

3 Sheets—Sheet 1.

DEVICE FOR REGULATING POWER.

Patented Sept. 23, 1884.

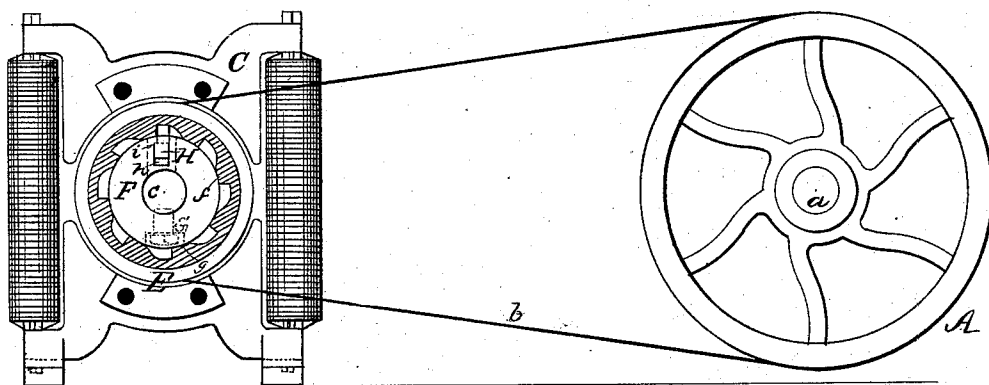


Fig 1

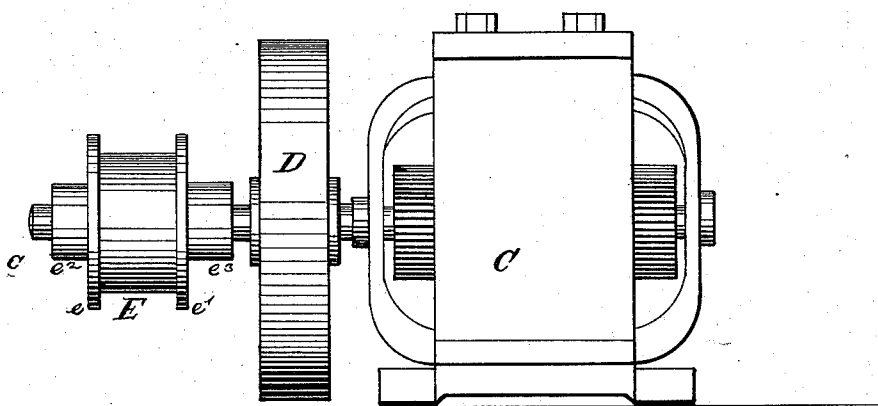


Fig. 2

WITNESSES:

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(No Model.)

3 Sheets—Sheet 2.

J. SCHINNELLER.

DEVICE FOR REGULATING POWER.

No. 305,635.

Patented Sept. 23, 1884.

