

No. 795,337.

PATENTED JULY 25, 1905.

T. E. BUTTON.  
RATCHET WORM GEAR.  
APPLICATION FILED JAN. 3, 1905.

2 SHEETS—SHEET 1.

Fig. 2.

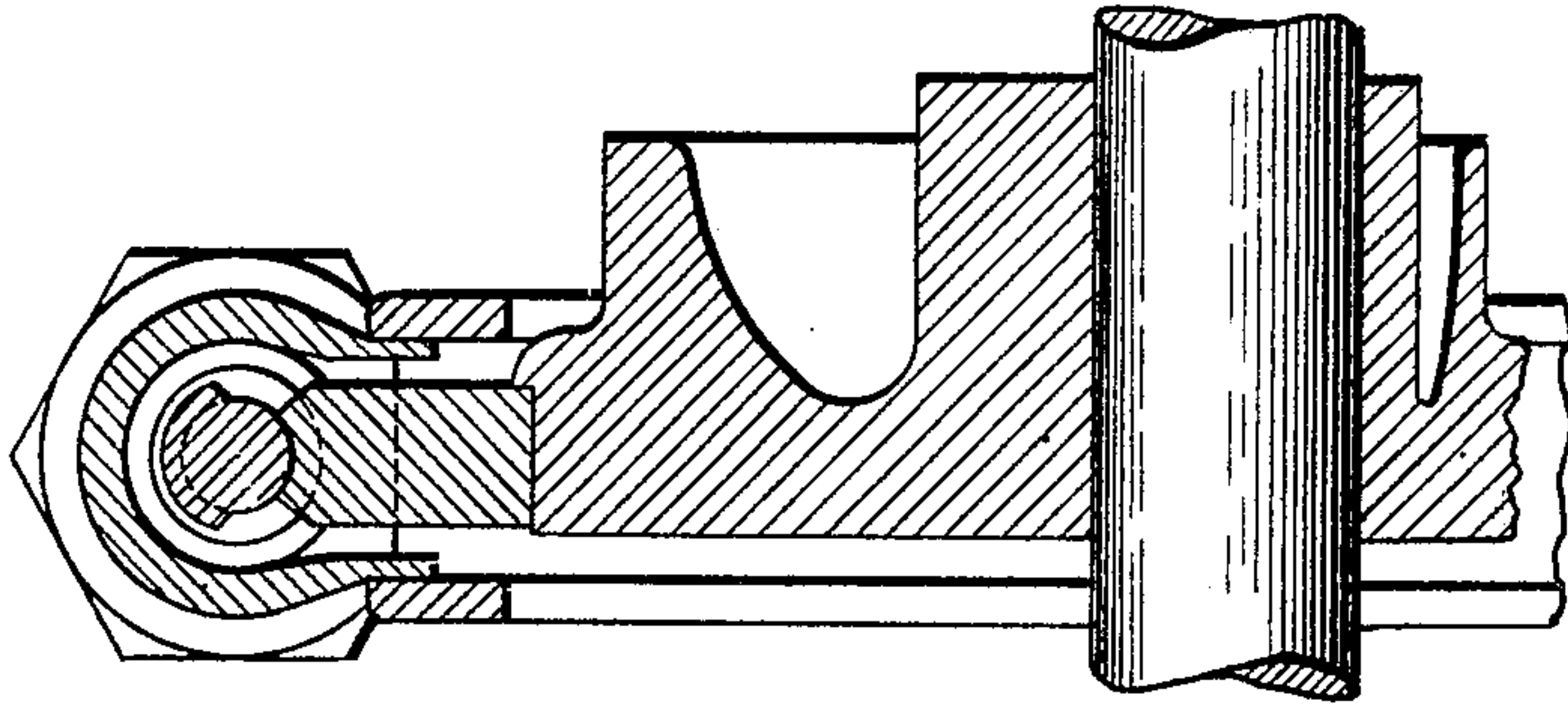
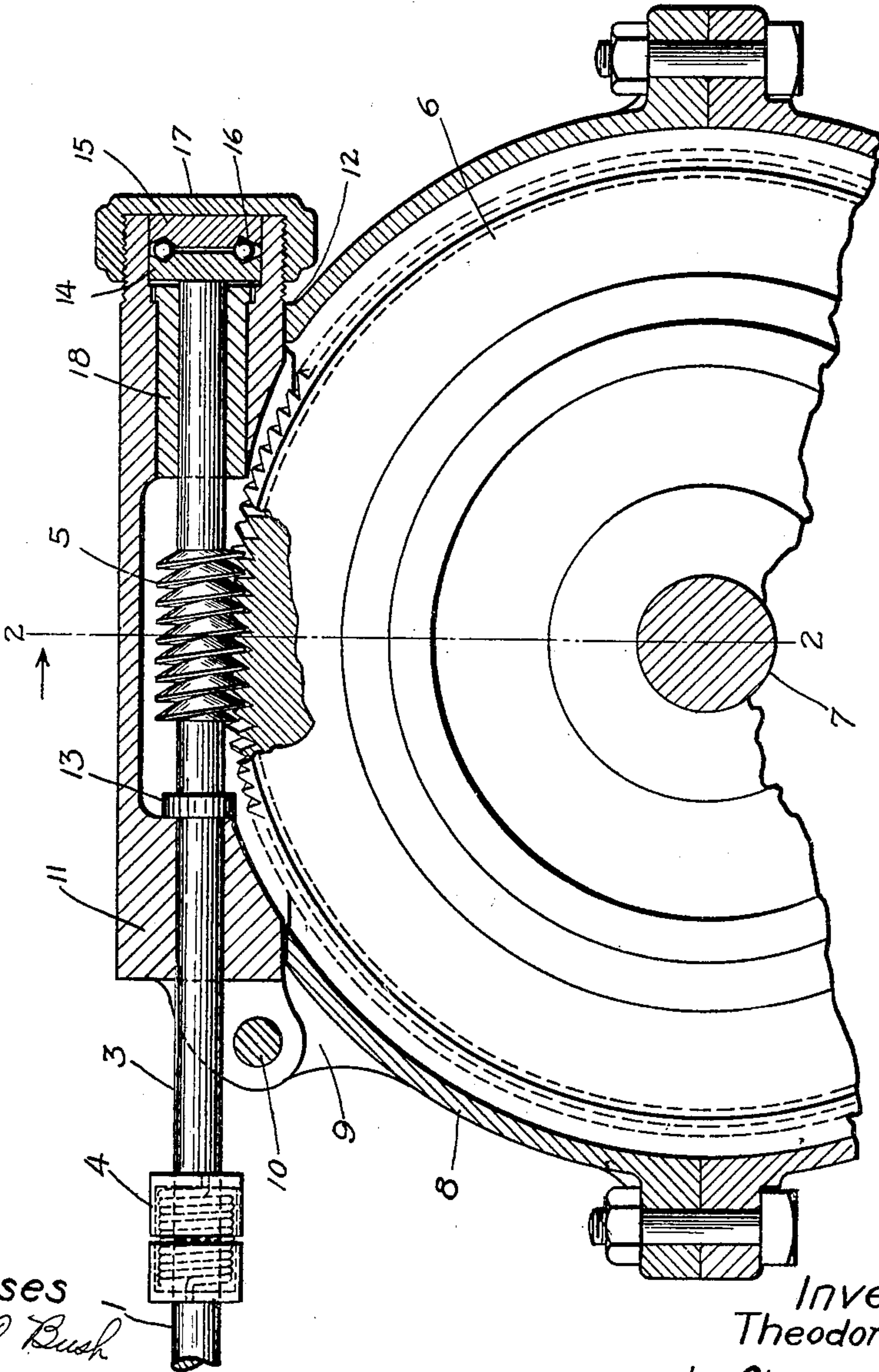


