(No Model.)

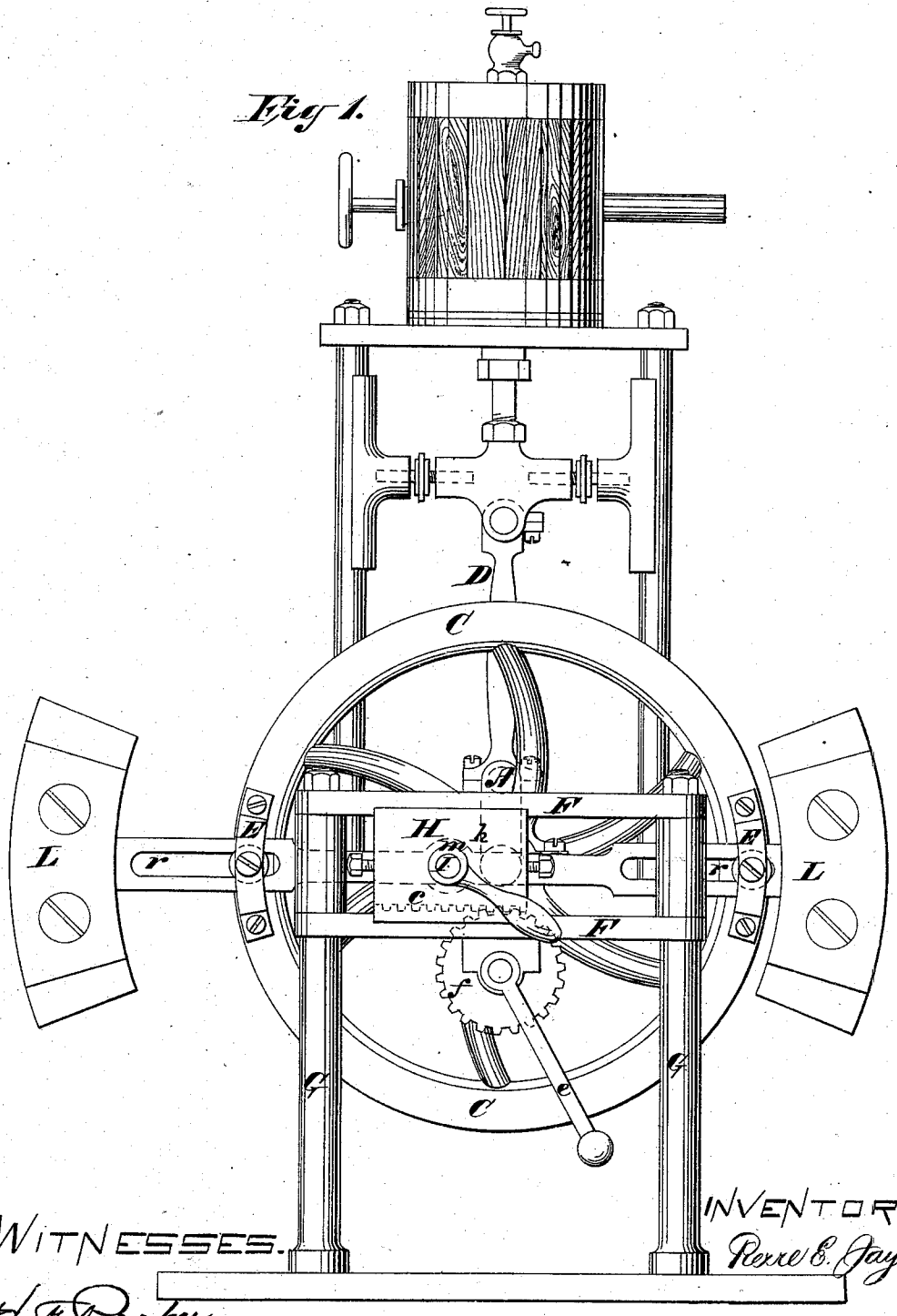
2 Sheets—Sheet 1.

P. E. JAY.

Apparatus for Overcoming Dead Points in Cranks.

No. 235,876. Patented Dec. 28, 1880.

Fig 1.



WITNESSES.

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(No Model.) 2 Sheets—Sheet 2.

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Apparatus for Overcoming Dead Points in Cranks.

No. 235,876. Patented Dec. 28, 1880.

Fig. 2.

