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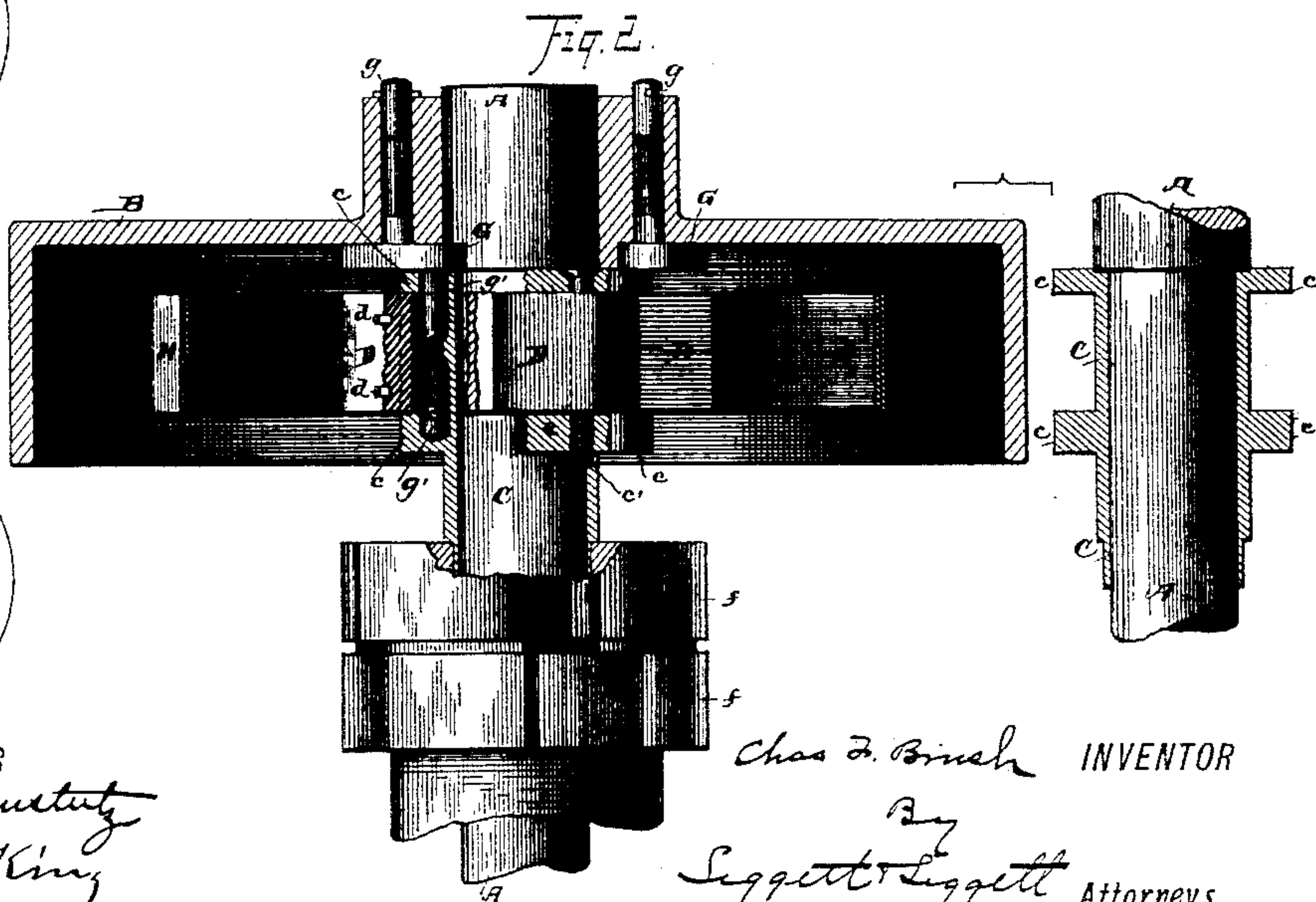
