

(No Model.)

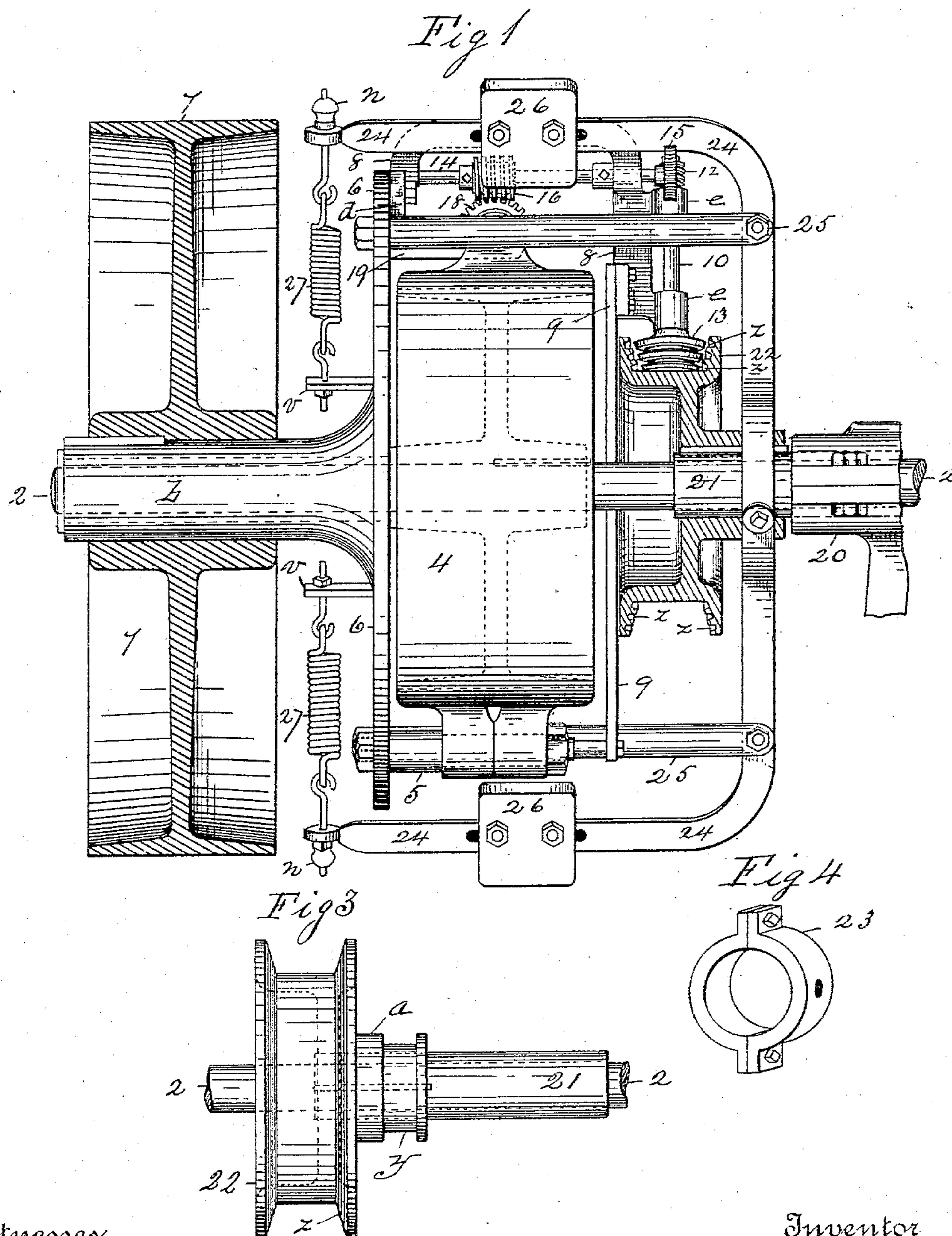
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C. E. BARRETT.

SPEED REGULATOR.

No. 369,272.

Patented Aug. 30, 1887.



