J. F. Foss,

Converting Motion.

No. 49,618. Patented Aug 29, 1865.

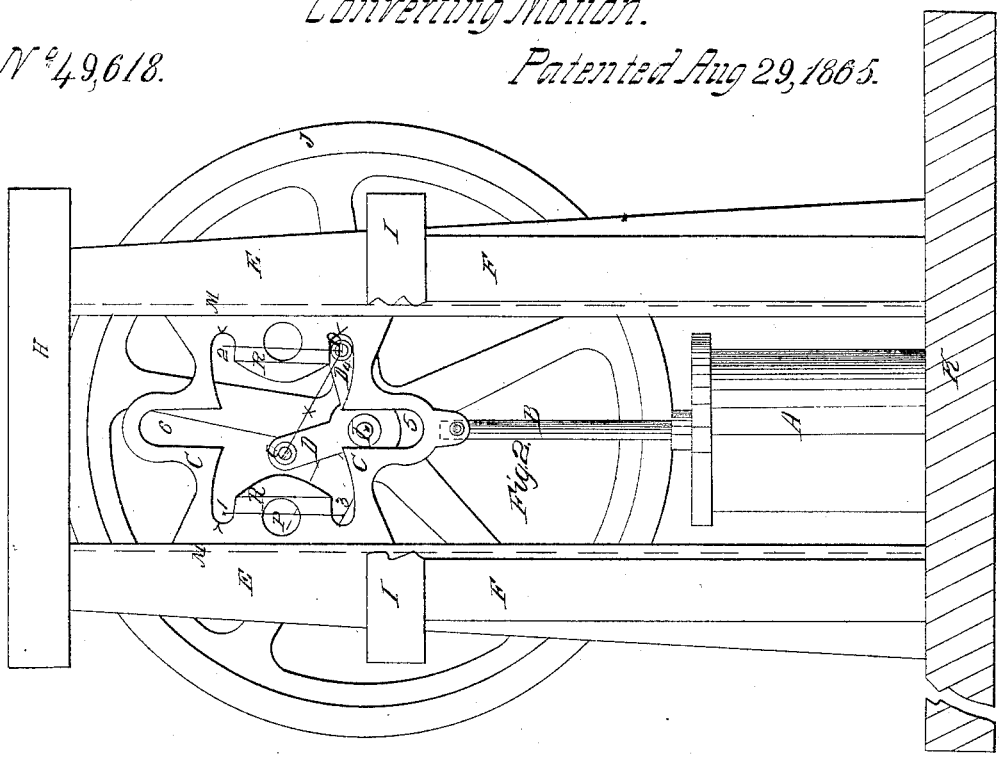

Fig 2.

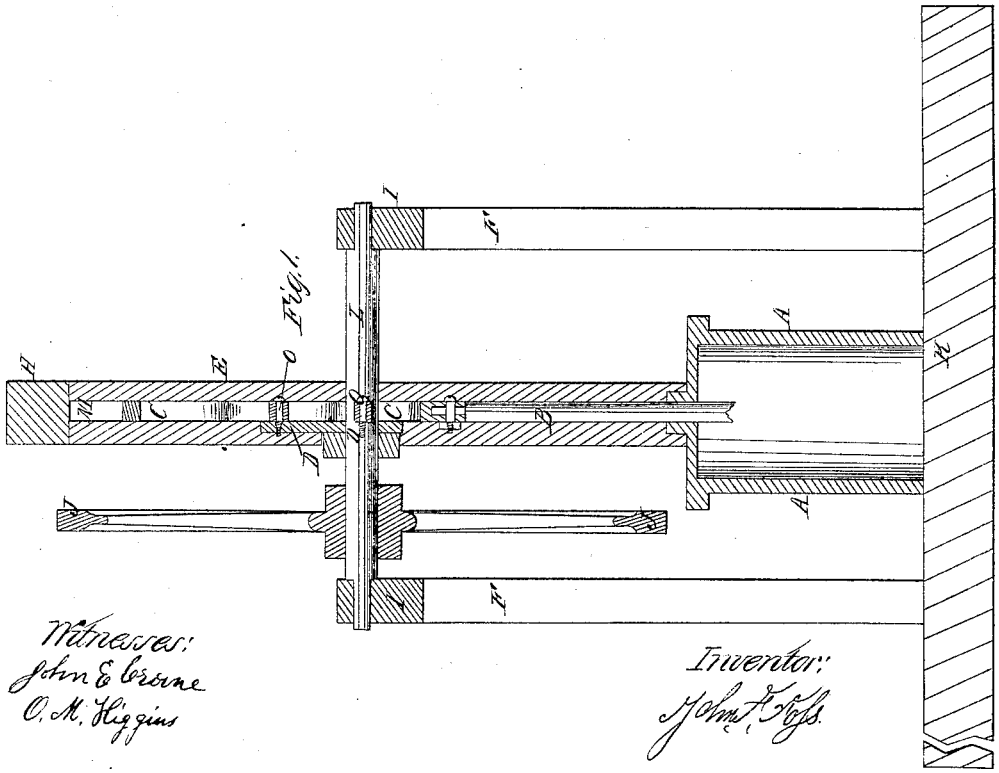

Fig 1.

Witnesses:
John E Irvine
O. M. Higgins

Inventor:
John F. Foss.

UNITED STATES PATENT OFFICE.

JOHN F. FOSS, OF LOWELL, MASSACHUSETTS.

IMPROVEMENT IN CONVERTING RECIPROCATING INTO ROTARY MOTION.

Specification forming part of Letters Patent No. **49,618**, dated August 29, 1865; antedated August 28, 1865.