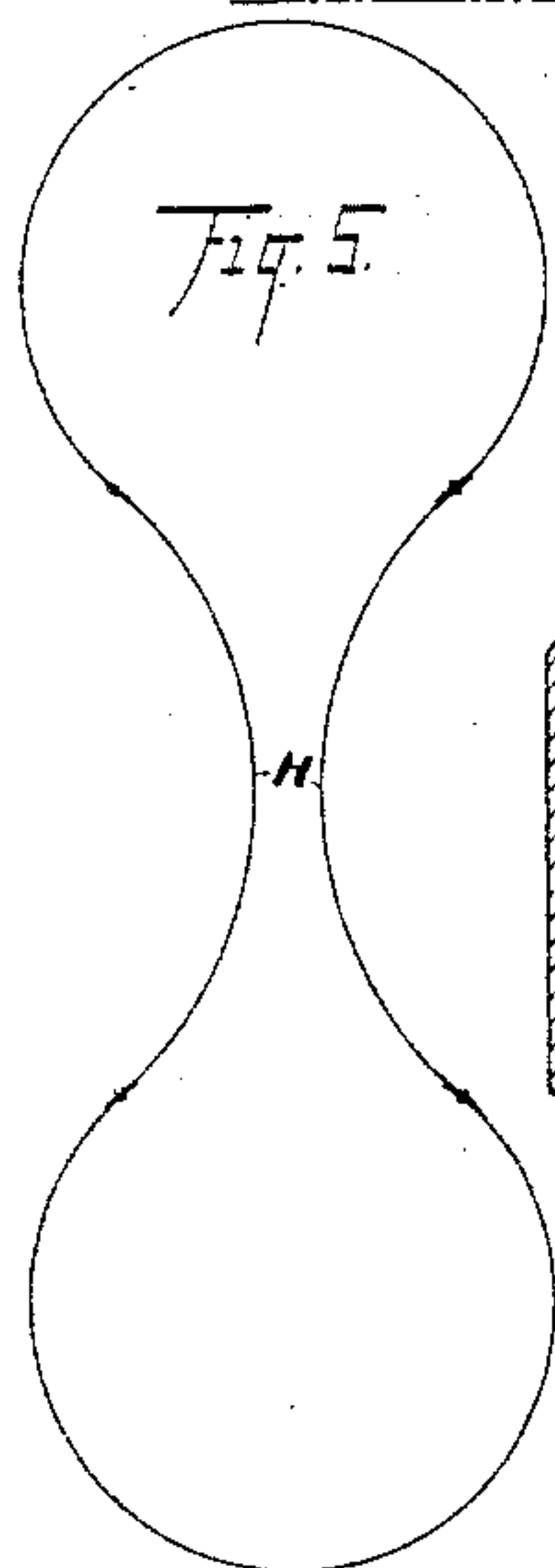
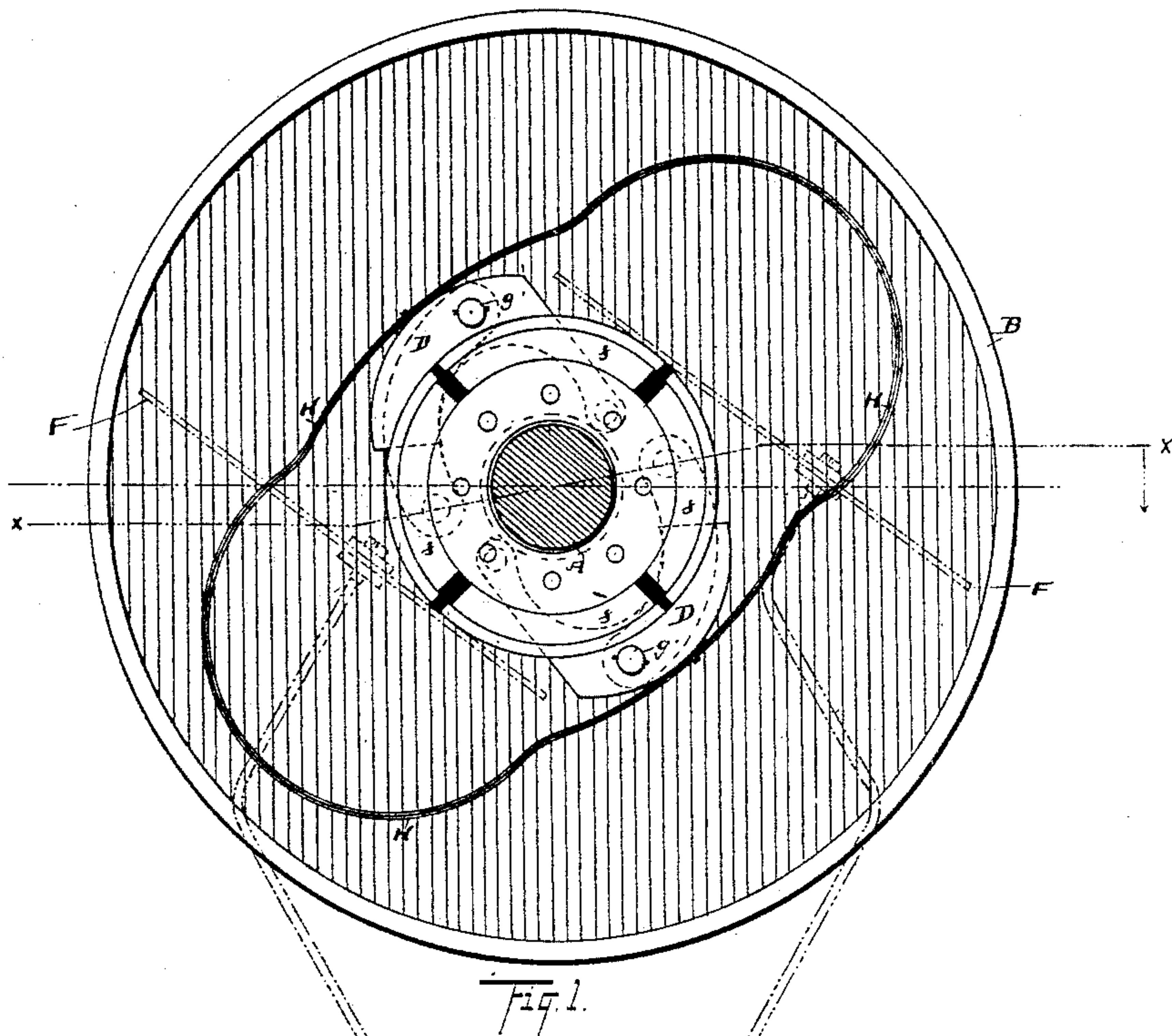
2 Sheets—Sheet 1.