Witnesses
Wm H Chapin
G. M. Chamberlain.

Inventor
Charles E. Barrett.

By his Attorneys Chapin & Co.

(No Model.)

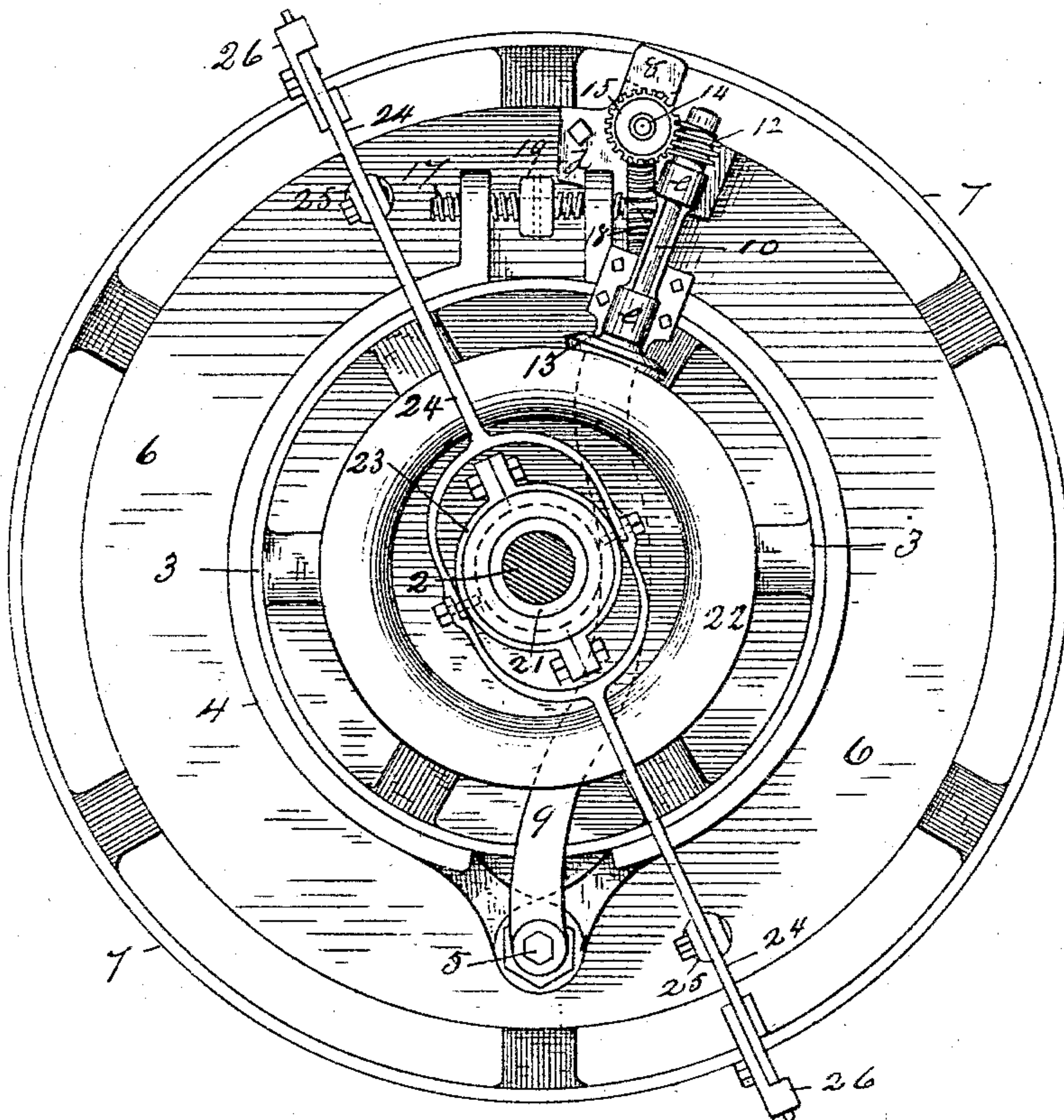
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Fig 2



