dynamo from the driven wheel, governed by the steam pressure used in turning the same.

12. The combination, substantially as described, of a dynamo machine, a driving mechanism therefor, and means for automatically connecting and disconnecting the dynamo from the driving mechanism, as the driving power varies.

13. The combination, of a dynamo, a storage battery charged thereby, a wheel driven by any suitable power, means for connecting and disconnecting the dynamo from said wheel as the strength of the power varies, and devices for automatically adjusting the output of the dynamo in accordance with changes in the speed of the driving wheel.

14. The combination, with a wheel, of a dynamo machine driven therefrom, a storage battery charged by such dynamo, a clutch between the armature shaft and the driving wheel, a spring or retractor tending to disengage the clutch, and a cylinder connected with a steam space of the boiler for the engine which operates the driving wheel, said cylinder having a piston for causing the clutch to engage.

Signed at New York, in the county of New York and State of New York, this 8th day of September, A. D. 1890.

FRANK E. KINSMAN.

Witnesses:
WM. H. CAPEL,
HUGO KOELKER.