C. F. BRUSH.

GOVERNOR FOR ELECTRO MAGNETIC MOTORS.

No. 383,857.

Patented June 5, 1888.



WITNESSES  
*C. S. Amstutz*  
*Geo. W. King*

*Chas. F. Brush* INVENTOR  
*Siggett & Siggett* Attorneys

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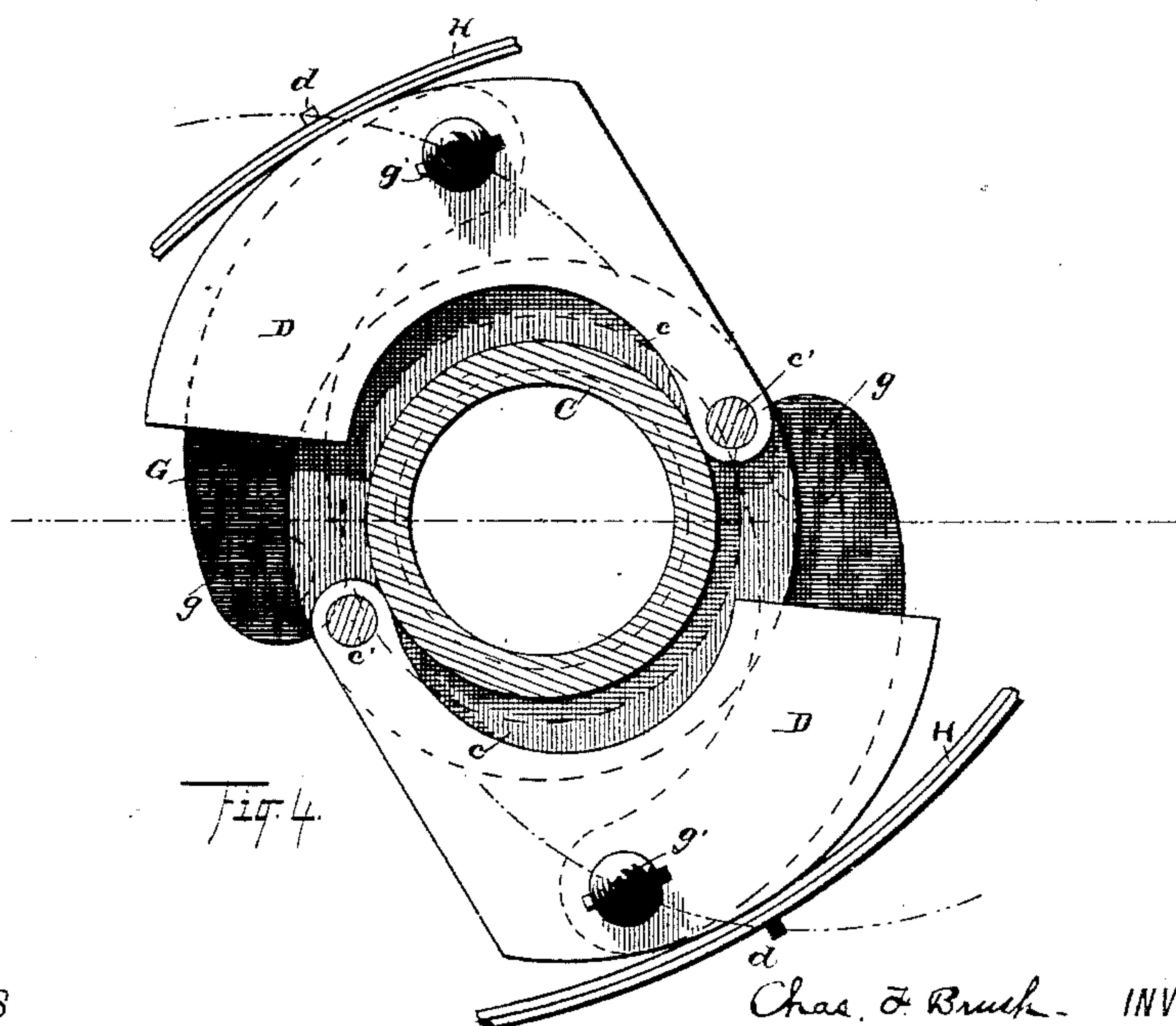
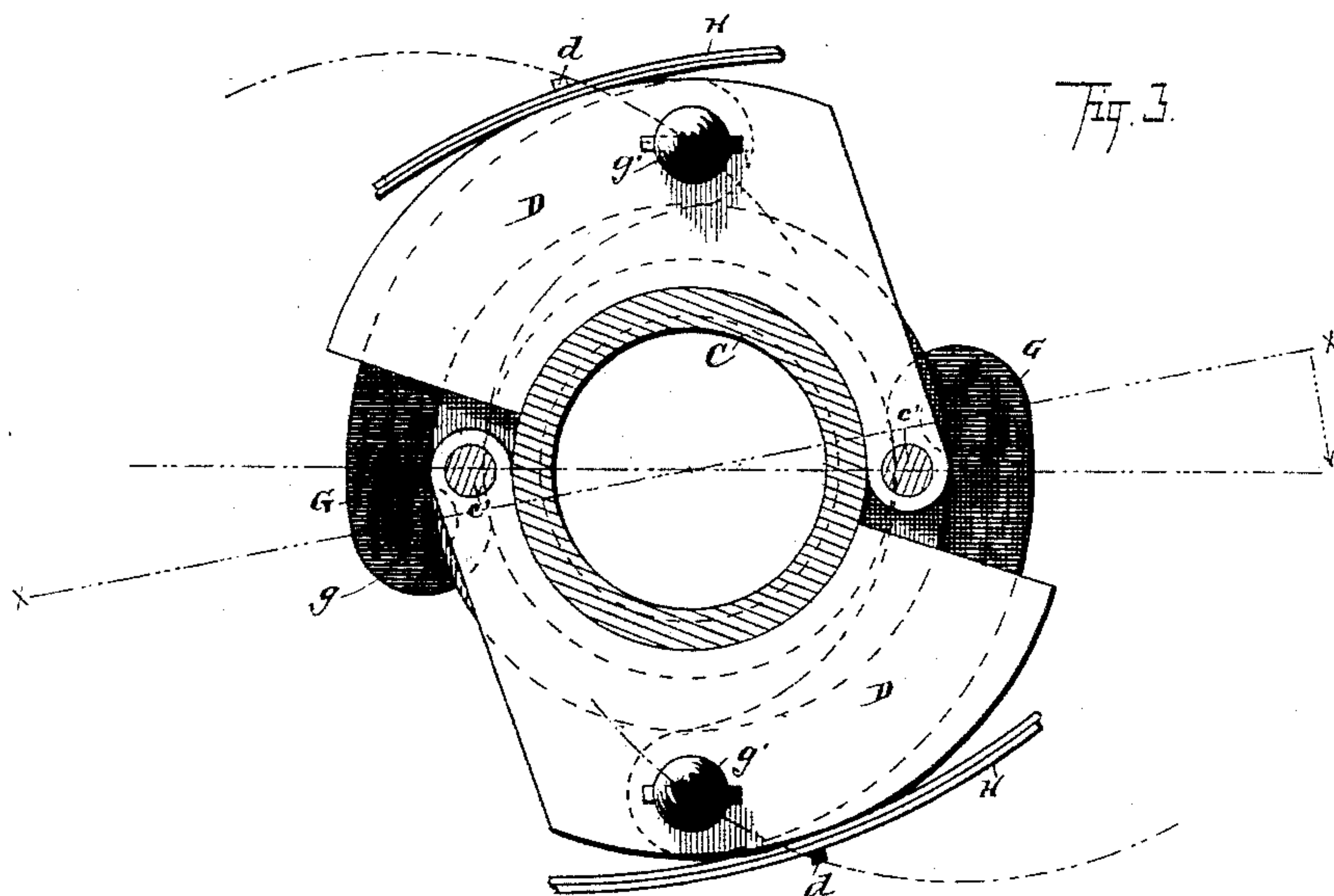
2 Sheets—Sheet 2.