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3 Sheets—Sheet 3

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Fig 7

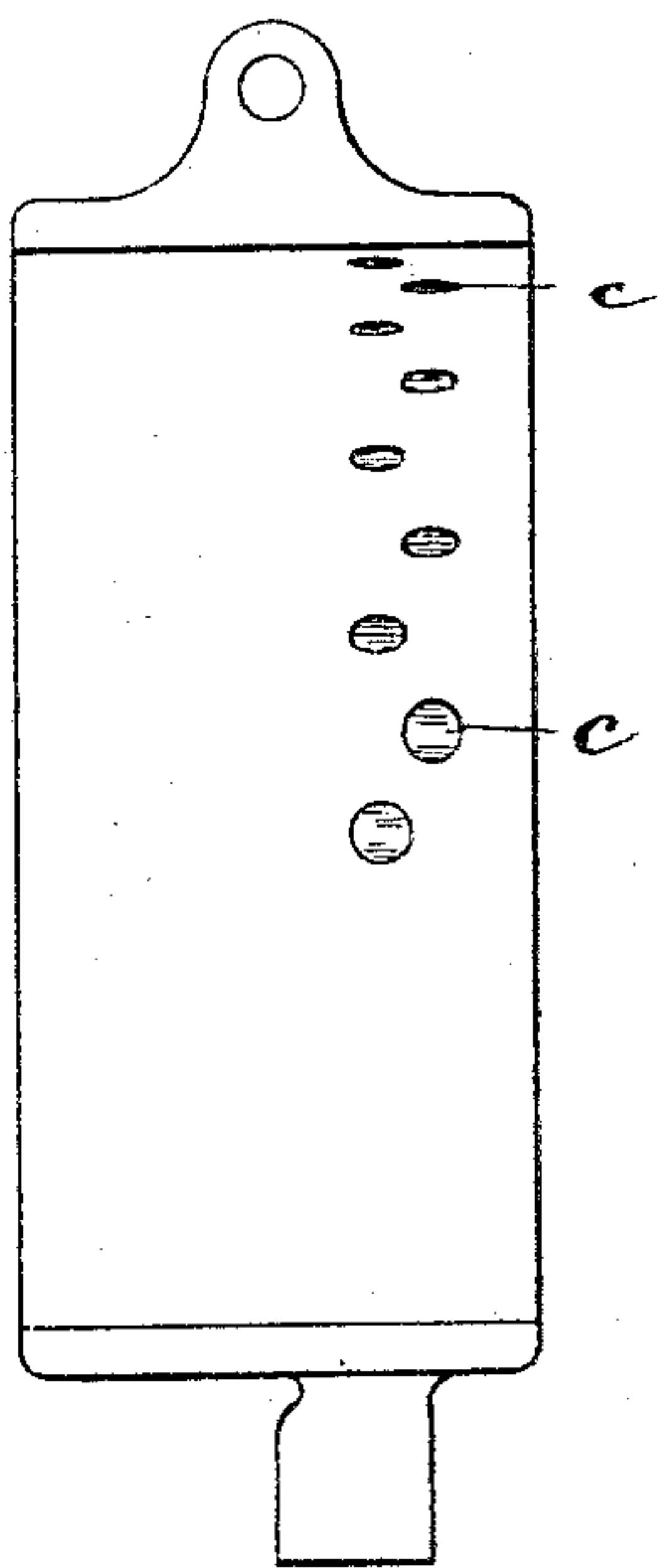


