No. 628,947.

Patented July 18, 1899.

G. E. LOB.

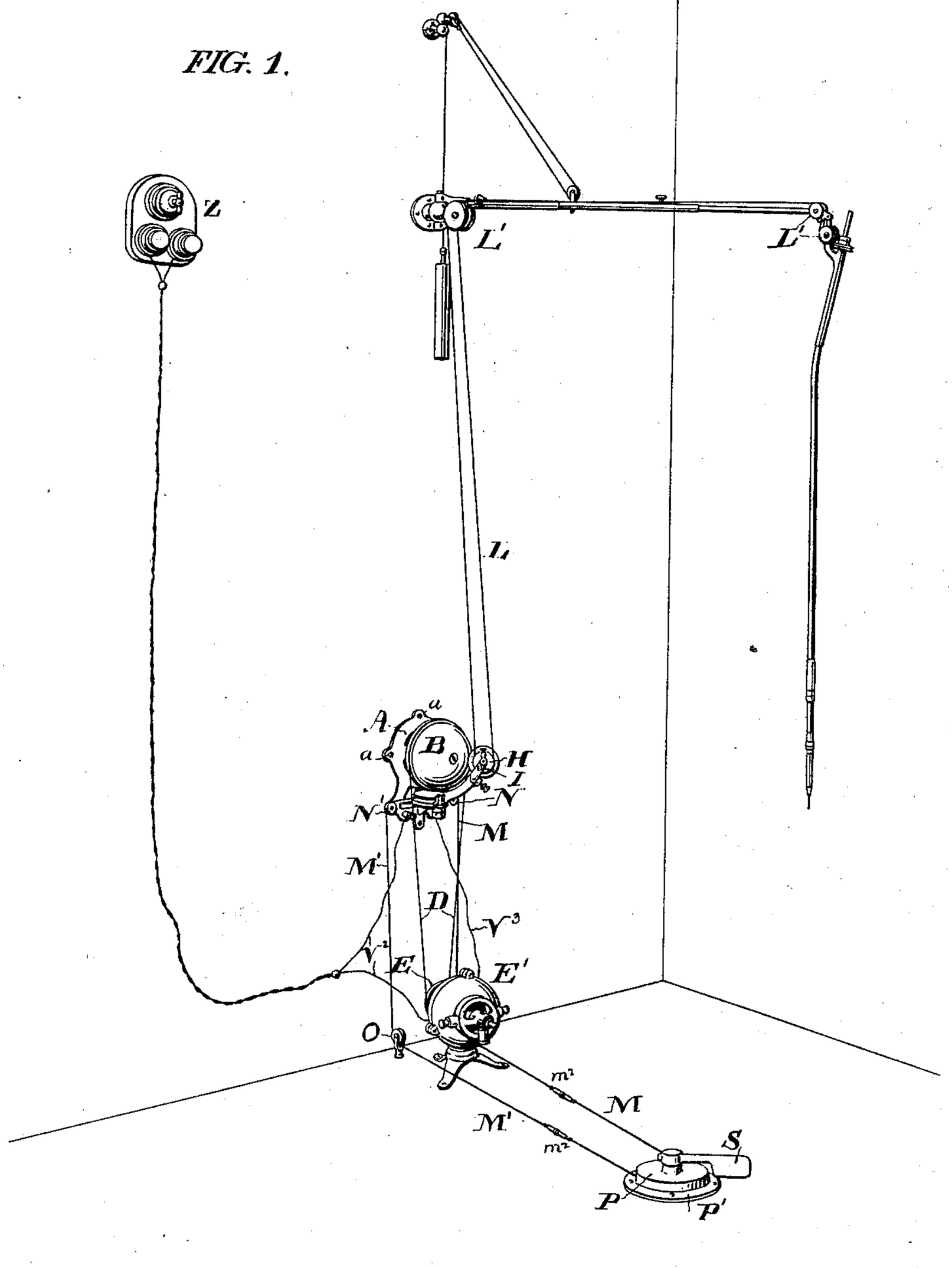
SPEED REGULATOR.

(Application filed Apr. 4, 1899.)

(No Model.)

4 Sheets—Sheet 1.

FIG. 1.



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(No Model.) 4 Sheets—Sheet 2.