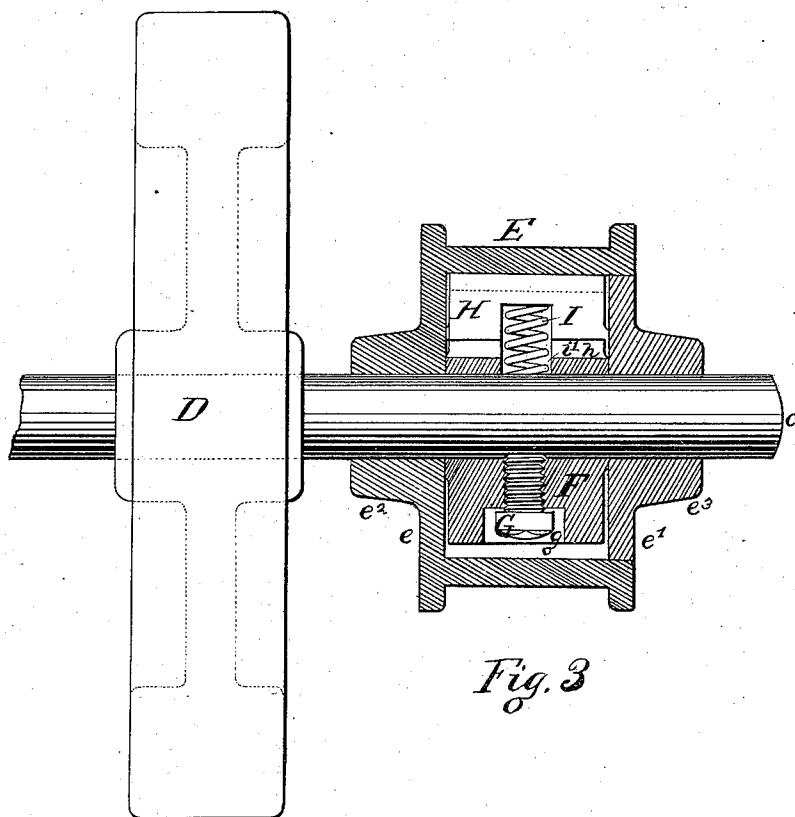


Fig. 3

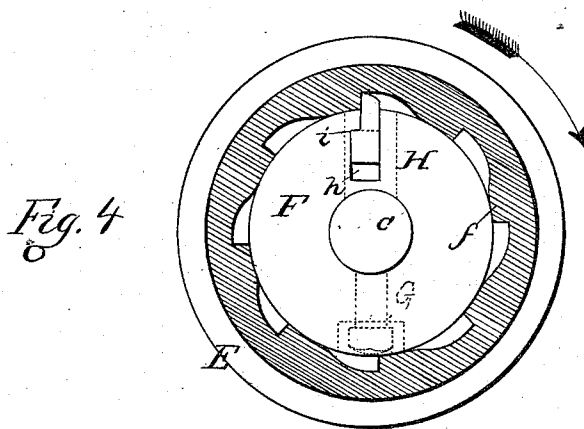


Fig. 4

Witnesses

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(No Model.)

3 Sheets—Sheet 3.

J. SCHINNELER.

DEVICE FOR REGULATING POWER.

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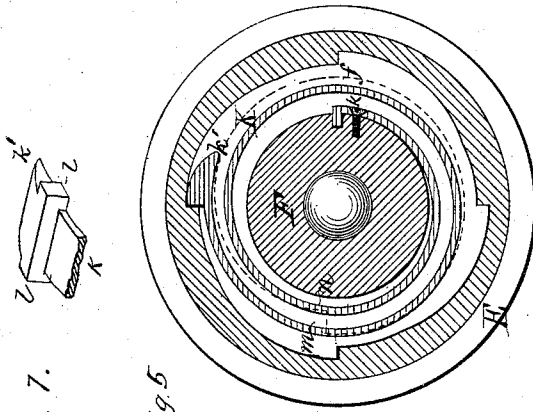


Fig. 7.

Fig. 5.

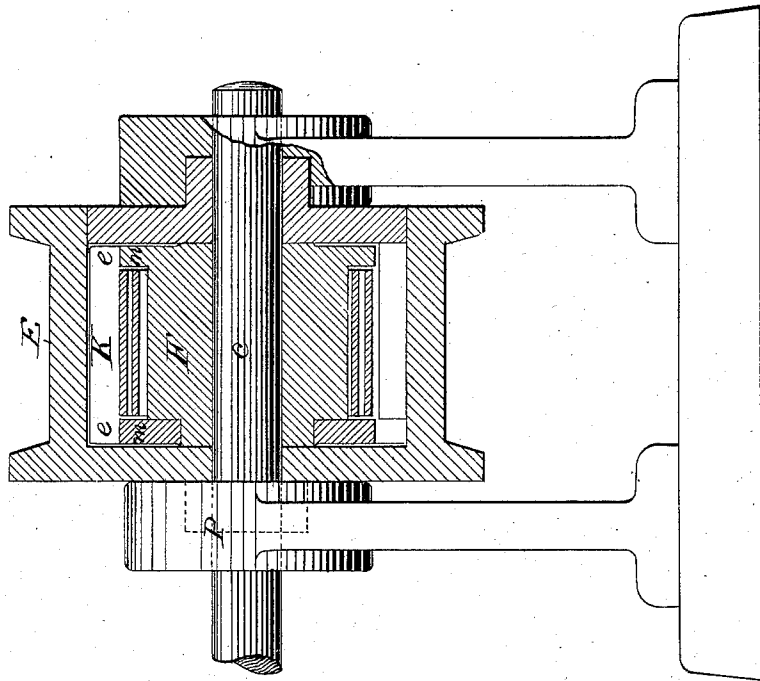


Fig. 6.

WITNESSES

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UNITED STATES PATENT OFFICE.

JACOB SCHINNELLER, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO JUNIUS A. McCORMICK, OF SAME PLACE.

DEVICE FOR REGULATING POWER.

SPECIFICATION forming part of Letters Patent No. 305,635, dated September 23, 1884.

Application filed May 23, 1884. (No model.)