Fig 5

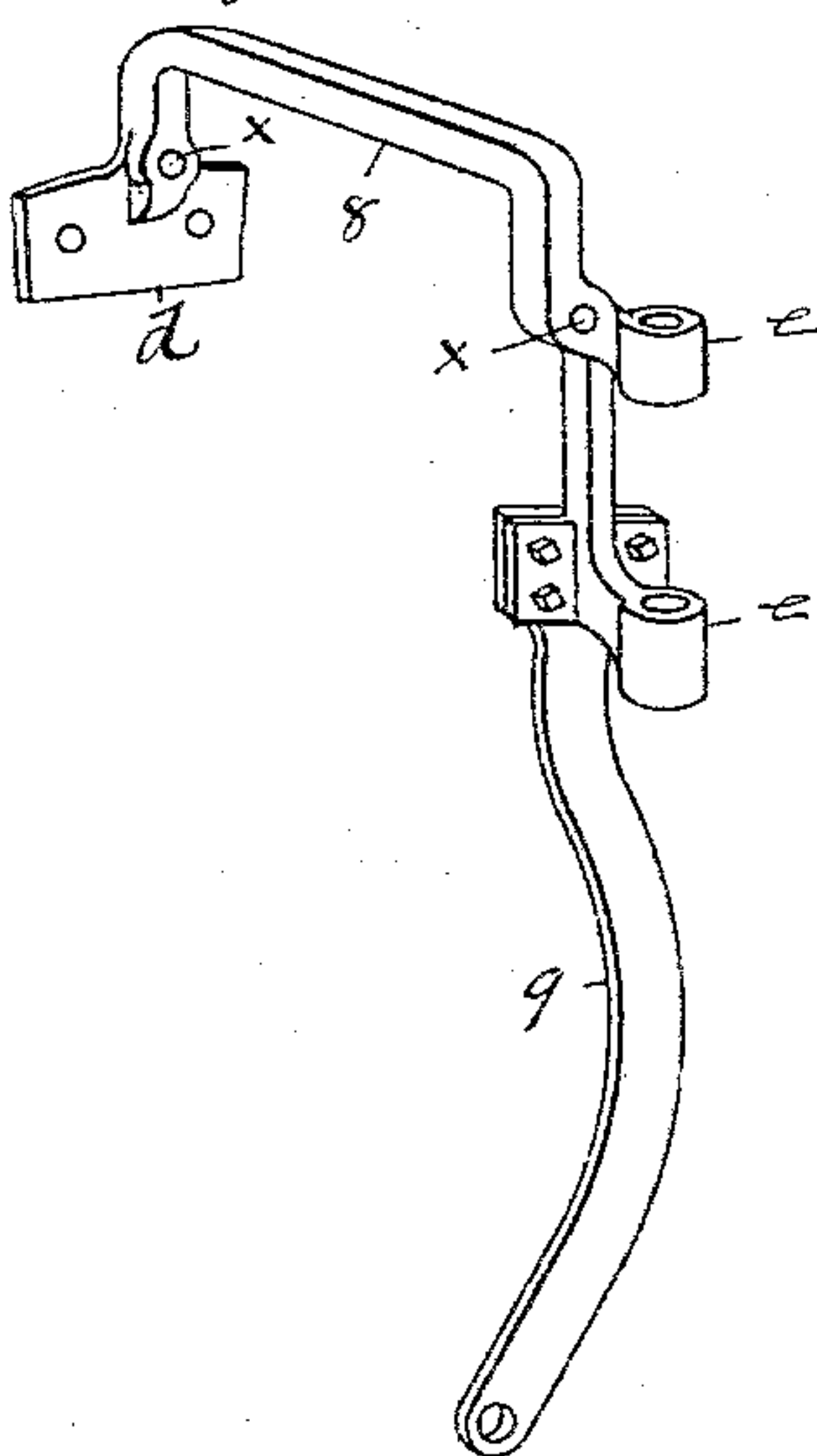
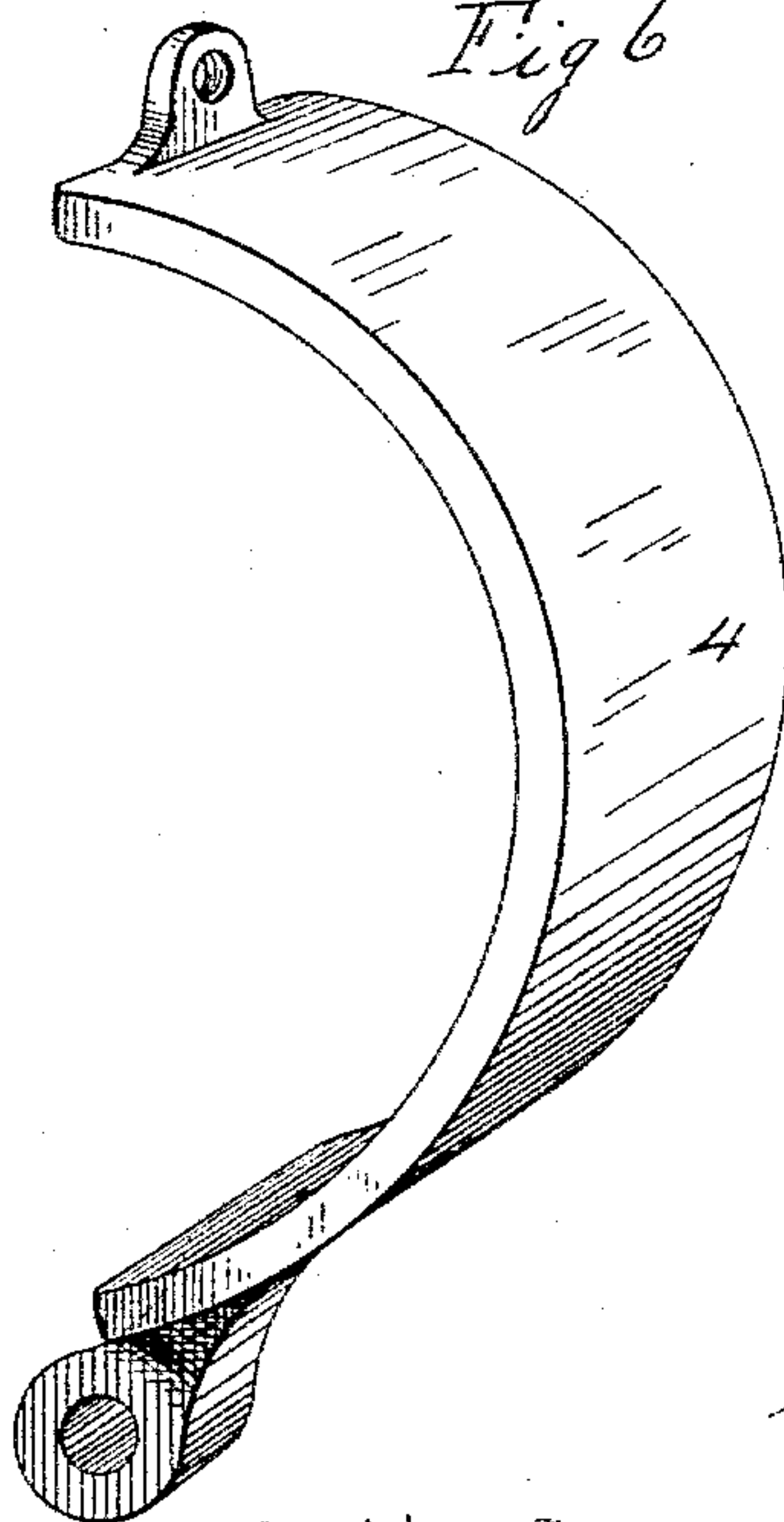