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WITNESSES

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# UNITED STATES PATENT OFFICE,

CHARLES F. BRUSH, OF CLEVELAND, OHIO.

## GOVERNOR FOR ELECTRO-MAGNETIC MOTORS.

SPECIFICATION forming part of Letters Patent No. 383,857, dated June 5, 1888.

Application filed August 1, 1887. Serial No. 245,863. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES F. BRUSH, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and  
5 useful Improvements in Governors for Electro-Magnetic Motors; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make  
10 and use the same.

My invention relates to improvements in governors for electro-magnetic motors, in which an endless spring is mounted on and made to embrace the governor-weights. The  
15 weights are mounted on links of the crank variety, and are pivotally connected with the commutator-sleeve, with the arrangement of parts such that a limited outward movement of the weights is sufficient to rotatively advance the commutator-sections from maximum to minimum points of effectiveness, to  
20 the end that prompt action and a wide range of governing capacity are attained.

With these objects in view my invention  
25 consists in certain features of construction and in combination of parts, hereinafter described, and pointed out in the claims.

My present invention is designed more especially as an improvement on a governor for  
30 which Letters Patent No. 343,886 were granted to me June 15, 1886, and to which reference is hereby made.

In the accompanying drawings, Figure 1 is a side elevation. Fig. 2 is a plan partly in  
35 section. Figs. 3 and 4 are enlarged side views in detail, showing, respectively, different positions of the weights and connected parts. Fig. 5 is an edge view of the endless spring employed.

40 A represents the armature-shaft, on which is mounted and rigidly secured the governor shell or casing B.

F are the commutator-brushes, and *f* the commutator-sections that are mounted on the  
45 sleeve C, the latter being journaled on the shaft A.

The parts mentioned thus far may be substantially the same as those shown and described in the aforesaid Letters Patent, and  
50 therefore need not be described in detail here.

