(No Model.) 3 Sheets—Sheet 1.

A. WATT.

ELECTRIC DRIVING APPARATUS FOR CENTRIFUGAL MACHINES.

No. 316,316. Patented Apr. 21, 1885.

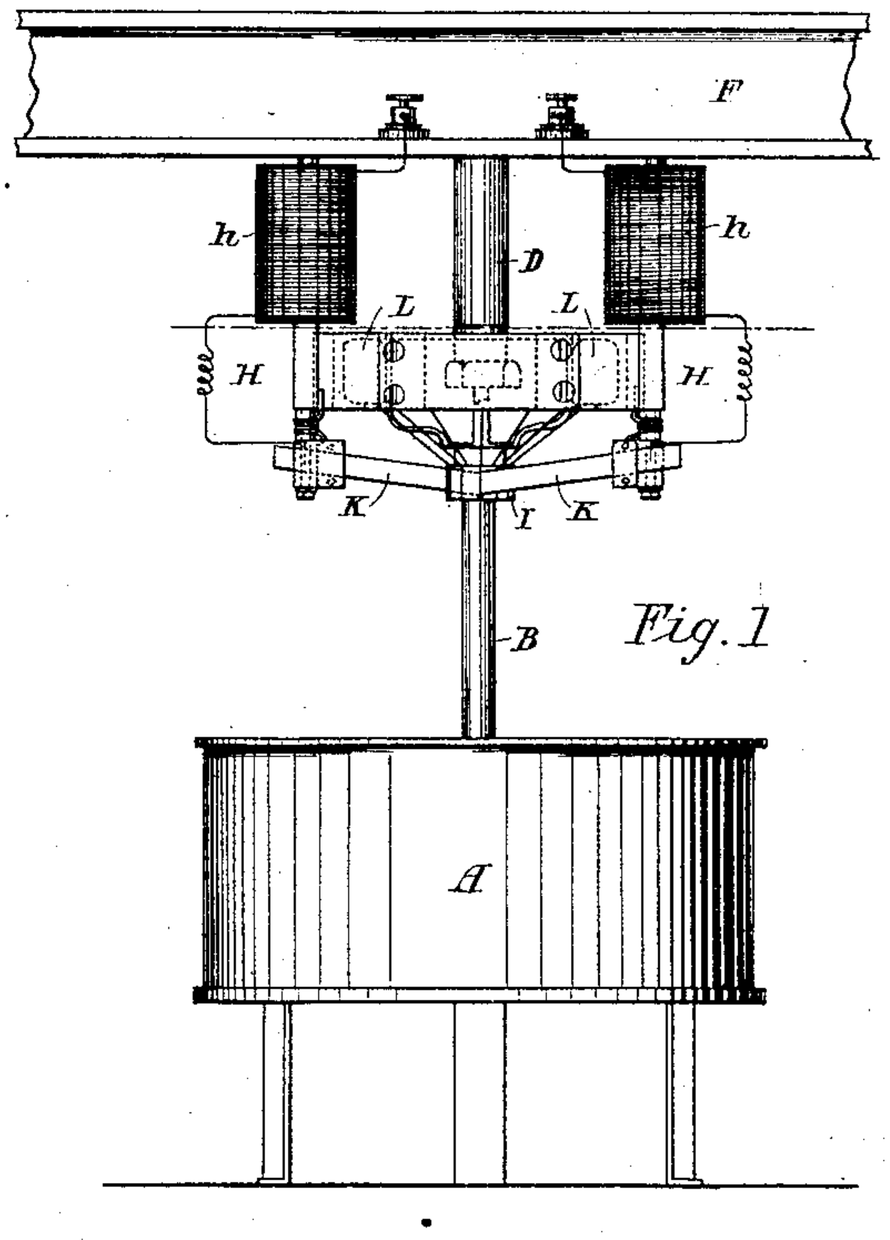

Fig. 1

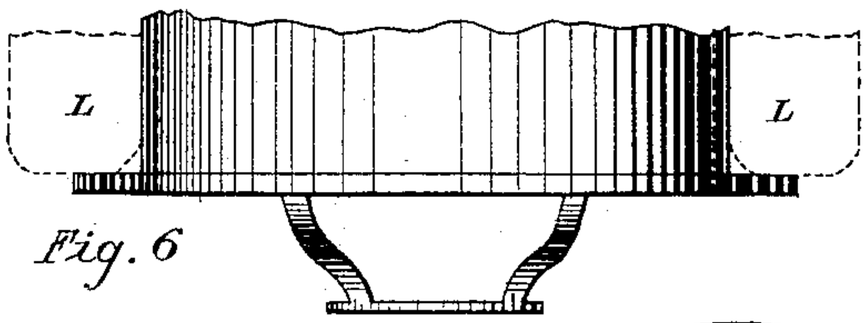