Fig 6



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UNITED STATES PATENT OFFICE.

CHARLES E. BARRETT, OF BRATTLEBOROUGH, VERMONT, ASSIGNOR TO R. F. HAWKINS, TRUSTEE, OF SPRINGFIELD, MASSACHUSETTS.

SPEED-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 369,272, dated August 30, 1887.

Application filed May 18, 1887. Serial No. 238,585. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. BARRETT, a citizen of the United States, residing at Brattleborough, in the county of Windham and State of Vermont, have invented new and useful Improvements in Speed-Regulators for Machines, of which the following is a specification.

This invention relates to speed-governors, the object being to provide an improved speed-governing device which is attached to a driving-shaft which is used for driving dynamo-electric machines and others which require to be run at a uniform speed; and the invention consists in the peculiar construction and arrangement of the various parts of the governor in connection with a shaft on which it is located, all as hereinafter fully described, and pointed out in the claims.

In the drawings forming part of this specification, Figure 1 is a side elevation, partly in section, of a speed-governor constructed according to my invention, said figure showing a portion of the shaft on which the governor is located and one of the bearings for said shaft. Fig. 2 is an end elevation of the governor, showing the shaft on which it is located in section. Figs. 3 to 7 illustrate detail parts of the machine, as hereinafter fully described.

In the drawings, 2 indicates a shaft such as is ordinarily connected to a steam-engine or other motor, and through which motion is imparted to some machine through suitable pulleys or gearing. In this case, however, the pulley through which connection is made between said shaft 2 and a machine to be driven thereby is fixed on a part of the governor, and the latter is adapted to have an automatically-operating frictional connection with said shaft 2, which is variable, according to the power which is required to be transmitted by said shaft to maintain a uniform speed in said machine, which is connected with the governor.

On said shaft 2 is fixed a pulley, 3, whose rim and portions of its arms are shown in Fig. 2, Fig. 1 also showing in dotted lines the hub and two of the arms thereof. A box-bearing, 20, for shaft 2 is fixed on a suitable support a little removed from one side of said pulley 3, and said box-bearing incloses one end of a

sleeve, 21, through which the shaft 2 passes freely, and in which it rotates, said sleeve being rigidly held in said bearing, and the purpose thereof will be fully described farther on. A circular face-plate, 6, having a long hollow hub, *b*, is placed on the shaft 2, and has the pulley 7 keyed thereon rigidly.

Two friction clamp-straps, 4, of suitable metallic construction, preferably of brass or composition metal, are pivoted on a stud, 5, which is rigidly secured by one end to the face-plate 6. One of said clamp-straps is shown in perspective view in Fig. 6 and in side elevation in Fig. 7, the latter figure showing the interior side of said strap. To provide a desirable bearing-surface for the inner side of said straps 4, so that they may be employed to the best advantage without using oil or other lubricant between them and the surface of said pulley 3, against which they frictionally act, the said inner surfaces of the straps have inserted in suitable sockets therein the well-known metal-line pellets *c*, whose outer ends constitute the bearing-surface of said straps. Said straps 4 encircle the pulley 3, as shown in Fig. 2, and the ends of said straps opposite those which are pivoted on stud 5, as aforesaid, are united by a right-and-left-hand screw, 17, having fixed on one end thereof a worm-gear, 18. Said screw 17 passes through the end of a stud, 19, by which it is supported, said stud being secured by one end to the face-plate 6.

A combined bracket, 8, and brace 9 (illustrated in perspective view in Fig. 5) has the end of said brace secured to the end of the above-mentioned stud 5, which is fixed in the face-plate 6, and the end of the bracket 8, having a perforated plate, *d*, thereon, is bolted to the side of said face-plate, said bracket extending from the side of said plate in a direction across the rim of the pulley 3, but somewhat removed therefrom, and having formed on a part thereof two bearings, *e*, in which is hung a shaft, 10, in a line substantially at right angles to the main shaft 2. The said shaft 10 has on one end a worm, 12, and on its opposite end, or that nearest shaft 2, an annularly-grooved friction-pulley, 13. The said bracket 8 has bearings formed therein at *x x* for the shaft 14, running substantially in a line paral-

lel to the main shaft 2, and on one end of said shaft 14 is fixed a worm-gear, 15, which engages with the aforesaid worm 12 on shaft 10.

A worm, 16, is fixed on said shaft 14 between its bearings, and engages with the aforesaid worm-gear 18 on the end of the right-and-left-handed screw 17, which unites the ends of the friction-straps 4, as above described.

A friction-wheel, 22, (illustrated in side elevation in Fig. 3 and in section in Fig. 1,) has a sliding keyed connection with the aforesaid sleeve 21, and is prevented by the key between it and said sleeve from rotating; but it is capable of a longitudinal movement on the latter by means below described. The wheel 22 has a deeply-grooved periphery, as shown, the sides of which groove are outwardly inclined and have formed therein a series of annular grooves, *z*, as clearly shown in Fig. 1, and the hub of said wheel 22 (indicated by *a* in Fig. 3) has an annular groove, *y*, therein, in which is placed a split collar, 23, (shown in perspective view in Fig. 4,) having bolt-holes in its opposite sides, as shown.