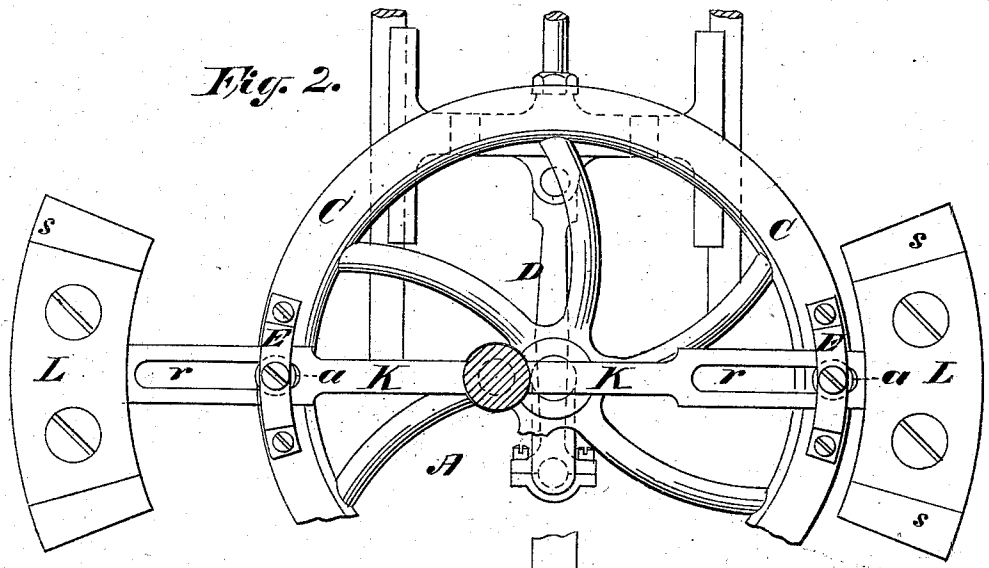


Fig. 3.

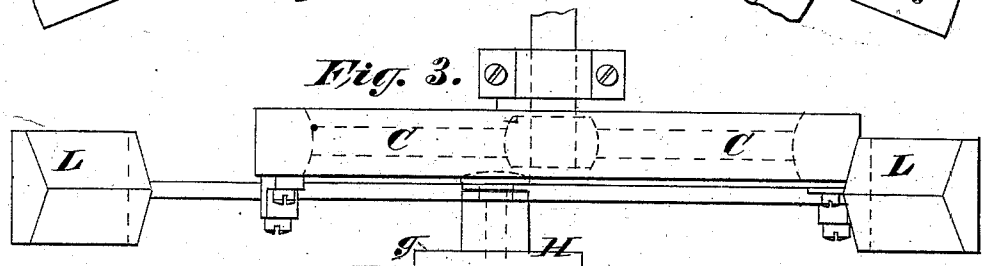


Fig. 4.

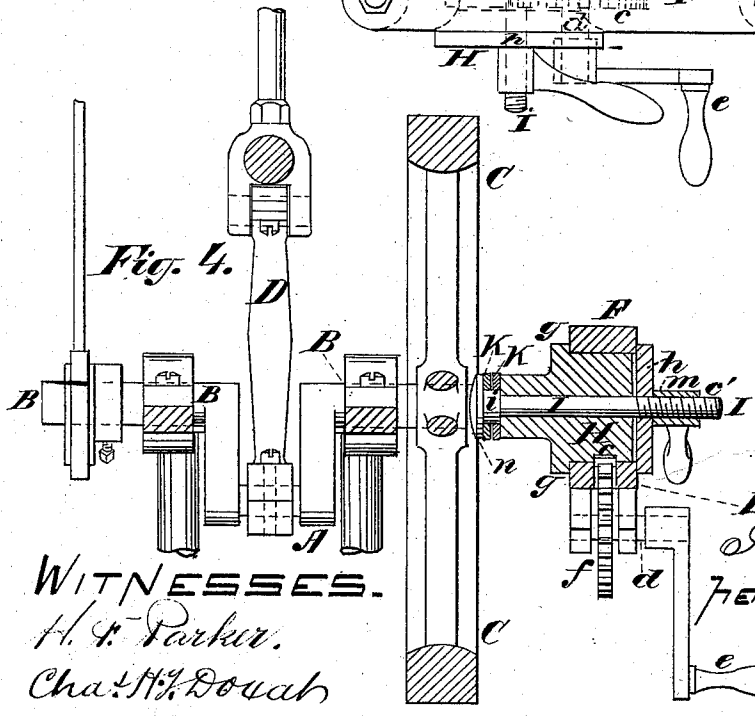
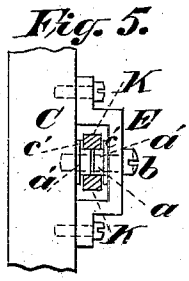


Fig. 5.



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UNITED STATES PATENT OFFICE.

PIERRE E. JAY, OF NEW YORK, N. Y.

APPARATUS FOR OVERCOMING DEAD-POINTS IN CRANKS.

SPECIFICATION forming part of Letters Patent No. 235,876, dated December 28, 1880.