Fig. 6

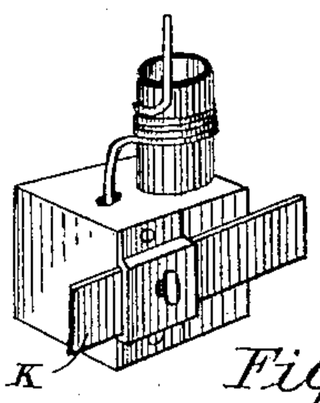

Fig. 7

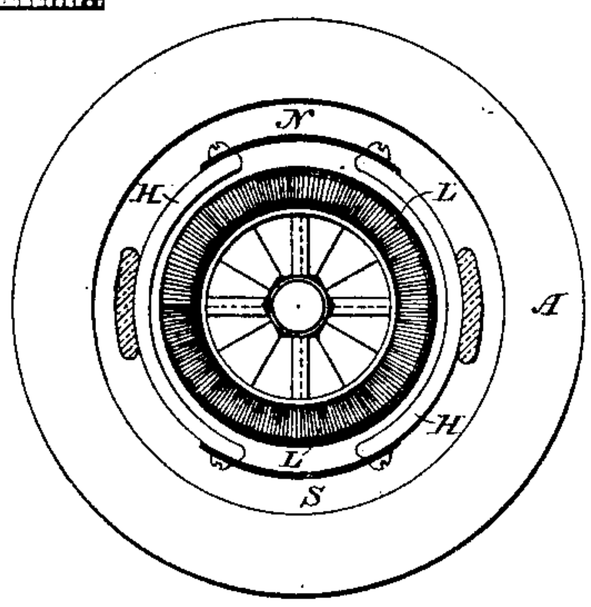

Fig. 2

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Pope & Edgecomb

(No Model.) 3 Sheets—Sheet 2.