The aforesaid annularly-grooved friction-pulley 13, which is fixed to one end of said shaft 10, occupies a position within the groove in the periphery of said friction-wheel 22, between the above-described grooved sides of the groove in wheel 22. The said pulley 13 is cone-shaped or tapering to coincide with the inclined sides of the groove in wheel 22, but is of such diameter that when it occupies a central position in the groove in the latter it has no engagement with wheel 22.

Two elbow-levers, 24, are each pivoted in the end of a stud, 25, which is fixed by one end to said face-plate 6, said studs extending in lines substantially parallel with the main shaft 2 and on opposite sides of the latter. Said elbow-levers 24 extend from a point to the rear of the face-plate 6, in a line with shaft 2, for a certain distance, as shown, and are then bent at right angles, and their bifurcated ends (see Fig. 2) are pivotally connected to the said split collar 23. The ends of the said studs 25, to which the elbow-levers 24 are pivoted, as aforesaid, constitute the fulcrum-points of said elbow-levers, and when the ends thereof opposite sides of pulley 3 are caused, as below described, to swing away from and toward the shaft 2 the friction-wheel 22, with which said elbow-levers are connected through said split collar 23, is given a sliding movement on the sleeve 21, whereby first one side and then the other of said groove in wheel 22 is brought into engagement with the opposite sides of the grooved friction-pulley 13. On each of said elbow-levers 24 is adjustably secured a weight, 26, which is capable of being adjusted at a proper distance from the aforesaid fulcrum-point of said elbow-lever, whereby when the governor attains a certain speed of rotation the movement of said weights, under centrifugal force, will cause the elbow-levers to which they are attached to swing on

their fulcrum-points and operate the friction devices connecting the governor and the shaft 2, as below described.

On the rear side of the face-plate 6 are rigidly secured two projecting studs, *v*, and between the ends of said elbow-levers 24 and said studs *v* are connected two springs, 27, which serve the purpose of returning said elbow-levers, by their retracting power, to their normal position after having been swung outward by centrifugal force, as aforesaid, and to prevent any sudden outward movement of said elbow-levers said springs are connected to the ends of the elbow-levers 24 by a hook having a nut, *n*, thereon, whereby the tension of said springs relative to the elbow-levers 24 is suitably adjusted.

The operation of the above-described speed-governing devices is as follows: As above set forth, the main shaft 2 is given a continuous rotary motion by a suitable motor, like any of the ordinary shafts of a mill, and the speed-governor is applied to said shaft in the manner herein shown and described. The dynamo-electric or other machine to be driven, and whose speed is to be regulated by the governor, is connected with the latter by a belt running on the pulley 7. The clamp-straps 4 are adjusted by the screw 17 to have such a bearing on the surface of the pulley 3 as will permit the latter to slip more or less within the clamps when the governor and its attached machine are running at their normal or required speed, and when so adjusted the elbow-levers of the governor (indicated by 24, as aforesaid) and the wheel 22 and pulley 13 occupy the relative position shown in Fig. 1. It will be remembered that, as above described, the said wheel 22 has no rotary motion, and that the governor is rotated by the engagement therewith of the pulley 3 on shaft 2, and consequently the pulley 13 is carried around within the groove of the friction-wheel 22 by the rotary motion of the governor. If, now, the speed of the main shaft and the governor be increased beyond that to which the governor is adjusted when started, elbow-levers 24, under the action of the centrifugal force acting on the weights 26, will swing outward, producing a movement of the ends thereof, which are connected to the hub of the wheel 22, which causes the latter to move toward the pulley 3, thereby bringing one side of its groove against the side of the friction-pulley 13, and causing the grooves and ribs of said pulley to engage frictionally in the grooves and ribs on one side of the groove in the wheel 22, whereby pulley 13 and its shaft 10 are given a rotary motion, which rotary motion is imparted to the shaft 14, and the latter, through its connection, as above described, with the screw 17, which unites the ends of the clamp-straps 4, causes said screw to be turned and said straps to be slightly relieved of their pressure against the pulley 3, thereby allowing such a degree of slip between the pulley and said straps as