FIG. 3

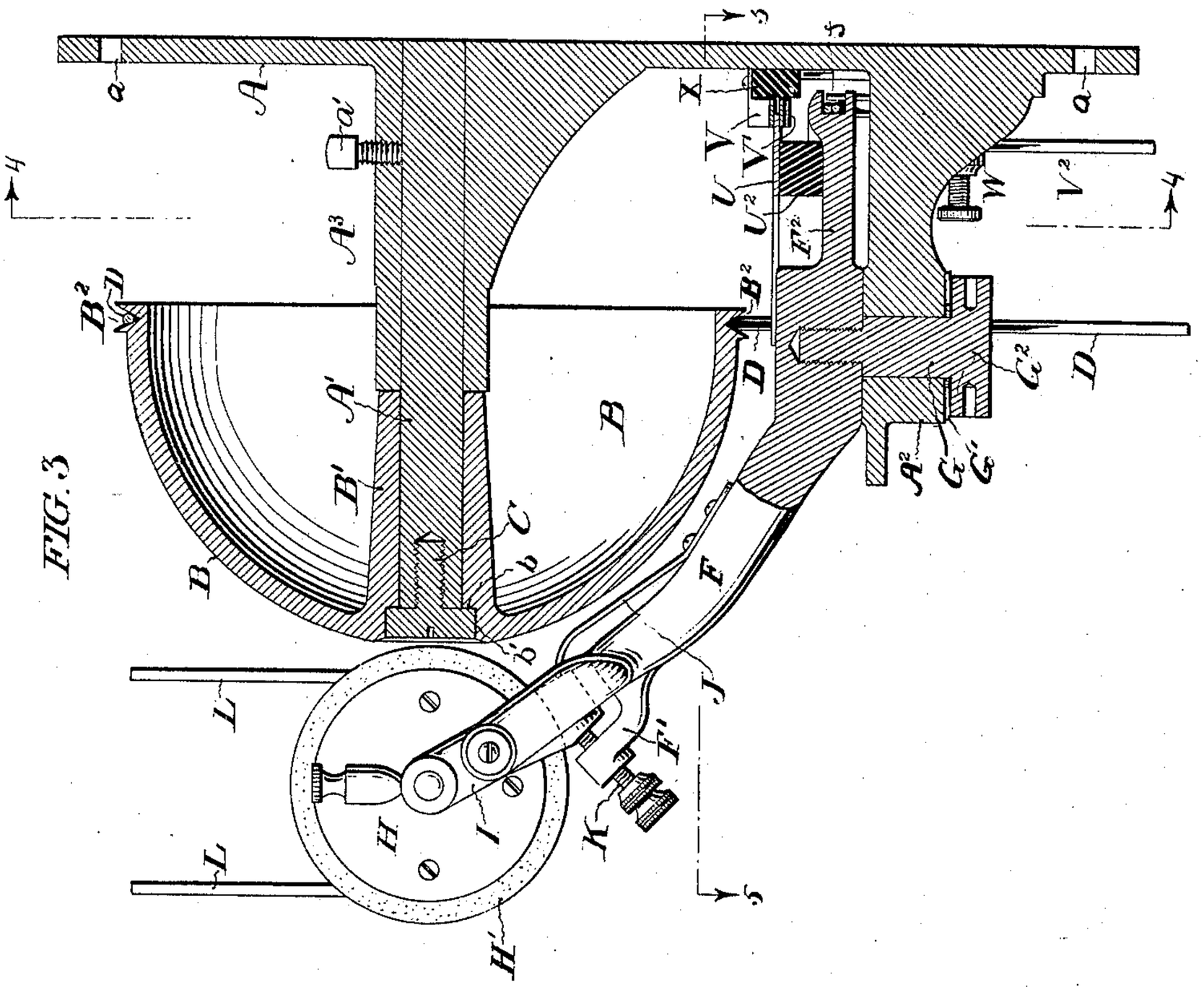
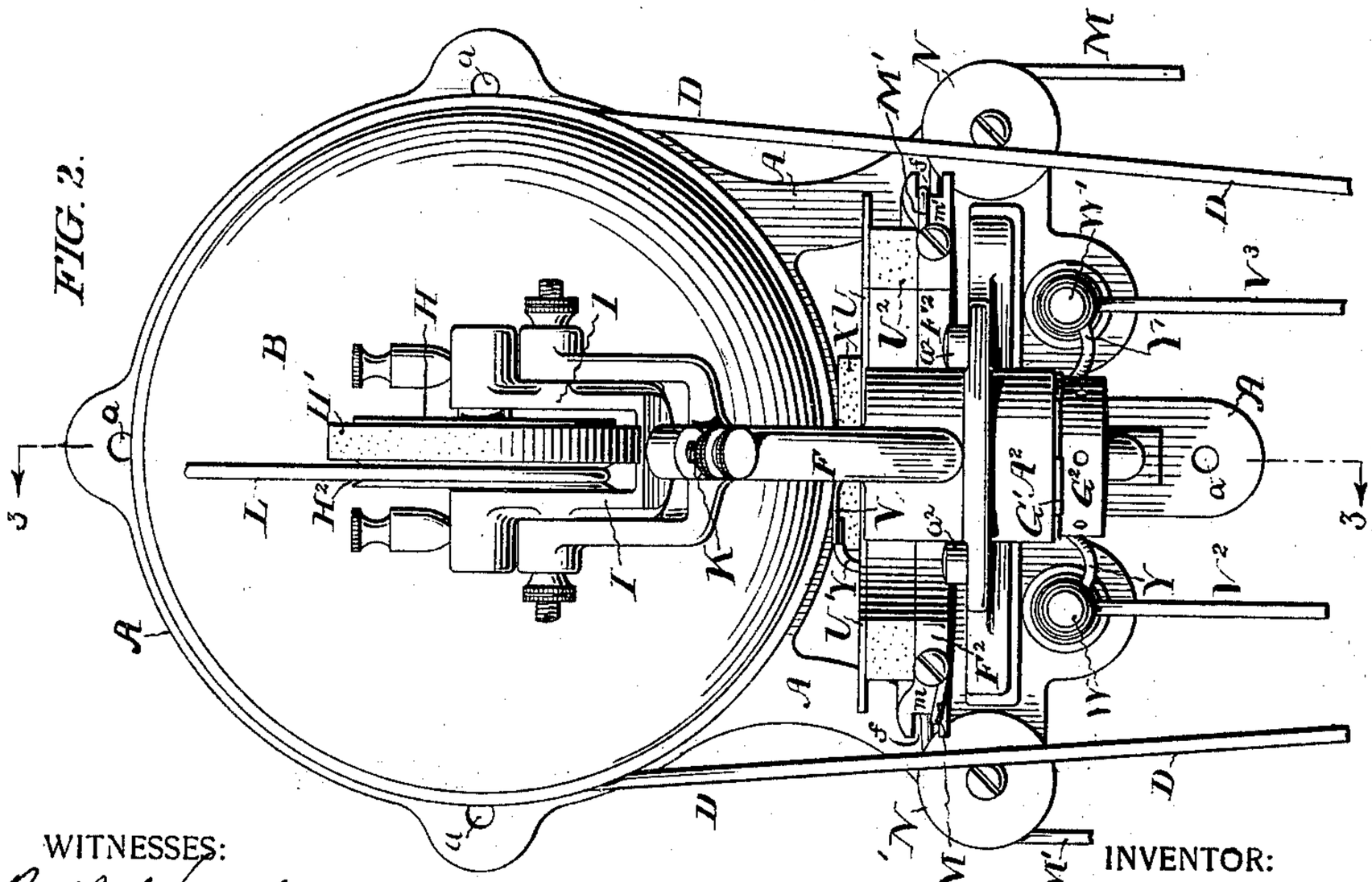


