T. Stewart,

Correcting Motion.

No. 21,911. Patented Oct. 26, 1858.

Fig. 1

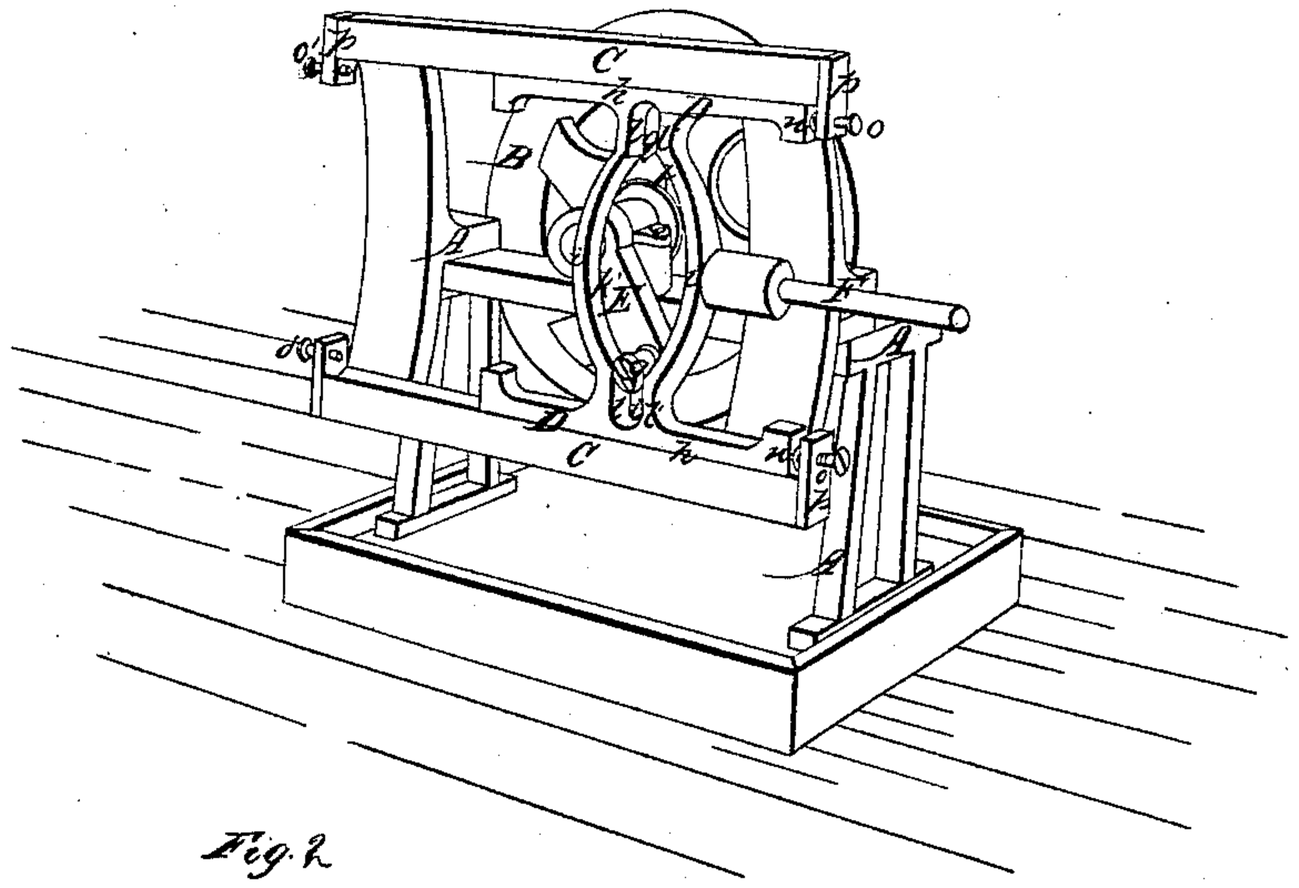
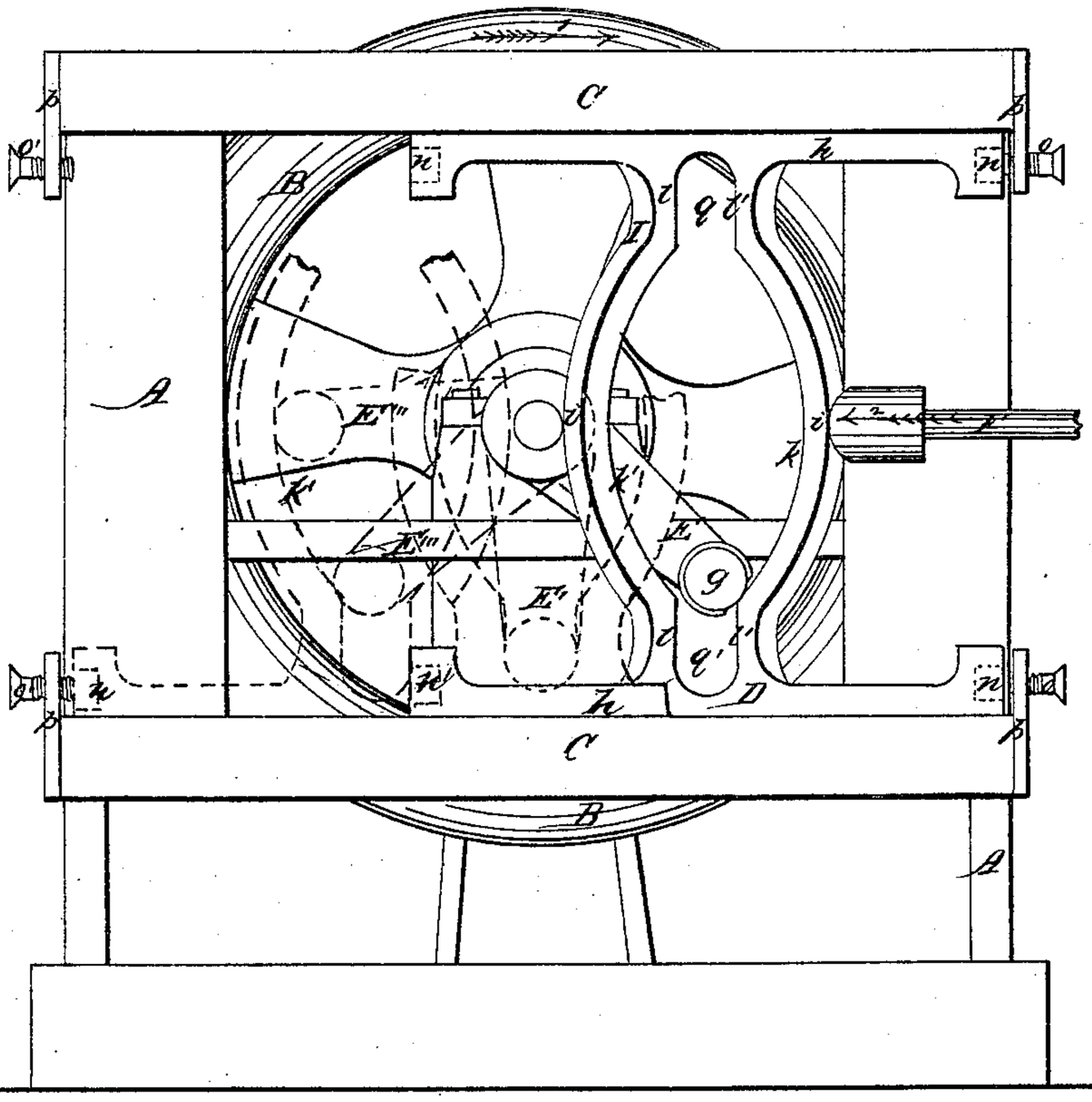