Fig. 1



Witnesses  
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Att'y.





# UNITED STATES PATENT OFFICE.

THEODORE E. BUTTON, OF SCHENECTADY, NEW YORK, ASSIGNOR TO  
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## RATCHET WORM-GEAR.

No. 795,337

Specification of Letters Patent.

Patented July 25, 1905.

Application filed January 3, 1905. Serial No. 239,331.

*To all whom it may concern:*

Be it known that I, THEODORE E. BUTTON, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Ratchet Worm-Gears, of which the following is a specification.

This invention relates to worm-gearing, and has for its object the provision of means whereby a ratchet engagement between the driving and driven element in a train of worm-gearing may be secured.

While my invention is capable of a very broad application and is in no sense limited as to the type of mechanism with which it may be used, I have shown its connection with a switch mechanism described and claimed in the patent to Hewlett, No. 755,771, granted March 29, 1904. In this type of switch the desired object is to produce a wide separation of the points of contact rupture as quickly as possible and to do so at a point of safety for the operator. This is accomplished by means of a motor which stores energy in a separating mechanism as it moves the terminals into contact with each other and which is provided with means for disconnecting or unclutching the motor from the separating mechanism, so that the latter may act instantaneously.

My invention is illustrated in connection with the unclutching device in the above-noted type of mechanism, but is only limited in its scope by the claims appended to and forming part of this specification.

In the drawings, Figure 1 is a longitudinal section of my device, the worm-wheel being broken away to show the shape of its teeth. Fig. 2 is a section approximately on the line 2 2 of Fig. 1 looking in the direction of the arrow, and Fig. 3 shows my device used in connection with the type of switch above referred to.

Referring to the drawings, 1 is a shaft driven in any desired manner, as by the motor 2, and having another shaft 3 coupled thereto by means of a flexible or universal coupling 4. The coupling 4 consists of two parts, which are chambered out to contain a coil-spring, the extremities of which are respectively fixed to the two parts, which are in turn fixed to the shafts 1 and 3. A small space is left between the two parts of the coupling for the purpose hereinafter set forth.