FIG. 2.



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4 Sheets—Sheet 3.

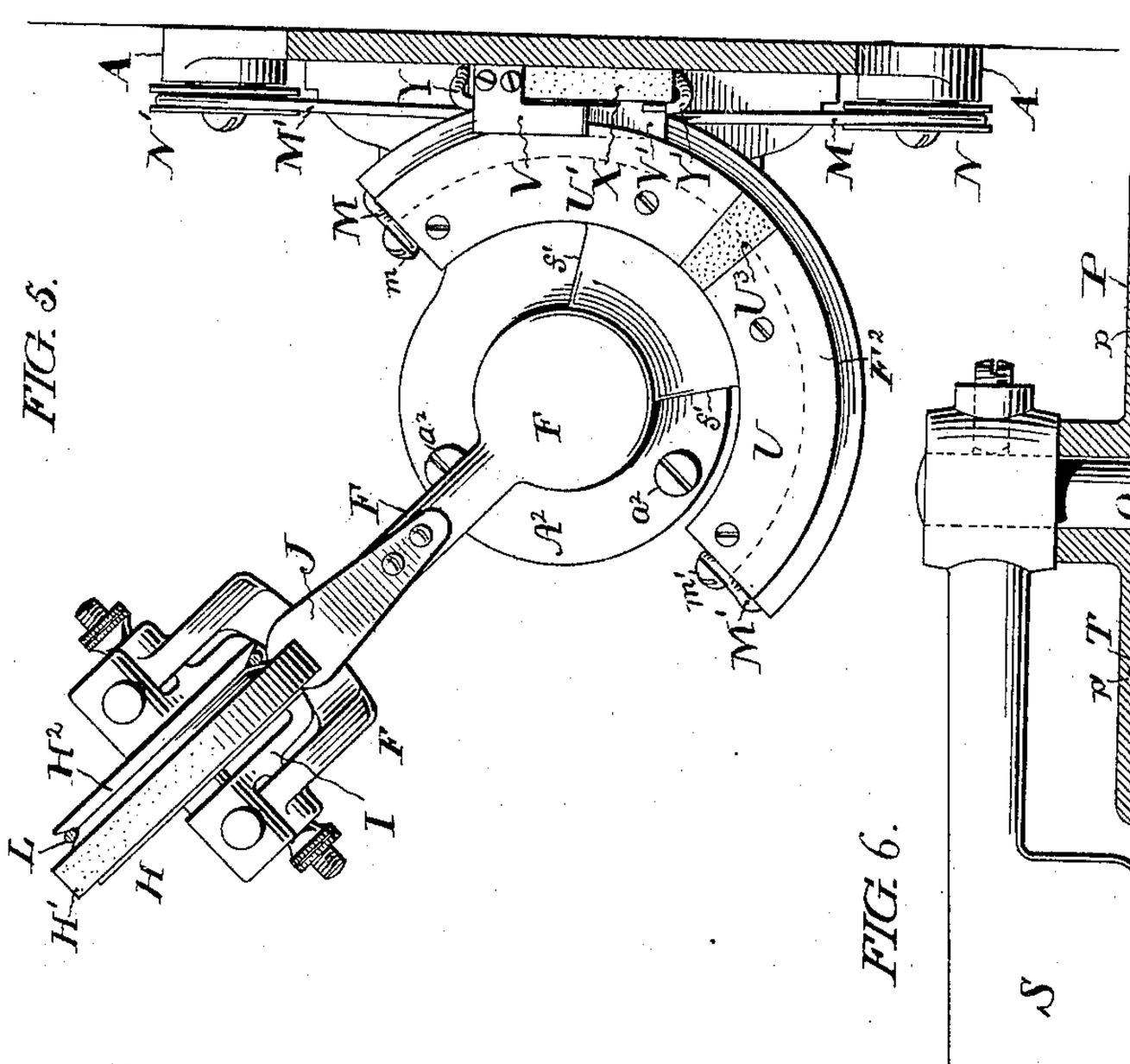

FIG. 5.