Fig. 2



Witnesses
Benj Smith
Charles D. Freeman

Inventor.
Thos. Stewart

UNITED STATES PATENT OFFICE.

THOMAS STEWART, OF PHILADELPHIA, PENNSYLVANIA.

APPLYING POWER TO THE CRANKS OF ENGINES.

Specification of Letters Patent No. 21,911, dated October 26, 1858.

To all whom it may concern:

Be it known that I, THOMAS STEWART, of the city of Philadelphia, in the State of Pennsylvania, have invented a new and Improved Mode of Applying Power to the Cranks of Engines; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the accompanying drawings, in which—

Figure 1, is a perspective view of the invention as applied to the crank of a steam engine; and Fig. 2, a side elevation of the same, showing several different positions of the crank, and cross head or crank yoke; the said drawings forming a part of this specification; and like letters on the different figures indicating the same parts.

My invention has for its object the economizing of steam, or other motive power, of an engine, by applying it to the crank by such means that it shall operate upon the latter, only when it is at its most favorable position, in its revolution, for receiving the full effect of that power; and consists in the employment for the purpose, of a device in connection with the piston rod, so constructed as to permit the said piston rod to rest while the crank makes about one-fourth of a revolution on each opposite side of an imaginary line passing across the center of the crank shaft at right angles to another such line passing through the axis of the piston rod, or, in other words, while the piston is at either end of its cylinder.

In the drawings, A, represents a part of the supporting frame of a steam engine—the usual cylinder being omitted as unnecessary in the illustration of the invention; B, the balance wheel; C, C, the guides for its cross-head, or crank yoke; D, the said yoke; E, the crank; and F, the piston rod.