Application filed November 15, 1880. (No model.)

To all whom it may concern:

Be it known that I, PIERRE E. JAY, of the city, county, and State of New York, have invented certain Improvements in Apparatus for Obviating the Dead-Points in Crank-Movements, of which the following is a specification.

This invention is more particularly designed for overcoming the "dead-points," so called, in steam-engine cranks; but it may also be applied to other machinery in which a rotary crank is employed, and in which it is desirable that the crank should not be permitted to stop upon the "dead points" or "centers," as they are sometimes called.

This invention relates to that class of devices for the purpose indicated in which a weight or weights attached is placed in such relation with the crank that when the latter is brought to its dead-point or dead-center the weight will be in position to continue the movement of the crank past the dead-center by the force exerted by the gravity of the said weight.

My said invention comprises certain novel combinations of parts whereby this principle of operation is very advantageously carried into effect, and whereby the position of the weight to exert a greater or less force in turning the dead points or centers may be very readily adjusted, and whereby, in various respects, the apparatus is rendered efficient and durable and certain in its operation.

Figure 1 is a front view of an inverted vertical steam-engine provided with my said invention. Fig. 2 is a vertical sectional view taken in a plane parallel with the front to the apparatus. Fig. 3 is a plan view, and Fig. 4 is a vertical sectional view taken in a plane at right angles to Fig. 2. Fig. 5 is a sectional view, illustrating one of the details of construction in the apparatus.

A is the crank, of which the axial shaft is shown at B, one end of said shaft being provided with a wheel, C, the purpose of which will hereinafter appear. In the drawings, the crank A is shown in Fig. 1 at the upper dead-center, and in Figs. 2 and 4 at the lower dead-center. The crank receives its rotary motion from the connecting-rod or pitman D in the usual manner.

Placed at opposite parts of the circumference of the wheel C, at the front of said wheel, as more clearly represented in Figs. 1 and 2, are guides E, the construction of which is indicated in detail in Fig. 5. Placed within each of these guides is a friction-roller, *a*, which is made in two parts, *a'*, each part provided at its outer edge with a circumferential flange, *c'*. These two parts are placed opposite each other, upon an axial pin, *b*, which passes through the guide E, and has its inner end screwed into the rim of the wheel C.

Fixed in front of the wheel C are two horizontal guides, F, which may be supported upon standards G, or otherwise made stationary. Between these bars moves a sliding block, H, formed in the under side of which is a rack, *c*. (Represented in dotted outline in Figs. 1 and 3, and also shown in Fig. 4.)

Working in suitable bearings attached to the lowermost of the guides F is a shaft, *d*, provided with a crank, hand-wheel, or the like, as at *e*. Upon the said shaft *d* is a spur-pinion, *f*, which gears into the rack *c*, so that, by turning the crank *e* more or less, the sliding block H may be moved horizontally between the guides F and to any required distance laterally from the axial line of the crank-shaft B—in other words, from the line of the axis of rotation of the crank A. It should be mentioned that in order to retain the block H within the guides F the inner side of said block is formed with horizontal flanges *g* at its upper and lower edges, which bear against the adjacent side surfaces of the guides F. Upon the opposite or front side of the block H is placed a flat plate, *h*, the upper and lower edges of which extend upon the adjacent upper and lower side edges of the guides F. A bolt, I, having head *i* at its inner end, passes through the block H and plate *h*, as represented in Fig. 1, and being provided at its outermost end with a screw-thread, *c'*, and a nut, *m*, the plate *h* is kept in position, so that its upper and lower edges serve the same purpose at the front of the block H as the flanges *g* at the back thereof, and by this means the displacement of the block H in a forward or backward direction from the guides F is prevented. Furthermore, by tightening the nut *m* upon the bolt

I the plate *h* and block H are drawn toward each other, so that the flanges *g* on one side of the guides F and the upper and lower edges of the plate *h* on the other side of said guides are caused to gripe the guides with a force sufficient to hold the block H firmly at any desired point along the length of the said guides.

The head *i* of the bolt I is of cylindric shape and of such a length as to afford a bearing for the inner ends of two radial arms, K, there being an annular flange or supplemental head, *n*, formed at the outermost extremity of the head *i* in such a manner that the inner or pivoted ends of the arms K are held between the flange *n* and the rearmost surface of the block H, as more clearly represented in Fig. 4.

It is desirable that the bolt I should be situated in substantially the same horizontal plane as the axis of the crank-shaft B. In the outermost portion of each of the arms K is a slot, *r*. These arms K pass within the guides E, with the rollers *a* situate within the aforesaid slots *r*. To enable this to be done the said rollers *a* have the construction hereinbefore explained, the parts being put in their proper relation by first detaching the guides E, then inserting the two parts *a'* of each of the rollers *a* in proper position in the slots *r*, then replacing and securing in place the guides E, and finally passing the pivot-screw *b* through the axial openings of the parts *a'*.