FIG. 6.

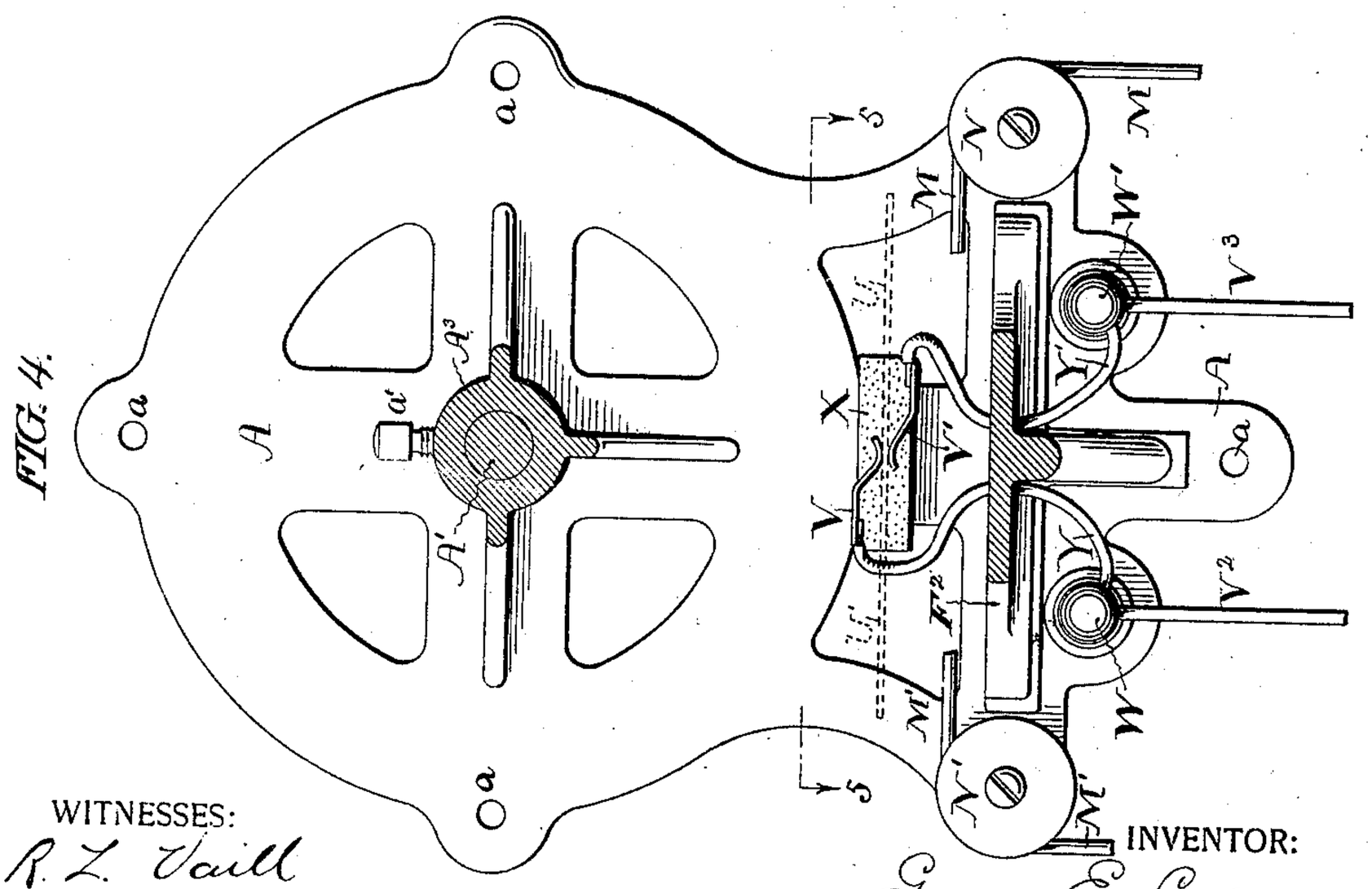

FIG. 4.

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No. 628,947. Patented July 18, 1899.

G. E. LOB.

SPEED REGULATOR.

(Application filed Apr. 4, 1899.)

(No Model.) 4 Sheets—Sheet 4.