To all whom it may concern:

Be it known that I, JACOB SCHINNELLER, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Devices for Regulating Power; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

It has been found difficult to use many classes of engines, both steam and gas, where a very uniform rate of motion is required. Particularly is this the case with engines which run at a comparatively slow rate of speed, and whose power is transmitted to machinery running at a higher rate of speed, for the reason that any variation of speed in the engine is multiplied in the machinery in proportion to their relative rates of motion. In engines of that class wherein the power is applied at irregular intervals—such, for instance, as gas-engines, where the cylinder takes gas only on every second or third stroke—the movement of the shaft and fly-wheel is so irregular as to render their use in many instances undesirable if not utterly impracticable, notably in electric lighting, where it is necessary that the generator should run at an absolutely uniform rate of speed to produce the best effect of steadiness in the lights. Efforts have been made to remedy this defect in the motive power by the employment of heavy fly-wheels on the engine-shaft, sensitive governors, and various electrical appliances on the engine and on the generator, but with indifferent success. A further objection to this class of engines lies in the fact that upon stopping the engine the shaft frequently makes a portion of a revolution in the reverse direction. Such reversal of the shaft works disaster to many classes of machinery—as, for instance, in the class of electric generators, where the reversal of the direction of motion of the generator-shaft causes great injury to the brushes of the commutator.

My invention relates to the transmission of power from an engine or other motor to ma-

chinery; and it has for its object the provision of means whereby any irregularity in the speed of the engine will be corrected and a regular and even motion given to the machinery, whether its rate of speed be fast or slow.

My invention consists in the novel construction and arrangement of certain devices adapted to be applied to and form part of the media through which the power is transmitted from a motor to a machine, and to operate in such manner as to correct any sudden variation of speed in the motor.

My invention further consists in the provision of means comprising certain novel arrangement of mechanism for preventing a reversal of the direction of motion in a machine by the reversal of the direction of motion of the motor by which said machine is operated.

My invention still further consists in the provision of a supplementary fly-wheel applied to the shaft of a machine, or to a counter-shaft between the machine and its motor, and adapted to be turned in a certain direction by the said motor, and to continue its motion in that direction at a uniform rate of speed during any sudden variation of the speed of the motor.

My invention still further consists in the combination, with a supplemental fly-wheel applied to the shaft of a machine, or to a counter-shaft connected therewith, of a pulley set loosely upon said shaft and a clutching device fast upon said shaft, and adapted to engage with the pulley and transmit motion to the shaft and fly-wheel when the rate of speed of said pulley is regular, and to disengage itself from said pulley and allow the shaft and fly-wheel to continue their movement by the momentum of the latter if the speed of the pulley should suddenly vary.

My invention still further consists in the combination, with a supplemental fly-wheel applied to the shaft of a machine, or to a counter-shaft connected therewith, of a pulley loosely mounted upon said shaft, and provided with an interior ratchet, and a spiral spring whose end engages with said ratchet, and whose other end is fast to the said shaft, whereby any sudden increase in the speed of the

pulley is taken up by the spring and gradually transmitted to the shaft and fly-wheel.

Referring to the accompanying drawings, wherein Figure 1 is an elevation of the fly-wheel of an engine and a dynamo-electric machine with my improvements attached, Fig. 2 is an end elevation of the dynamo, the clutch-pulley, and the supplemental fly-wheel. Fig. 3 is an elevation of the supplemental fly-wheel and the shaft on which it is mounted, the clutch-pulley being shown in section. Fig. 4 is a transverse section of the pulley and shaft; Figs. 5 and 6, a longitudinal and transverse section, respectively, of a modified form of clutch-pulley, the former showing also the manner of arranging the pulley on its shaft so as to avoid the friction caused by the pull of the belt. Fig. 7 is a perspective view of a detail.

A represents the fly-wheel of the motor; *a*, the shaft on which the same is mounted, and *b* the belt by which power is transmitted to the machine. D designates the supplemental fly-wheel, which is of the ordinary construction and of considerable weight, and is keyed or otherwise secured upon the shaft *c* of the machine C, to which the power is to be applied.

E designates the pulley around which the belt from the engine passes. Said pulley is in the form of a hollow cylinder with heads *e* and hubs *e'*. The head *e* and hub *e'* are cast integral with the periphery of the pulley, and the head *e'* and hub *e'* separate therefrom, but are connected thereto in suitable manner. The interior of the pulley E is formed with longitudinal ribs *f f*, extending from side to side, said ribs being inclined in one direction and having a straight side, as shown, and form a wide ratchet.

F designates a cylindrical block, which fits snugly within the interior cavity of pulley E, and is secured to the shaft *c* by a set-screw, G, whose head is received in a depression, *g*, in said block. A longitudinal mortised slot, *h*, is formed in the block F opposite the screw *g*, and in said slot is placed a sliding plate, H, having a shoulder, *i*, which limits the extent of its outward movement and prevents it from touching the interior of the pulley between the ribs *f f*, and thereby creating friction. Said plate has its outer edge beveled off in the same direction as the ribs *f f*. A hole, *i'*, is formed in the block F, at the center of the slot *h* and diametrically opposite the screw G, for the reception of a spiral spring, I, which presses the plate H outwardly against the interior surface of the pulley.