The commutator-sleeve C has external annular flanges, *c*, that are made to embrace with

an easy fit the governor-weights D, the latter being preferably of substantially the form shown. The weights at their rear ends, by means of  
55 pins *c'*, are pivotally connected to the flanges *c*, such pivotal connections being made on opposite sides of the commutator-sleeve and as near as practicable to the axis of the sleeve, such radial distance being so short that only  
60 a limited movement of the weights is required to rotate the sleeve the number of degrees necessary in shifting the commutator-sections between the points of maximum and minimum effectiveness. The weights are mounted on  
65 links G of the crank variety, the axis *g* of the links being journaled in suitable holes made through the hub of the casing and parallel with the shaft A, the wrists *g'* of the links operating in holes made laterally through the  
70 respective weights. The normal or closed position of the weights and links is shown in Fig. 3, the inner periphery of the weights engaging the sleeve, with the links approximately at a quarter throw from the line *xx*,  
75 taken through the axles of the links. With such relation of parts, the weights, when thrown outward by centrifugal force, are by the action of the links drawn forward with accelerated movement, a slight outward move-  
80 ment of the weights being sufficient to advance the commutator-sections some degrees. (See Fig. 4.) It is evident that the less radial distance the weights have to move the quicker such movements can be made and the less  
85 range of working-tension of the spring will be required and the more prompt will be the action of the governor.

H is an endless spring that is mounted on and made to embrace the weights. The spring  
90 acts centripetally on the weights in opposition to the centrifugal force of the latter. The spring, preferably, is of thin flat material, and for convenience in shaping and tempering may be wrought in two or more pieces with  
95 overlapping ends riveted or otherwise secured together. A spring of such construction is shown in Fig. 5, where four pieces are riveted together; also, in this figure is shown a preferable form of spring before it is strained, the  
100 spring having curved or approximately-semi-circular ends with reverse curves along the sides thereof. If a stiffer spring is required, it should be made of two or more thicknesses



of thin material rather than of a single layer of thicker material, as the latter is more liable to break.

Pins *d* of the weights enter corresponding holes made in the spring and hold the latter in position on the weights. With the weights in their closed position, the seats for the spring are, comparatively speaking, wide apart, and the weights having, as already stated, but little outward movement it follows that the spring, when distended far enough to embrace the weights, will have been strained to within a few degrees of its maximum working-tension, and consequent upon such limited range of working-tension the spring is prompt and effective in action and durable in use.

The construction of the governor is of a simple character, the parts are few in number, and the friction and wear merely nominal.

What I claim is—

1. The combination, with the armature-shaft and governor casing connected therewith, of a commutator-sleeve loosely mounted on the armature-shaft, governor-weights pivotally connected with the commutator-sleeves, and links pivoted at one end to the weights and at their opposite end to the governor-casing, substantially as set forth.

2. The combination, with the armature-shaft and governor-casing connected therewith, of a commutator-sleeve loosely mounted on the armature-shaft, governor-weights pivoted to the commutator-sleeve, links pivoted to the governor-weights and governor-casing, and an endless spring engaging the governor-weights, substantially as set forth.

3. The combination, with the armature-shaft and governor-casing connected therewith, of a

commutator-sleeve loosely mounted on the armature-shaft, governor-weights pivoted at one end to the commutator-sleeve, and links pivoted at one end to the governor-casing and at their opposite ends to the governor-weights at a point between its ends, substantially as set forth.

4. The combination, with the armature-shaft and governor-casing connected therewith, of a commutator-sleeve loosely mounted on the armature-shaft, and governor-weights pivoted at one end to the commutator-sleeve and connected by links to the governor-casing, said weights being formed to partly encircle the commutator-sleeve, substantially as set forth.

5. The combination, with the armature-shaft and governor-casing connected therewith, of a commutator-sleeve having external flanges, governor-weights located between the flanges and pivotally connected therewith, and links pivotally connecting the weights and governor-casing, substantially as set forth.

6. The combination, with the armature-shaft and governor-casing connected therewith, of a commutator-sleeve loosely mounted on the armature-shaft, governor-weights pivoted at one end to the commutator-sleeve, links pivoted to the governor-weights and governor-casing, and an endless spring consisting of two or more pieces riveted together and arranged to embrace the weights, substantially as set forth.

In testimony whereof I sign this specification, in the presence of two witnesses, this 13th day of July, 1887.

CHARLES F. BRUSH.

Witnesses:

CHAS. H. DORER,  
ALBERT E. LYNCH.