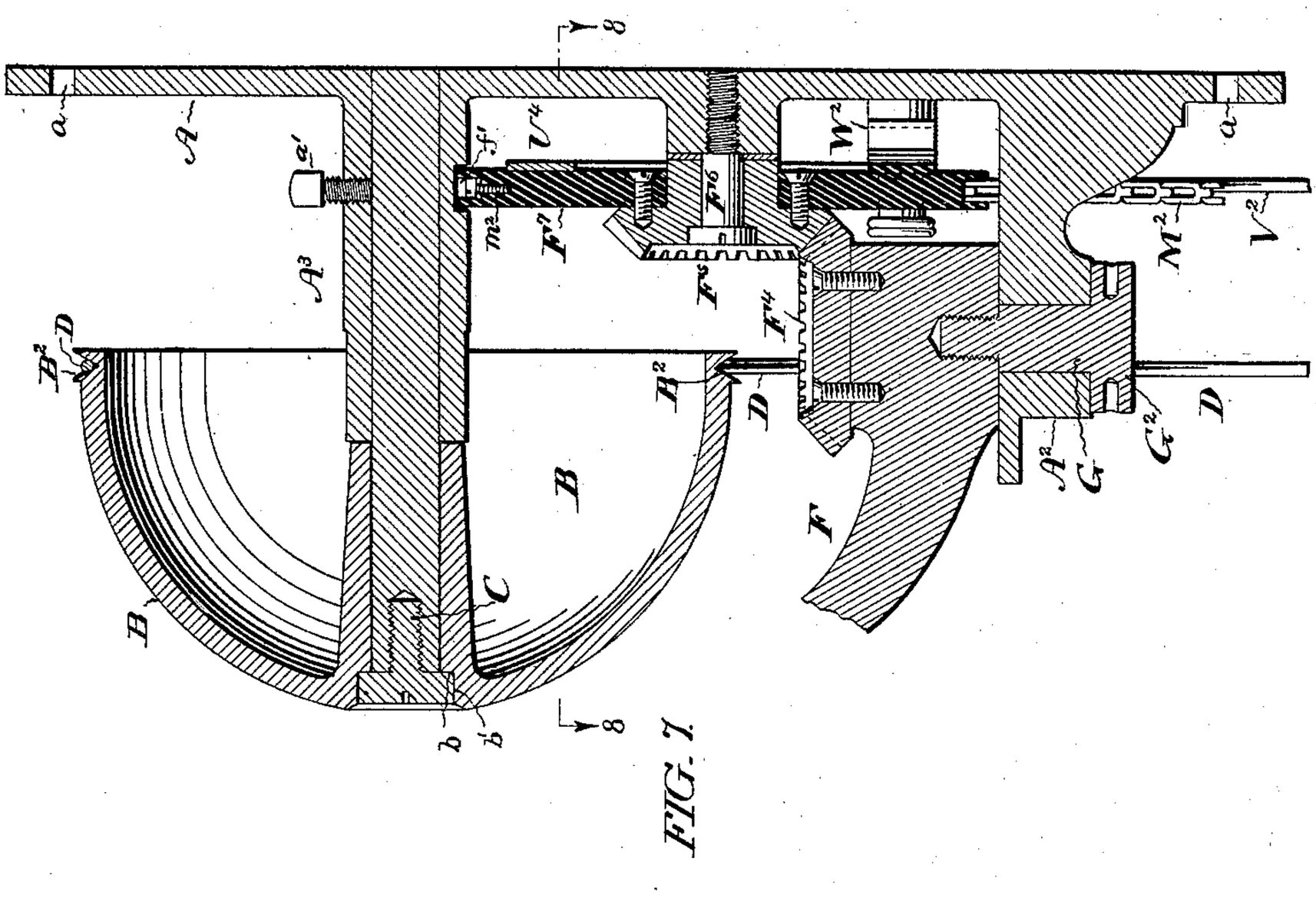

FIG. 7.