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Fig 3

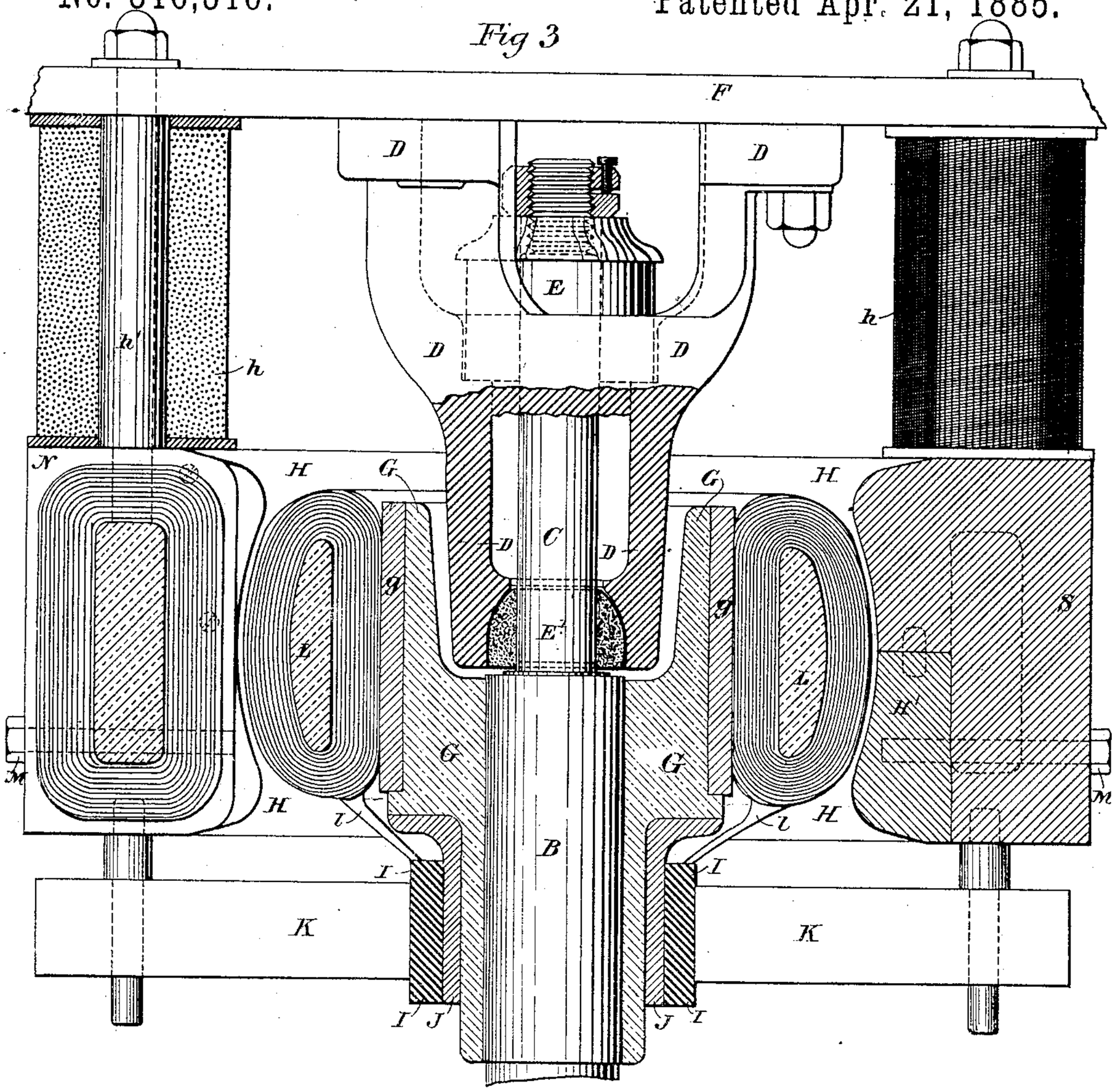
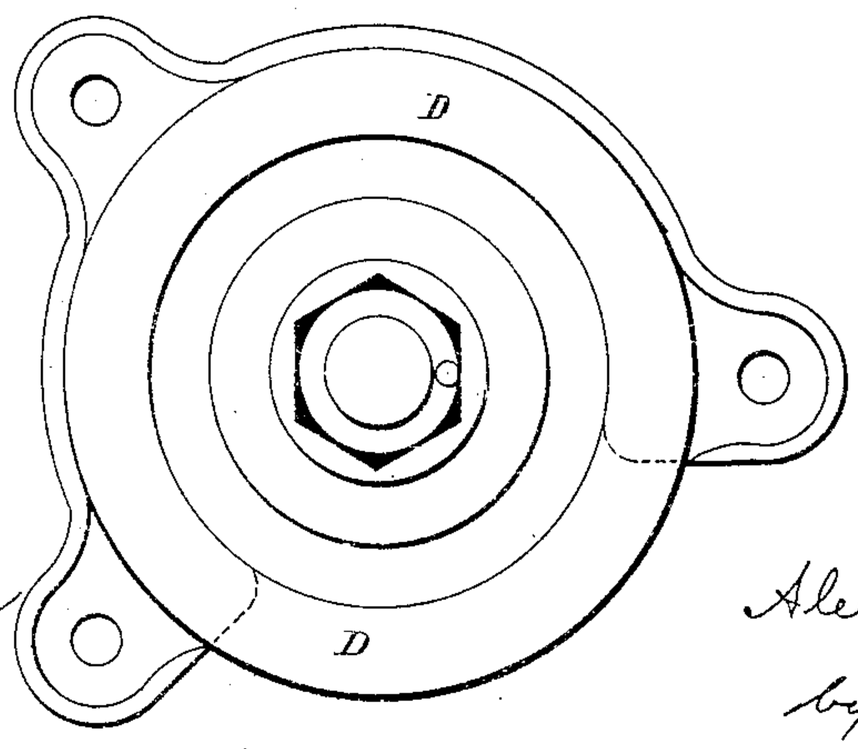