To all whom it may concern:

Be it known that I, JOHN F. FOSS, of Lowell, in the county of Middlesex and State of Massachusetts, have invented a new and Improved Device for Converting Reciprocating into Rotary Motion or Rotary into Reciprocating Rectilinear Motion; and I do hereby declare that the following is a full and exact description thereof, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 is a longitudinal section of my improved device as applied to a shaft. Fig. 2 is an end view of the same after a portion of the girt I I has been removed, and is represented as acting on a shaft in a manner to cause the shaft to rotate.

Similar letters refer to corresponding parts in both figures.

My improved device for converting reciprocating into rotary motion or rotary into reciprocating rectilinear motion consists of a two-arm right-angled crank, D D, secured to the shaft L at any point between the two ends, or at either end of the same, and a sliding frame, C C, which is made to slide up and down in the grooves M M of the guides E E, by means of power applied to one end of the sliding frame C C.

In the drawings I have shown a steam-cylinder, A, with its piston-rod B connected with one end of the sliding frame C C, showing how the power may be applied to move the frame C C up and down—that is by means of the piston-rod B—when steam is properly applied to the cylinder A. Any other suitable power may be applied to move the sliding frame up and down, or, if placed in a horizontal position, to move the sliding frame forward and back. The sliding frame C C is provided with side slots or bearings, 1 2 3 4, and when proper motion is given to the said frame C C the crank-pins O O are forced from one bearing to another in such a manner as to cause the shaft L to perform one revolution at each up-and-down or each forward and back movement of the sliding frame C C. The sliding frame C C is also provided with slots or openings 5 6, to allow the said frame to pass the shaft L at each up-and-down movement, as is clearly shown in Fig. 2. The shaft L revolves upon bearings in the girts I I, which girts rest on the top ends of the posts F F, the bottom ends of said posts being secured to the bed-plate K.

The balance wheel or pulley J may be secured to the shaft L in any suitable manner.

The bottom ends of the guides E E are secured to the bed-plate K, and the top ends of the same are held firmly together by means of the top girt, H.

In applying my improved device for converting rotary into reciprocating motion, it is only necessary to apply the power to the pulley J by a belt and attach the apparatus which is to receive a reciprocating motion to one end of the sliding frame C C. Thus the crank D D acts upon the sliding frame C C and imparts to the said frame C C and the apparatus so attached a reciprocating rectilinear motion.

In constructing my improved device I first determine the length of the crank-arms and the distance from the center of the shaft L to the center of either crank-pin O O. The arms of the crank being at right angles, the distance between the centers of the crank-pins O O on the line X will be the distance between the centers of the slots or bearings 1 and 3 or 2 and 4 on the line P in the sliding frame C C. I then make the said slots or bearings 1 2 3 4 sufficiently wide and deep to allow the crank-pins to pass freely into and out of the said slots or bearings, and not come in contact with the extremities of the said slots or bearings V V V V of the sliding frame C C, all as clearly shown in Fig. 2. The inside of the sliding frame C C, between the slots or bearings 1 3 or 2 4, may be curved where the disengaged crank-pins passes, or they may be straight, as shown by the lines R R, Fig. 2. The top sides of the slots or bearings 1 and 2 are curved slightly downward and intersect with the slot or opening 6. These curved portions are for the purpose of retaining the crank-pin which occupies the upper slot or bearing in contact with the top of the said bearing until the lower crank-pin engages with the bottom slot or bearing when the sliding frame C C is being forced upward. The lower slots or bearings, 3 and 4, curve upward and intersect with slot or opening 5, and serve the same purpose of the upper

curves when the sliding frame C C is being forced downward, substantially as shown in Fig. 2.

The operation of my improved device is as follows: With the crank-pin O^2 in the slot or bearing 4, as shown in Fig. 2, the sliding frame C C being forced upward, crank-pin O′ swings downward and comes in contact with the curved portion of bearing 3, at which point the crank is nearest a dead-center of any position it can occupy, and the sliding frame C C is at the highest point of the upward stroke. The motion of the balance-wheel J prevents the crank from stopping on the center, and the crank is kept in motion by the downward movement of the sliding frame C C. With crank-pin O′ engaged in bearing 3, crank-pin O^2 swings upward into bearing 1; then crank-pin O′ is forced out of bearing 3 and swings round and upward and comes in contact with the curved portion of bearing 2; then the downward stroke is completed and the crank is at its other dead-center. The motion of the sliding frame C C is then reversed, and crank-pin O^2 swings round into bearing 4, and crank-pin O′ is forced out of bearing 2 and round to its former position and the point of beginning, as shown in Fig. 2. Each successive revolution is performed in the same manner.

Where the ordinary crank is used for converting reciprocating into rotary motion considerable power is lost when the crank passes its centers. It is also very difficult to start a steam-engine when it has been stopped with the crank on either center. In the use of my improved device no such difficulty can occur, as the arms of the crank D D, when in action, are so near at right angles with the working-line of the piston-rod B that considerable power is gained thereby; and in starting an engine with my improved device attached, with the crank on either center, the crank has to be moved only about one-fourth of an inch to allow the engine to start in either direction.

My improved device provides a much longer stroke of the piston than the ordinary crank, as the ordinary crank of one foot from the center of the shaft to the center of the crank-pin provides a stroke of two feet, whereas with my improved device the two-arm right-angle crank of one foot from the center of the shaft to the center of each crank-pin provides a stroke of about two feet and nine inches.

What I claim as new, and desire to secure by Letters Patent, is—

The construction of the sliding frame C C, the combination, arrangement, and operation of the said frame C C and the crank D D with the shaft L, substantially as herein specified, and for the purpose herein set forth.

JOHN F. FOSS.

Witnesses:

JOHN E. CRANE,

O. M. HIGGINS.