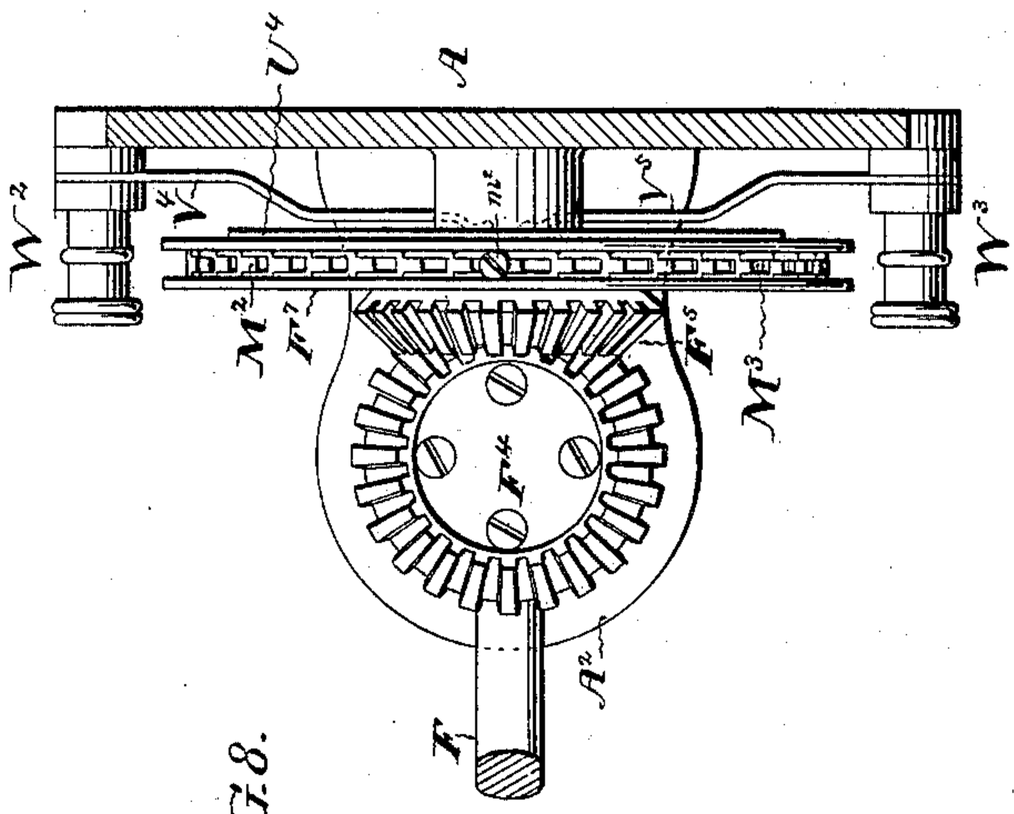

FIG. 8.

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UNITED STATES PATENT OFFICE.

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SPEED-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 628,947, dated July 18, 1899.

Application filed April 4, 1899. Serial No. 711,670. (No model.)

To all whom it may concern:

Be it known that I, GUIDO E. LOB, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Mechanical Speed-Regulators for Dental Engines; 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 appertains to make and use the same.

My invention relates to certain improvements in mechanical speed-regulators particularly designed for dental engines and belongs to that class of mechanical regulators in which the speed of the engine being operated may be regulated without varying the speed of the motor.

The object of my invention is to generally improve this class of mechanical speed-regulators and to render them more efficient.

My invention consists of a new form of mechanical speed-controller of the class referred to and in certain details of construction, all of which will be hereinafter fully described and then specifically pointed out in the claims.

In the accompanying drawings I have illustrated my improvements as embodied in suitable apparatus shown in connection with a dental engine of the wall-bracket type operated by an electric motor.

In said drawings, Figure 1 is a general perspective view of the improved speed-regulator mounted in connection with said wall-bracket dental engine and electric motor. Fig. 2 is a view in front elevation of the regulator on an enlarged scale as compared to Fig. 1. Fig. 3 is a view of said regulator, mainly in vertical central section, on the line 3 3 of Fig. 2. Fig. 4 is a vertical sectional view of said regulator on the line 4 4 of Fig. 3. Fig. 5 is a top or plan view, partly in horizontal section, on the line 5 5 of Figs. 3 and 4. Fig. 6 is a central vertical sectional view of the foot-actuated treadle mechanism for said regulator. Figs. 7 and 8 are views of a modified form of regulator, Fig. 7 being a vertical central sectional view and Fig. 8 a horizontal sectional view on the line 8 8 of Fig. 7, parts being broken away in both of these views.

My improved speed-regulator consists, essentially, of a friction-hemisphere rotating upon a center shaft and driven at a substantially uniform speed by a motor, a friction-pulley for transmitting the motion of the friction-hemisphere to an engine to be operated by the motor, said friction-pulley being supported by a pivoted arm and adapted to be pressed against and moved over the surface of said friction-hemisphere for the purpose of varying the speed of said friction-pulley and said engine and also for starting and stopping and reversing the direction of rotation of said engine, and means, such as a foot-actuated treadle, for imparting such movement to the pivoted arm and the friction-pulley carried thereby.

The regulator may be constructed as follows:

A wall-plate A, having openings *a* to enable it to be attached to a wall the proper distance above the floor by means of screws, constitutes the base of the apparatus. Projecting horizontally from said plate is a shaft A′, upon which the friction-hemisphere B is mounted to rotate, the hub B′ of said hemisphere fitting upon the outer portion of said shaft. For the purpose of firmly supporting the shaft A′ the same may be fitted in a tubular arm or bracket A^3, projecting from the wall-plate. A set-screw *a*′ serves to hold the shaft in place. A screw C, screwing into the outer end of the shaft A′ and the head of which bears against a shoulder *b*, formed by the bottom of a countersunk recess *b*′ in the center of the hemisphere, serves to hold said hemisphere in place upon the shaft. The outer surface of the head of the screw C when in place is preferably slightly below or inside the outer surface of the hemisphere. This, in effect, provides a flattened portion or depression at the center of the hemisphere for a purpose later on to be made plain. The inner edge of the hemisphere is provided with a pulley-groove B^2, around which passes a belt or cord D, which also passes around the driving-pulley E of an electric motor E′, shown as being mounted upon the floor beneath the regulator. By means of this belt the motion of the motor is transmitted to the hemisphere, which is

thereby rotated at a uniform speed, according to the speed of the motor.