Fig 5



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(No Model.) 3 Sheets—Sheet 3.

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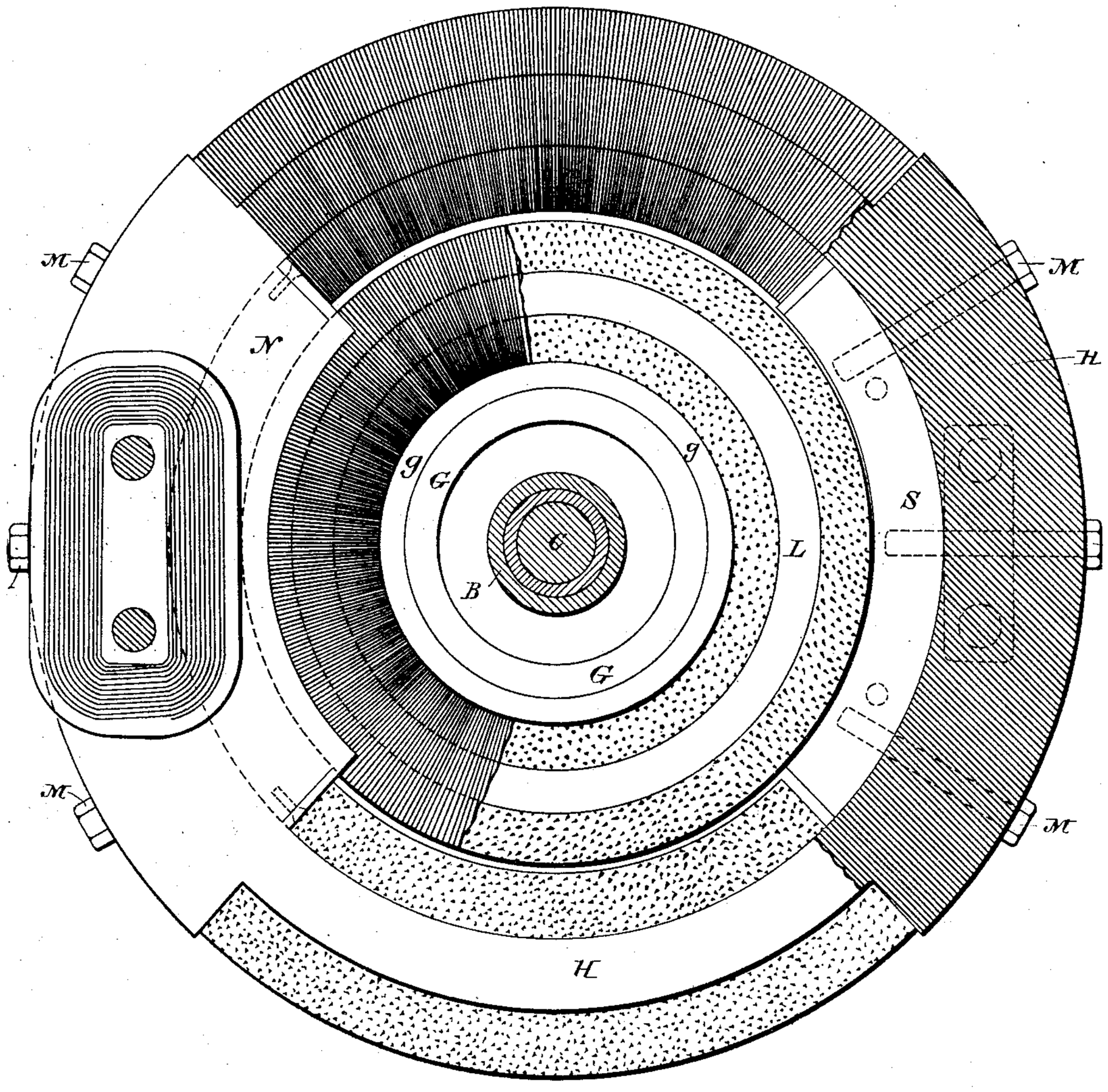
Fig 4