In Figs. 5 and 6 of the drawings I have shown a modified form of clutch, wherein the sliding plate in the interior of the pulley is replaced by a wide spiral spring, K, secured at one end by a screw, *k*, to the block F, which in this construction is made smaller, so as to afford room for the spiral spring which surrounds it. The outer end of the spring K is provided with a dog or tooth, *k'*, which engages

with the ribs *f f* of the pulley, when the latter turns in one direction, and slips over said teeth and allows the pulley to turn in the other direction independently of the shaft. The winding up of the spring, which takes place when the pulley is turned in one direction, has a tendency to reduce the diameter of its convolutions and cause the tooth on the end of the spring to slip past the ribs on the interior of the pulley. In order to guard against such slipping, I form ears *ll* on the end of the spring, which ride on spiral flanges *m m* on the edges of the block. Said flanges have shoulders at *n n*, which allow the spring to drop down and become disengaged from the ribs when the direction of the pulley is reversed and before the reverse motion can be conveyed to the shaft. This construction also allows the shaft to turn independently of the pulley at certain times.

The clutch and its appurtenances may with the fly-wheel be set directly upon the shaft of the machine to which my invention is to be applied, and in practice it will be preferable to do so when possible; but they will operate advantageously if applied to a counter-shaft or equivalent device connected to the machine in proper manner. As the pulley E runs loosely on the shaft when arranged as shown in Figs. 1 and 2, considerable friction will ensue (from the pull of the belt) between the hubs of the pulley and the shaft. I have devised means for avoiding such friction between the pulley and the shaft, and have shown such means in Fig. 6 of the drawings, wherein the hubs of the pulley on each side are prolonged into sleeves, which fit into the bearings of upright brackets P P. In this case the strain of the belt is taken up by the brackets instead of falling upon the shaft, and thereby allows a freer movement of said shaft.

The operation of my invention is as follows: The devices being arranged as described and the engine started, the pulley E turns in the direction of the arrow. The clutch engaging with the interior of the pulley causes the shaft to turn and the supplemental fly-wheel to revolve. Now, as long as the engine continues to run at a regular and uniform rate of speed, the parts will maintain a fixed relation; but if the engine should suddenly and momentarily slack up the momentum of the supplemental fly-wheel will cause the wheel and the shaft to revolve at its former rate of speed, the clutch within the pulley slipping a number of teeth. Any sudden increase of speed will be taken up and stored in the fly-wheel and afterward distributed by it, as it will take a certain amount of time to overcome the inertia of said fly-wheel. Where the spring-clutch shown in Figs. 5 and 6 is used, the sudden increase of speed is taken up by the spring, which is thereby wound up more tightly, and the power accumulated is gradually imparted to the shaft and gradually distributed by the spring and the fly-wheel to the machine.

It will be noted that any reversal of the di-

rection of the engine will not affect the machinery, as the clutch allows a reversal of the direction of the pulley without affecting the shaft.

5 Having fully described my invention, I claim—

1. In a device for transmitting motion, the combination, with the motor and the machine, of a supplemental fly-wheel applied to the
10 shaft of the machine, and means, substantially as described, whereby said fly-wheel is adapted to be turned by the engine when the speed of the latter is uniform and to revolve by its momentum when the speed of the engine suddenly varies, as set forth.

2. In a device for the transmission of power, the combination, with the motor, the engine, and the intermediate gearing, of a pulley forming part of the latter, a supplementary fly-wheel on the shaft with said pulley, a clutch
20 adapted to engage with said pulley when the latter turns in one direction, and to be disengaged when the direction of motion of the pulley is reversed, substantially as described.

25 3. In a device for the transmission of power, the combination, with the motor and the machinery, of a supplemental fly-wheel, a clutch set fast on the shaft with said fly-wheel, a pulley set loosely on the same shaft and adapted
30 to turn said shaft and fly-wheel through the

medium of the clutch when the movement of the engine is regular, but to allow the shaft to turn independently of the engine by the momentum of the said fly-wheel when the speed of the engine suddenly varies, substantially
35 as described.

4. In a device for the transmission of power, the combination, with the motor and the machinery, of a supplemental fly-wheel, a spiral spring-clutch set fast upon the same shaft as
40 the said fly-wheel and adapted to engage with a loose pulley on the same shaft, whereby said spring is wound up on any sudden increase of speed in said pulley and gradually transmits its power to said shaft, substantially as
45 described.

5. The combination of shaft *c*, loose pulley *E*, mounted on said shaft, and provided with the internal ribs, *f f*, with the block *F*, having spiral spring *K* secured thereto and adapted
50 to engage with said ribs, substantially as described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

JACOB SCHINNELLER.

Witnesses:

JOS. B. CONNOLLY,
ALVA A. MOORE.