Projecting from the wall-plate A beneath the hemisphere B is a rigid bracket A^2, and pivoted to this bracket is a horizontally-movable arm F, the pivot of said arm being directly in a line with the center of the circle, which would be formed by the continuation of the hemisphere. The pivot is formed by a screw G, fitted in an opening in the bracket A^2 and screwing into a threaded socket in said arm. A spring-washer G′ may be interposed between the under side of the bracket and the head G^2 of the screw, if desired, for producing friction between the parts. The amount of friction may be increased or diminished by turning the screw G in one direction or the other. A friction-pulley H is carried at the outer end of the horizontally-movable arm F. Instead of journaling this friction-pulley directly to the arm F it is journaled between the members of a yoke I, which is pivoted about midway its length between the outer bifurcated end of the arm F. A spring J, connected at one end to the upper surface of the arm F and bearing at its opposite end upon the lower portion of the pivoted yoke I, serves to force the friction-pulley H against the hemisphere B. A set-screw K, screwing in a lug or bracket F′ of the arm F, is adapted to bear at its inner end upon the lower portion of the yoke I on the side thereof opposite the spring J for the purpose of limiting the movement of said yoke. By means of the screw K the pressure of the friction-pulley upon the hemisphere, and consequently the amount of friction between the same, may be regulated as desired. The friction-pulley is best provided with a rubber periphery H′ and a groove H^2, around which a belt or cord L may be passed. This belt is adapted to pass around the pulley or pulleys L′ of a dental engine for the purpose of conveying thereto the motion of the motor as transmitted through the hemisphere and friction-pulley.

When the friction-pulley is opposite the central depressed portion of the hemisphere, the movement of the same is of course not communicated to the friction-pulley, because there is no contact between them. Movement of the friction-pulley to the right of the center of the hemisphere causes said friction-pulley to rotate in one direction, the speed of such rotation being increased the farther the pulley is moved away from the center of the hemisphere. Movement of the friction-pulley to the left of the hemisphere's center reverses the direction of rotation of said pulley.

Means for moving the friction-pulley over the face of the hemisphere for starting and stopping and regulating the speed and direction of the engine may be as follows: The pulley-supporting arm F is extended on opposite sides of its pivot G to form a segment F^2. The inner edge of the segment is provided with a groove *f*, and cords M M′, preferably wire cords, are connected to the opposite ends of the segment. The cord M is connected to one end of the segment at *m*, lies in the groove *f*, and passes over a pulley N on that side of the wall-plate A opposite to that end of the segment to which the cord M is secured. The other cord M′ is connected to the opposite end of the segment at *m′*, lies in said groove *f*, and passes over a pulley N′ on that side of the wall-plate opposite the pulley N. The cords M and M′ after passing over the pulleys N and N′ pass downwardly and over pulleys O O upon the floor, only one of which is shown, and thence to a foot-actuated treadle device P, located at some suitable place upon the floor in convenient reach of the operator's foot. The movement of the pivoted arm F and the friction-pulley carried thereby is limited in opposite directions by means of shoulders *f′ f′* on said arm coming in contact with lugs formed by screws a^2, projecting from the bracket A^2. The lugs prevent the friction-pulley from being moved beyond the inner edge of the friction-hemisphere or its portion of greatest diameter.

The above-referred-to foot-actuated treadle device (see Figs. 1 and 6) is shown as consisting of a preferably circular housing P, having a base-flange P′, by way of which it may be fastened upon the floor by screws, as shown. A vertical shaft Q is journaled in the housing, and a grooved wheel or disk R is secured upon the lower end of the shaft inside the housing, and an operating lever or handle S is secured upon the upper end of said shaft outside the housing. The cords M and M′ after passing through suitable slots or openings *p p* in the side of the housing (only one of said openings being shown) are secured to the wheel or disk R at a point to the rear of the slots or openings *p p* when said wheel is in its normal position. Said point of connection is shown at *r* directly under the operating-lever S. In Fig. 6 the operating-lever is shown in its central or normal position, in which position it is yieldingly held by a suitable detent device. This detent device may consist of a bolt T, fitted to slide in a seat R′, formed in the wheel or disk R and adapted to engage a notch *p′* in the housing P, a spring T′ serving to force the bolt into engagement with said notch.

When the foot-actuated lever S occupies its normal or central position, the friction-wheel H is opposite the center of the hemisphere. By moving said lever to the right or left of its normal position the friction-pulley is moved over the face of the hemisphere, as before described.

Turnbuckles m^2 m^2 may, if desired, be employed to regulate the tension of the cords M M′.

While my improved speed-regulator may be used in connection with any style or construction of engine operated by any suitable kind of motor, I have shown it in connection with an electric motor E′ of well known construction and which need not be described.