Witnesses
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Romeva C. Gould

Inventor
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by his attorneys
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UNITED STATES PATENT OFFICE.

ALEXANDER WATT, OF LIVERPOOL, COUNTY OF LANCASTER, ENGLAND.

ELECTRIC DRIVING APPARATUS FOR CENTRIFUGAL MACHINES.

SPECIFICATION forming part of Letters Patent No. 316,316, dated April 21, 1885.

Application filed June 10, 1884. (No model.) Patented in England June 13, 1883, No. 2,944.

To all whom it may concern:

Be it known that I, ALEXANDER WATT, of Liverpool, in the county of Lancaster, in the Kingdom of England, have invented certain new and useful Improvements in Electrical Driving Apparatus for Centrifugal Machines, (for which I have obtained Letters Patent in England dated June 13, 1883, No. 2,944,) of which the following is a specification.

Centrifugal machines or hydro-extractors require to be driven at a high circumferential velocity, and it is usual to drive them by straps running at a high speed, the speed being increased from the main shafting by one or more counter-shafts, the straps passing from pulleys of large diameter onto ones of smaller diameter. Without a complication of machinery such as cone-drums, or stepped cone-pulleys, &c., no means can be provided for regulating the speed of a single centrifugal machine where there are a number working together, and if the speed of one machine is required at any given time either greater or less than the average for a special material under operation it is usual under the present system to increase or decrease the speed of the engine, and the whole range of the machines go at the altered speed. The numerous driving-straps required are also a source of great trouble and danger, besides occupying much valuable space. I have therefore designed this invention to enable me to drive each centrifugal machine independently by converting it into or combining it with an electric motor, as by this mea s by simply placing in each circuit a resistance-coil of ordinary construction, and by a simple turn of the handle altering the quantity of electricity passing through, I can vary the speed to any desired extent, and, if necessary, reverse its direction. Thus the starting of the machine may be made so gradual that the jarring and wear and tear consequent upon throwing a belt going at a high speed onto an inert machine is avoided.

By these improvements in the driving of centrifugal machines the dangerous belting may be dispensed with; and I estimate that while still leaving sufficient room to properly attend to each machine the number of machines placed in a given space may be doubled or even trebled without causing inconvenience.

Electric motors will be found specially adapted for driving centrifugal machines, as both motor and machine are usually driven at a high speed.

My invention is applicable for use with centrifugal machines of any ordinary construction; but the arrangement shown in the accompanying drawings is chiefly designed for use with Weston's suspended centrifugal machine, (the mode of suspension of which is clearly described in the specifications of his patents,) and consists, essentially, in replacing the ordinary driving-pulley of the machine by the armature of an electric motor, and surrounding this with the field-magnet, which may be attached to or in part formed of the girder from which the machine is suspended.

Figure 1 is a general descriptive elevation of a centrifugal machine with my invention attached thereto; Fig. 2, a plan view of Fig. 1; Fig. 3, a detailed sectional elevation of electrical driving apparatus for centrifugal machine constructed according to my invention; Fig. 4, a plan partly in section of Fig. 3; Fig. 5, a plan of bracket D, Fig. 3; Fig. 6, a detailed view of attachment fixed to the shaft for carrying the armature and the commutator, Fig. 1; Fig. 7, a detailed view of bracket carrying the commutator-brushes, Fig. 1.