It will be observed that the guides E serve to retain the rollers *a* in position, and that the said rollers *a*, together with the flanges *c'* thereof, hold the arms K against displacement, and at the same time reduce to a minimum the friction incident to the longitudinal movement of the said arms through the said guides, as hereinafter explained, said longitudinal movement being permitted by the slot *r* in said arms K.

Upon the outer extremity of each of the arms K is a weight, L, the ends *s* of which are tapered to a sharp edge in order that the resistance of the air to the rotary motion, hereinafter described, of the weights L may be reduced to the least possible degree. The sharpened ends of the weights L divide the air, and throw it laterally, said weight thereby offering less resistance than would be the case if it were flat or square across.

The guides E are so placed upon the wheel C that the arms K are in a position at an angle to the position of the crank A, upon the shaft B of which the said wheel C is attached, as hereinbefore explained.

In order to put the apparatus in operation the block H is moved laterally to bring the axis of the bolt I—in other words, the axis of motion of the arms K—at a greater or less distance from the axial line of the crank-shaft B; in other words, to bring the path of rotation of the weights L eccentric to the path of rotation of the wheel C. This being done, the block H is tightened in place, as hereinbefore explained. The crank being put in rotation by the movement of the pitman or connecting-rod D, it follows that the rotation of the wheel C will revolve the arms K, and consequently their weights L, and inasmuch as the axis of motion of the latter is eccentric to that of the said wheel C, it follows that, as each of the arms K is turned over toward that side of the wheel to which the axis of rotation of the arm is nearest, the said arm will change its position with reference to the circumference of the wheel, being thrust out therefrom to an extent equal to twice the distance of the axial line of rotation of the arm from that of the wheel C. By this means the weight on the arm K is carried to a greater distance from the axis of the wheel C, and being thereby caused to preponderate at that side of the wheel, depresses the said side of said wheel during a portion of its revolution. Furthermore, inasmuch as the two weights are simultaneously moved, it follows that when one weight is protruded from one side of the wheel the other weight is drawn inward at the opposite side of the wheel, and inasmuch as this occurs as each weight is brought in succession toward and to the one side of the wheel, as just explained, and inasmuch as this preponderating action of the weights at one side of the wheel C is made to coincide in point of time with the dead-points of the crank, it follows that when the pitman is powerless to act upon the crank, as is always the case at the dead-points, the preponderance of the weights at one side of the wheel insures the rotation of the latter, and consequently the rotation of the crank-shaft and the throwing of the crank A past the dead-points. It is, of course, to be understood that one of the arms K, with its weight L, answers to one of the dead-points of the crank, while the other of the said arms and its weight answers to the other of the dead-points of the crank, so that by this means it is impossible to have the crank remain upon the dead-point, inasmuch as when the action of the pitman or connecting-rod ceases upon the crank the action of one or the other of the weights is brought into play to throw the crank past the dead-point, at which the pitman or connecting-rod is idle, and inasmuch as the extent of the throw of the weights L is regulated by the distance between the axial line of rotation of the arms K and the axial line of the crank-shaft B, it follows that the intensity of the force exerted to turn the crank past its dead-points may be adjusted with great readiness and delicacy by the lateral adjustment of the block H, as hereinbefore explained.

What I claim as my invention is—

1. The combination of the laterally-adjustable block H, carrying the pivot of the arms K, the arms K, provided at their outer extremities with weights L, the wheel C, having guides for holding the arms K in position, and the crank A, having the wheel C attached to its shaft B, all substantially as and for the purpose herein set forth.

2. The combination of the laterally-adjustable block H, plate *h*, bolt I, nut *m*, guides F, pivoted arms K, having weights L, wheel C, having guides for retaining the arms K in position, and crank A, the whole arranged for joint use and operation, substantially as and for the purpose herein set forth.

3. The combination of the block H, having the rack *c* on its under side, and pinion *f*, having a crank or hand wheel, in combination with the arms K, having weights L, the wheel C, having guides for holding the arms K in position, and the crank A, the whole arranged for joint use and operation, substantially as and for the purpose herein set forth.

4. The rollers *a*, each composed of the two parts *a'*, having the flanges *c'*, the guides F, and pivots or screws *b*, in combination with the slotted arms K, having weights L, the wheel C, and the crank B, all substantially as and for the purpose herein set forth.

5. The weights L, constructed with sharpened ends, as described, in combination with the arms K and the wheel C on the shaft of the crank A, all substantially as and for the purpose herein set forth.

PIERRE E. JAY.

Witnesses:
H. F. PARKER,
CHAS. H. T. DOXAT.