5 is a worm either mounted on or integral

with the shaft 3 and provided with a thread beveled on one face. The driving-face of the worm is radial, while the opposite face is inclined thereto, preferably at an angle of about forty-five degrees. This worm engages the worm-wheel 6, mounted on shaft 7 and provided with teeth similarly inclined and meshing with the worm. The worm-wheel is partly surrounded by a sectional casing 8. This casing is provided with lugs 9, to which is pivoted at 10 a casing 11, forming a bearing for the shaft 3. The end of this casing opposite the pivot rests upon a shoulder 12 of casing 8. The shaft 3 is provided with a thrust-collar 13 and also with a bearing to take up the thrust in the opposite direction. This bearing comprises two hardened bearing-plates 14 15, having hardened bearing-balls 16 between them, the whole being made adjustable by means of the nut 17. The casing 11 provides two bearings for the shaft, one of which is preferably provided with a sleeve 18 to act as a journal-box.

From the above description it will be seen that the worm-wheel 6 may move faster or that its teeth may slip past those of worm 5. In doing this the casing 11 rises slightly around the pivot 10 and causes a slight flexure in the coupling 4. This movement also causes a slight compression between the two parts of this coupling, the compression of which is taken up by the spring. The gears are again brought into mesh partly by the tension of the spring and partly by the weight of the worm and casing. The shoulder 12 maintains the worm-wheel in a proper driving relation.

In Fig. 3 I have shown my device in connection with the type of switch above referred to. I shall not attempt to describe all the details of this switch mechanism which are fully set forth in this patent. I shall only describe in a general way the mode of operation and its relation with my device. The motor 2 drives the shaft 7 to lower the contact-carrying rods 19, 20, and 21 through the worm 5 and wheel 6 (not shown here) from the position shown in the figure until the crank 22 is in a diametrically opposite position. By this movement the spring 23 is compressed and the weight 24 is raised to store energy in the wheel 6. When now the motor is started so as to move the pivotal point 29 of crank 22 and link 25 very slightly out of line with shaft 7 and pivotal point 26, the spring 23 and weight 24 will



instantaneously cause the shaft 7 to revolve in the direction of the arrow. The teeth of the wheel 6 slip past those of the worm 5 with a very rapid movement, and as the motor continues to operate the latter "catches up," so to speak, with the wheel 6 after the stored energy has been expended, and the worm again falls in mesh with the worm-wheel and moves it to a full open position. It will thus be evident that the worm-wheel can always move freely when power is applied to its shaft in a direction to cause the sloping faces of the worm and gear to engage, whereas when power is applied to the worm to move the wheel in the same direction the radial faces engage.

It is to be understood that I have shown my invention in connection with the above-noted type of mechanism simply for purposes of illustration and that I do not limit its application to this or any other form of switch mechanism; but that its application to any type of mechanism in which such a device may be found desirable is within the scope of my invention.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. The combination of a worm-wheel, and a worm mounted for ratchet engagement therewith.

2. The combination of a worm-wheel, and a worm mounted for ratchet engagement therewith, the thread of said worm having a substantially radial driving-face.

3. The combination of a worm-wheel, and a worm pivotally mounted for engagement therewith, the thread of said worm having one face substantially radial and the other beveled.

4. The combination, with a worm-wheel, of a drive-shaft, and a ratchet-worm having universal connection therewith and mounted for engagement with said worm-wheel.

5. The combination of a driving means, a ratchet-worm yieldably connected therewith,

a pivotally-mounted bearing for said worm, and a worm-wheel mounted in operative relation with said worm.

6. The combination of a ratchet-toothed worm-wheel, a pivotally-mounted casing, and a ratchet-worm having a bearing in said casing and in operative relation with said worm-wheel.

7. The combination of a ratchet-toothed worm-wheel, a casing therefor, a ratchet-worm, and a bearing therefor pivotally mounted on said casing and maintaining said worm in operative relation with said worm-wheel.

8. The combination, with a worm-wheel provided with teeth each having one face radial and the other at an angle therewith, of a worm having a similarly-shaped thread and yieldably mounted for engagement with said worm-wheel.

9. The combination of a ratchet-toothed worm-wheel, a casing therefor, a ratchet-worm, and a bearing therefor having one end pivoted to said casing and the other end resting thereon to support said worm in operative relation with said wheel, said bearing comprising a shaft-bearing and a thrust-bearing provided with means for adjusting the same.

10. The combination, with a drive-shaft, of a ratchet-worm yieldably coupled thereto, a ratchet worm-wheel mounted for engagement with said worm, means for storing energy in said wheel as it is driven to a predetermined position in one direction, and means for instantaneously releasing said energy when the wheel passes said position.

In witness whereof I have hereunto set my hand this 30th day of December, 1904.

THEODORE E. BUTTON.

Witnesses:

BENJAMIN B. HULL,  
HELEN ORFORD.