The crank (E) is fixed so as to project from the balance wheel shaft in the usual manner. The yoke (D) is of a peculiar construction, and is made to slide between the guides (C, C) in the usual manner, in a plane parallel with the plane in which the crank revolves. It consists of two guide-bearings *h*—*h*, connected together by two curved pieces, *i*—*i*, to one of which the usual piston rod (F) is rigidly connected in any suitable manner. The inner and opposite sides of the two pieces (*i*—*i*), have their curves, *k* and *k′*, each formed by a radius whose length is precisely equal to the length of the crank (E) with the radius of its wrist-pin (*g*) added; and their lengths, respectively, about equal to one fourth of the circle of which they are parts—their extremes terminating, respectively, in the parallel lines, *l* and *l′*, whose distance apart, at each end of the said curves, (*k* and *k′*) is precisely equal to the diameter of the wrist pin (*g*)—forming between them the two slots, *q* and *q′*, whose length is sufficient to allow the wrist-pin (*g*) of the crank to pass in and out of the same, respectively, as it is carried around in the crank's revolution upon its shaft—the said yoke (D) at the same time reciprocating in the guides (C—C).

In each end of both the bearings (*h h*) of the yoke (D), a block of india-rubber gum, *n*—*n*, or a metallic spring, is inserted so as to form a cushion thereat; and directly opposite to these cushions, set-screws, *o*—*o*, or their equivalents, are adjusted in the pieces, *p*—*p*, or their equivalents, so as to be in contact with the respective cushions (*n*—*n*) when the said sliding yoke (D) is brought through the motion of the piston rod (F), to its extreme of motion in the guides (C—C), in either direction.

In the drawings the wrist-pin (*g*) is shown as being just about to enter the lower slot (*q′*)—the motion of the balance wheel (B) being in the direction of the arrow (No. 1,); and just about at this point in the revolution of the crank, the steam is supposed to be let into the cylinder and, driving the yoke (D) in the direction of the arrow, 2, it brings the crank (E) successively into the positions shown, in blue lines, by E′ (Fig. 2), where its wrist-pin (*g*) is at the bottom of the slot (*q′*); and by E″, (red lines) when the said wrist pin is just leaving the said slot; the crank having been moved, by the steam acting thereon through the yoke (D) and piston rod (F), about one quarter revolution: The sliding yoke (D) having now attained its limit of motion in that direction, its cushions (*n*—*n*) are supposed to be in contact with their respective set screws (*o*—*o*)—thus preventing the pistons striking the cylinder head—and the curve (*k′*) having been formed, as before stated, by a radius equal to the length of the crank with the radius of its wrist-pin added, it is manifest that the momentum which the balance wheel has acquired will cause the crank to carry the wrist pin (*g*) along in contact

with the said curve (k'), as shown in blue lines at E$'''$, until it would enter the upper slot (q); and the yoke (D) being now driven by the steam back to its other extreme of motion, the crank would finally arrive at its original position (as at E) having made a complete revolution. In the foregoing description of the operation of this yoke (D) upon the crank, it is evident that if the piston of an engine is rigidly connected with it so as to be at either end of its stroke when the yoke is at the respective end of its motion in the guides, as described, the crank will, by the momentum of the balance wheel, be caused to make one quarter revolution, passing the "dead point" mid-way, and come into a position (shown by E) which is the most favorable for its being acted upon, before a particle of steam can exert its power upon the crank—because its piston is at rest during that time; and that this resting period will again occur only during another corresponding fourth part of the crank's revolution: consequently, there will be an economizing of the steam, during the periods of rest, in comparison with engines working in the usual manner—viz. working with the steam admitted into the cylinder, either immediately after the crank has passed the dead points, and consequently when it cannot have the advantage of the greatest leverage of the crank to act upon; or, when admitted at any other subsequent point of the stroke, with the consequent disadvantage of its having to fill the vacuum in the cylinder before any effective power is exerted upon the piston. In addition to these advantages, the crank can, in consequence of this invention, be made longer, in proportion to the length of the cylinder of the engine, than in any other mode of applying the power to the same.

It is manifest that the wrist pin (g), if made to slide in a slot in the crank, the same result would be produced; but I consider the mode herein described, as preferable.

Having thus fully described my invention, and pointed out what I believe to be the best device for carrying it into effect; what I claim as my invention and desire to secure by Letters Patent, is—

Keeping the piston rod (F) at rest while the crank (E) makes about one fourth of its revolution on each opposite side of an imaginary line passing across the center of the said crank's shaft at right angles with another such line passing through the axis of the piston rod—the same being effected by means of the yoke (D), or its equivalent, constructed so as to operate upon the crank substantially in the manner and for the purpose described.

THOS. STEWART.

Witnesses:
BENJ. MORRISON,
JOHN WHIFFLEIN.