

United States Patent Office.

ANDREW H. SMITH, OF CHARLTON, NEW YORK.

Letters Patent No. 79,403, dated June 30, 1868.

IMPROVEMENT IN COMPENSATING FLY-WHEEL.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, ANDREW H. SMITH, of Charlton, in the county of Saratoga, in the State of New York, have invented a certain new and useful Compensating Fly-Wheel; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawing, making part of this specification.

The object of this invention is to employ the surplus power of a reciprocating engine, when the crank is in a position at right angles to the centre, to elevate a weight, which descends again as the crank approaches the centres, thus aiding it to pass those critical points, and making the motion of the engine more uniform and smooth.

This is effected by giving to the fly-wheel two revolutions to every revolution of the crank, and attaching to the rim of the fly-wheel a weight, so placed that it will be raised on one side of the fly-wheel while the crank is passing the points perpendicular to the centres, and descend on the other side while the crank is passing the centres. The weight will thus tend to retard the machinery when the piston is at half stroke, and there is a surplus of power, while it will accelerate it at full stroke when the power is deficient, thus equalizing the motion more efficiently than can be done by the mere momentum of the ordinary fly-wheel. It will also prevent the liability of the engine to stop on the centres. In the drawings—

Figure 1 is a plan representing my invention applied to a reciprocating engine.

Figure 2 is a side elevation of the same.

Figure 3 is a diagram to illustrate the operation of the invention.

Similar letters of reference indicate corresponding parts in the several figures.

B represents the bed-plate, C the cylinder, and D the piston-rod of an ordinary reciprocating engine. The connecting-rod or pitman E rotates the shaft G, through the medium of a crank, F, in the customary manner. Upon the shaft G is a cog-wheel, H, gearing with a smaller cog-wheel or pinion, I, having one-half as many teeth as the wheel G. The pinion I is keyed on a shaft, J, which carries the fly-wheel K. By this arrangement, two revolutions will be imparted to the fly-wheel by every revolution of the crank, F. L represents an arm pivoted upon the centre of the fly-wheel K, and secured to the rim or periphery of said wheel by a catch, M or M'. These catches are pivoted at *m m*, and in their normal position are held against stop-pins N N by springs O O. P represents a weight, attached adjustably to the arm L, in such a manner that it may be placed in a position concentric with the fly-wheel K, or may be set out as far as desired toward the periphery, so as to give a preponderance to that side of the wheel upon which the arm L may be set. Q is a lever, fulcrumed at *q*, and provided with a crescent-shaped cam, R, which, when the lever Q is lowered, will act upon studs *m*² on the catches M M', so as to retract said catches and release the arm L therefrom.

The operation is as follows: If the arm L, carrying the weight P, be adjusted to the catch M, as shown in the drawings, and the crank F and wheels H I K rotated in the directions indicated by the arrows in fig. 3, it will be seen that while the crank is passing through an effective portion of its orbit, from *f*¹ to *f*², the weight will be raised from *p*¹ to *p*², and while the crank is passing through the next ninety degrees of its orbit, (from *f*² to *f*³,) where it is almost non-effective, the weight will descend from *p*² to *p*¹, and by its gravity assist the movement. When, again, the crank is passing through the other effective portion of its orbit, from *f*³ to *f*⁴, the weight will be again raised from *p*¹ to *p*², and while the crank passes from *f*¹ to *f*⁴, the weight will again descend from *p*² to *p*¹.

Whenever the crank is on either of its centres, *f*^x *f*^x, the weight will be at *p*^x, where it will give the greatest aid to the movement. On the other hand, when the crank is at F or *f*, where the piston exerts the maximum of power, the weight will be at P, where it will exert the maximum of resistance. At the intermediate points the compensation will be equally perfect, so that if the weight be properly apportioned, the effective rotating power of the engine will be the same in all positions of the crank.

When the engine is reversed, it is necessary to change the weight from one side of the fly-wheel to the other. This is effected by depressing the lever Q, so that the stud m^2 of the catch M will come in contact with the cam R, which will retract the said catch from the end of the arm L, that bears the weight P, so as to allow the said arm to escape, and remain in a perpendicular position. If the lever Q be immediately re-elevated, to place the cam R out of reach of the studs m^2 , the catch M' on the other side of the wheel will seize and hold the end of the arm L, and the reversal of the weight will be effected.

The advantages derived from my invention are a steadier rotation with less power, less weight about the fly-wheel, avoidance of a tendency to stop on the centres, and a very speedy cessation of the motion after the steam is shut off, as the lagging of the weight will soon bring the fly-wheel to a stand.

The wheel K may be dispensed with if preferred, and the weight attached simply to a revolving arm.

Having thus described my invention, the following is what I claim as new therein, and desire to secure by Letters Patent:

1. I claim the compensating-weight P, arranged to make two revolutions to every revolution of the crank, F, substantially as and for the purpose set forth
2. I claim the pivoted or swinging arm L, in combination with the compensating-weight P, for reversing it from side to side.
3. I claim providing the compensating-weight P with radial adjustment, to vary its effect as required, substantially as herein described.

A. H. SMITH.

Witnesses:

J. H. SIMPSON,
J. W. LOCKE.