

UNITED STATES PATENT OFFICE.

JOSEF VON ZÁCH, OF BUDA-PESTH, AUSTRIA-HUNGARY.

SWINGING-LEVER ENGINE.

SPECIFICATION forming part of Letters Patent No. 260,509, dated July 4, 1882.

Application filed April 6, 1882. (No model.)

To all whom it may concern:

Be it known that I, JOSEF VON ZÁCH, a subject of the King of Hungary, and a resident of Buda-Pesth, Austria-Hungary, have invented a certain Swinging-Lever Engine, of which the following is a specification.

The construction of the engine is based on the combination of a pendulum with a lever, or the transformation of a pendulum into a lever of the variety known as "lever of the first class." If the rod of the pendulum is prolonged above its point of suspension, the pendulum is transformed into a lever. This pendulum thus prolonged I call a "swinging lever." The point of suspension of the swinging lever corresponds to the point of exercise of power of a lever, and the end of the pendulum-bar prolonged beyond the point of suspension corresponds to the point of application to the object to be moved. The two parts of the pendulum-rod—that is to say, the one above the point of suspension and the other below the same—correspond to the two arms of the common lever. The power exerted by the motion of the weight at one end of the swinging lever acts on the opposite end of the swinging lever, and will alternately press or pull in the direction of oscillation—that is to say, when the lever-arm presses in one direction it pulls at the same time from the opposite side.

According to the present invention this reciprocating motion is transformed into a rotary movement by means of ratchet-wheels and utilized as motive power for machinery by means of intermediate shafting and gearing.

Based upon the principle set forth, and excluding from consideration any suitable kind of arrangement of frame, gearing, fly-wheels, pulleys, and the like, the main elements of the swinging-lever engine are the following, viz: I, the swinging lever; II, the device for the transformation of the straight-line movement into a rotary one; III, the arrangement for supplying the power for keeping the swinging lever in motion.

It must be remarked that the proportionate dimensions of the parts of the engine will depend on the amount of work desired or on the purpose for which the engine is destined to serve.

In the accompanying drawings, Figures 1, 2, and 3 are diagrams illustrating the system of

this invention. Figs. 4, 5, and 6 are different views of the essential parts or elements of a machine constructed according to this invention. Figs. 7, 8, and 9 show in enlarged scale the construction of the arrangement for the suspension of the swinging lever.

I. *The swinging lever.*—The swinging lever consists of the pendulum-rod a , the suspension b , and the pendulum-weight c . The pendulum-rod a is divided by the point of suspension b into two unequal arms. The upper and shorter arm is provided with two lugs, a' a' , to which the two yokes e e' are jointed. The lower and longer arm, a^2 , of the swinging lever is formed in the shape of a frame for increasing its resistance and decreasing its elasticity. Below this frame the continuation a^3 is arranged for the reception of the pendulum weight or disk c . The pendulum-rod terminates in a screw-stud, a^4 , provided with a nut, d , carrying the weight c . The point of suspension b is the center of a round hole in the pendulum-rod. Above this round hole the groove b' , Fig. 9, is cut in the rod, into which groove is fixed a steel plate, b^2 , Figs. 7 and 8, reaching down to the point of suspension and having a prismatic edge. With this edge the swinging lever rests upon an axle, b^3 , Figs. 7 and 8, cut out toward the center, so that the steel plate b^2 can swing to and fro in this space. By means of the steel plate b^2 the friction produced by the oscillation of the swinging lever is reduced to a minimum. To prevent friction between the axle b^3 and the pendulum-rod the under side of the axle b^3 is filed away a little, as indicated in Fig. 8. As the swinging lever is carried by and moves solely on the edge of the plate b^2 , only the smallest part of the force imparted to the swinging lever is lost by friction. After many experiments and careful calculations the inventor has ascertained that a pendulum resting upon an edge and swinging together with the same upon a shaft cut out according to the system above described will only require per second a power equivalent to 0.0617 parts of its entire weight in order to keep it in continual uniform motion. The force to be restored is therefore mainly that absorbed by the work which has to be performed.

For the purpose of transforming the to-and-fro motion of the swinging lever into a ro-

5 tary one, yokes and ratchet-wheels are employed. The yokes $e e'$ are so arranged on the right and left upper side of the swinging lever that while the one yoke exerts a
 10 pressing force in consequence of the motion of the lever the other exerts a pulling force. The connecting-rods $g' g^2 g^3 g^4$ are jointed at one end to the yokes and at the other end to the
 15 double rods $i' i^2 i^3 i^4$, which are arranged on the shafts $h h'$ and carry the pawls $m' m^2 m^3 m^4$, engaging in the ratchet-wheels ll' , fixed on the said shafts $h h'$. It is evident that when
 20 in the motion of the swinging lever the upper pawl, m' or m^3 , engages in the teeth of the ratchet-wheel l or l' and turns the wheel with its shaft the lower pawl, m^2 or m^4 , will slip on the wheel, and vice versa. The ratchet-wheels transmit the motion imparted to them to other machinery by means of toothed wheels, pulleys, or any other suitable known device.

25 III. *Arrangement for supplying the power for keeping the swinging lever in motion.*—Either manual or any other suitable power may be employed to keep the swinging lever in motion, so as to replace the power lost by the actual work done and by the friction of the different parts of the machine.

I claim—

1. In a machine for converting motion, a pendulum with lateral arms extending from its rod, said arms being provided with dogs which engage with ratchet-wheels, whereby the reciprocating movement of the pendulum is converted into a rotary movement in the ratchet-wheels, substantially as described.

2. The manner of suspending the swinging lever by a plate attached to the same and resting in a groove cut in an axle, substantially as described.

3. The two yokes at the extremities of the lever for actuating the two ratchet-wheels.

4. The combination of the yokes attached to the pendulum and the ratchet-wheels operated by the yokes for the conversion of reciprocating into rotary motion, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOSEF V. ZÁCH.

Witnesses:

C. O. PAGET,

E. G. F. ROELLER.