A is the casing of the centrifugal machine, inside which the cage or basket revolves; B, the driving-spindle; C, the inner or supporting spindle suspended from the bracket D by an india-rubber or other elastic buffer, E, and moving round the center of the ball-joint E'. The bracket D is securely fixed to the girder F or other strong overhead support. The spindle C is fixed—that is to say, it does not revolve, but, being supported on an elastic buffer, allows a certain amount of oscillation at its lower end, the center-point of suspension being practically free from oscillation.

G is a bracket keyed or otherwise securely fixed to the shaft B, so as to rotate with it. The ends of this bracket G extend upward beyond the zero or center line of oscillation. The bracket G carries the circular armature L, which is wound like an ordinary Gramme ring, and insulated from the bracket by the ring of insulating material, *g*. As the shaft C has no lateral motion in the center of the ball-joint E', but merely a movement round a fixed center, the only motion of the armature caused by

the oscillation of the cage and shaft will be one at an angle to the plane of rotary motion and round the center of the ball-joint E′. To avoid any contact between the poles of the field-magnet H, the armature L is made convex on its outer edge and the poles of the magnet H concave, as shown.

H is the electro-magnet, with poles N and S. This magnet is formed of the circular ring H, encircling the armature L of the uprights *h*, and of a cross-piece connecting the uprights to and forming the crown of the magnet. These several parts may be fixed together in any well-known combination for forming a field-magnet, and then attached to the beam or support. I prefer, however, to construct the magnet as shown, where the support consists of an iron beam. The upright part of the magnet *h* is formed of the core *h′* in magnetic communication and firmly attached to the flange F of the beam by means of bolts fixed to the ring of the magnet, as shown, which thus forms a part of the magnet.

I is a commutator attached to and revolving with the bracket G, insulated therefrom by the insulating material J; *l*, bars connecting the sections of the armature L with the commutator I; K, brushes carrying the current from the electro-magnet H to the commutator. These are carried by studs or brackets supported by the magnet, but insulated therefrom. The commutator I is placed as near to the zero-line of oscillation as practicable, and in such a position as to receive the least possible movement from the oscillation of the cage and shaft.

The faces of the poles of the magnet H are made concave, as shown, for the purposes already described.

The lower piece, H′, of the pole of the magnet is movable and held in place by means of screws M. This piece is removed to allow of the raising or lowering of the armature, and replaced when the latter is in position.

I claim as my invention—

1. In combination with an elastic suspension device for the driving-shaft of a centrifugal machine, an electric motor placed round the point of suspension, with its armature fixed to the shaft, the field-magnet being fixed to stationary supports.

2. The combination, with a flexible suspension-joint such as Weston's herein described, of the armature of an electric motor fixed to the shaft, and the field-magnet fixed to stationary supports, with their centers, when at rest, in the plane of the zero-line of oscillation, so that the electric mechanism is unaffected or but little affected by the oscillations of the shaft, substantially as described.

3. The combination, in mechanism for driving centrifugal machines, of the revolving annular armature fixed to the shaft, the annular electro-magnet encircling the same, and the commutator fixed on and revolving with the same shaft, placed as nearly as possible to the zero-line of oscillation, substantially as described and shown.

4. The combination, with the driving-shaft of a centrifugal machine, of an electric motor having its moving part attached to the shaft thereof and its commutator located as nearly as possible to the plane of least oscillation and connected with the line by brushes, also placed as nearly as possible to the plane of least oscillation, substantially as described.

5. In electrical driving mechanism for centrifugal machines, the combination, with the shaft B and bracket G, of the circular armature L and commutator I, insulated by rings of insulating material, *g* and J, of the fixed bracket D, spindle C, elastic supporting-buffer E, and the ball-joint E′, whereby the point of oscillation is brought to the center of the bracket G, substantially as shown and described.

6. In electrical driving mechanism for centrifugal machines, the triple magnet composed of the ring H, and the uprights *h*, in combination with the beam F, substantially as described.

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

ALEXANDER WATT.

Witnesses:

W. P. THOMPSON,

JOHN HAYES.