brings the governor back to its normal speed. A reduction of the speed of the governor below that to which it is set results in a movement of the weighted ends of the elbow-levers 5 24 inward or toward the shaft 2, and in a consequent reverse movement of the wheel 22 to that above described, whereby the pulley 13 and the described parts connected therewith are turned in a reverse direction to that first 10 referred to, and the clamp-straps 4 are more tightly drawn against the pulley 3, and consequently the speed of the governor is again brought up to its normal state.

What I claim as my invention is—

15 1. A speed-governor for machines, consisting of a face-plate, substantially as described, capable of rotation on a shaft and of carrying a machine-driving pulley, a friction-wheel having a groove in its periphery capable of 20 receiving a friction-pulley between the sides thereof, supported opposite said face-plate and capable of a longitudinal movement toward and from said plate, a shaft, as 10, supported on a frame on said face-plate at right angles to 25 the axis of said friction-wheel, having a pulley thereon capable of frictional engagement with said wheel, two pivoted weighted elbow-levers, substantially as described, capable of vibratory movements by centrifugal force, having their fulcrums on supports on said face-plate and engaging with said friction-wheel, 30 two curved clamp-straps, substantially as described, having a pivotal support by one end on said face-plate and capable of a frictional engagement with a rotating pulley, a screw uniting the opposite ends of said clamp-straps and capable of opening and shutting said straps, gear-connections, substantially as described, 35 between said shaft 10 and said screw, whereby the rotary movements of said friction-wheel are communicated to said screw, and retracting-springs connected to said elbow-levers, 40 substantially as set forth.

2. A speed-governor for machines, consisting of the combination, with a suitable driving-shaft having a pulley fixed thereon, of a 45 face-plate, substantially as described, supported on said shaft and capable of having a machine-driving pulley attached thereto, two frictional clamp-straps having a pivotal connection by one end to said face-plate and in-

closing said pulley, a screw uniting the opposite ends of said clamp-straps, a grooved friction-wheel, as 22, supported on a sleeve on said driving-shaft and capable only of a longitudinal movement thereon, two pivoted elbow-levers, each having a weight adjustably 55 attached thereto, substantially as described, capable of vibratory movements by centrifugal force, having their fulcrums on supports attached to said face-plate and having an engagement with said wheel 22, a friction-pulley, as 13, capable of engagement with either side of the groove in said longitudinally-moving friction-wheel, suitable shafts, and worm 60 and gear connections, substantially as described, between said friction-pulley 13 and said screw, and retracting-springs connected to said elbow-levers, substantially as set forth.

3. The combination, in a speed-governor, of 65 clamp-straps, as 4, pivoted together by one end, a screw, as 17, connecting the opposite ends of said straps, a friction-wheel, as 22, having a groove in its periphery, a friction-pulley, as 13, supported on the end of a shaft, 70 as 10, between the sides of said groove, worm and gear connections, substantially as described, between said shaft and said screw 17, and two weighted elbow-levers, substantially as described, capable of a vibratory motion, 80 having an engagement with said friction-wheel to impart a movement thereto in a line with its axis, substantially as set forth.

4. The friction-wheel 22, having a groove in its periphery, in the opposite sides of which 85 are formed one or more annular grooves, as z , combined with a friction-pulley, as 13, having a diameter less than the width of said groove, and having one or more annular grooves in its surface capable of interlocking 90 with said grooves z , a shaft, as 10, supporting said pulley 13, a shaft, as 14, having connection with said shaft 10, two clamp-straps, as 4, and a screw, as 17, uniting the ends of said straps, having an engagement, substantially 95 as described, with said shaft 14, substantially as set forth.

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