When the regulator is used with an electric motor, it is desirable to provide means whereby whenever the friction-pulley is brought to rest at the center of the hemisphere and the engine is not running the motor should be automatically stopped and that whenever the friction-pulley is so adjusted as to operate the engine the motor is automatically started. In adapting the regulator to an electrically-operated engine I have provided the following mechanism for bringing the starting and stopping of the motor under the control of said regulator: The segmental extension F^2 of the pivoted arm F carries two segmental conductor-plates U U′, which are insulated from said extension F^2 by means of a non-conducting segment U^2, as of hard rubber. The plates U U′ are separated at the center of the segmental extension by a strip of insulating material U^3, such as vulcanized fiber or hard rubber. Spring-contacts V V are secured upon a non-conducting block X, mounted upon the wall-plate A, the contact V bearing upon the top of the conductor-plates and the contact V′ bearing upon the under side of said plates. Conducting-wires Y Y′ are connected to the respective spring-contacts V and V′ and are also connected to binding-posts W and W′ on the wall-plate A. Connected to the respective binding-posts W W′ are conducting-wires V^2 V^3, which are also connected with the motor, a suitable wall-switch Z being in the circuit of the conducting-wire V^2, as will be understood.

The operation of a mechanical speed-regulator constructed as herein shown and described is as follows: With the operating-lever S of the foot-actuated treadle device in its central or normal position the friction-pulley H is opposite the center of the friction-hemisphere, and even were the hemisphere in motion the friction-pulley, and consequently the engine, would not be in operation. As, however, the current to the motor is broken by reason of the spring-contacts V and V′ resting upon the insulator U^3, the motor as well as the hemisphere are at rest. Movement of the operating-lever S to the right of its normal position moves the friction-pulley to the right of the center of the friction-hemisphere and the engine is started in one direction, it being understood that this movement also carries the spring-contacts V and V′ into contact with the conductor-plate U, thus completing the electric circuit and starting the motor the instant the operating-lever is moved from its normal position. The speed of the motor may be increased by moving the operating-lever to the right, the friction-pulley being thus caused to move away from the center of the hemisphere toward its greatest diameter, the maximum speed being attained when the friction-wheel is moved practically to the inner edge of the hemisphere. To reverse the direction of the engine, it is only necessary to move the operating-lever to the left of its central or normal position, which movement obviously throws the friction-pulley to the opposite side of the hemisphere. To stop the engine, the operating-lever is adjusted to its normal position, which brings the friction-pulley opposite the center of the hemisphere and also stops the motor by bringing the spring-contacts upon the insulator U^3.

In the modification illustrated in Figs. 7 and 8 bevel-gearing is used in place of the segment F^2 and other parts before described. In this modification a bevel-gear F^4 is secured to the pulley-supporting arm F directly over its pivot G. Meshing with this bevel-gear F^4 is another bevel-gear F^5, which rotates upon an axis formed by a screw F^6, projecting from the wall-plate A. Secured to the gear F^5 is a disk F^7, having a peripheral groove f', in which are placed chains M^2 and M^3, corresponding with the cords M and M′ before described. The chains M^2 and M^3 are connected by a screw m^2 to the disk F^7. On the rear face of said disk F^7 is a circular conductor-plate U^4, interrupted at one point by a strip of insulating material U^5. Spring-contacts V^4 V^5, connected with binding-posts W^2 W^3 on the wall-plate, bear upon the circular conductor-plate for the purpose of making and breaking the electrical circuit, as previously described.

It will of course be understood that the operation of the modified regulator is practically the same as the operation of the regulator first described.

A speed-regulator constructed according to the principle of my invention possesses numerous advantages over mechanical speed-regulators as heretofore constructed. For instance, the regulator as a whole is compact and simple. The hemisphere form of friction-wheel not only provides a greater amount of friction-surface than the flat or disk friction-wheels commonly employed, but it also affords a better point of attack for the friction-pulley. The particular regulator shown and described, moreover, provides for automatically starting and stopping the electric motor simultaneously with the starting and stopping of the engine, which is of great importance in an apparatus of the class described. By means of the particular foot-actuated treadle device the regulator may be quickly and easily controlled, the spring detent thereof serving to yieldingly maintain the operating-lever and parts controlled thereby in their central or normal positions.

As has already been stated, the improved regulator may be used in connection with any form of dental engine and any style or character of motor. When used with a water-motor or with any character of motor other than an electric motor, the current make-and-break device may be dispensed with. It may also be observed that the regulator may be supported in a horizontal as well as in a vertical position and that any suitable form of treadle device may be employed in lieu of the particular foot-actuated treadle device

shown and described. The details of the apparatus may also be varied without departing from the principle of my invention, the present embodiments of my improvements merely illustrating how my invention may be carried into effect.

I claim as my invention—

1. The combination, in a mechanical speed-regulator, of a friction-hemisphere mounted to rotate upon a center shaft, a friction-pulley carried by a pivoted arm and adapted to be pressed against and moved over the surface of said friction-hemisphere, and means for moving said pivoted arm, substantially as and for the purpose described.

2. The combination, in a mechanical speed-regulator, of a friction-hemisphere mounted to rotate upon a center shaft, a base-plate to which said shaft is connected, an arm pivoted upon said base-plate, a friction-pulley carried by said arm, means for causing said friction-pulley to bear upon said friction-hemisphere, and means for rocking said arm about its pivot for causing said friction-pulley to move over the surface of said friction-hemisphere, substantially as and for the purpose described.

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

GUIDO E. LOB.

Witnesses:
HENRY G. THAYER,
BERNARD C. HOYNG.