J. V. Strait,

Converting Motion.

No. 8,233. Patented July 22, 1851.

Fig. 1

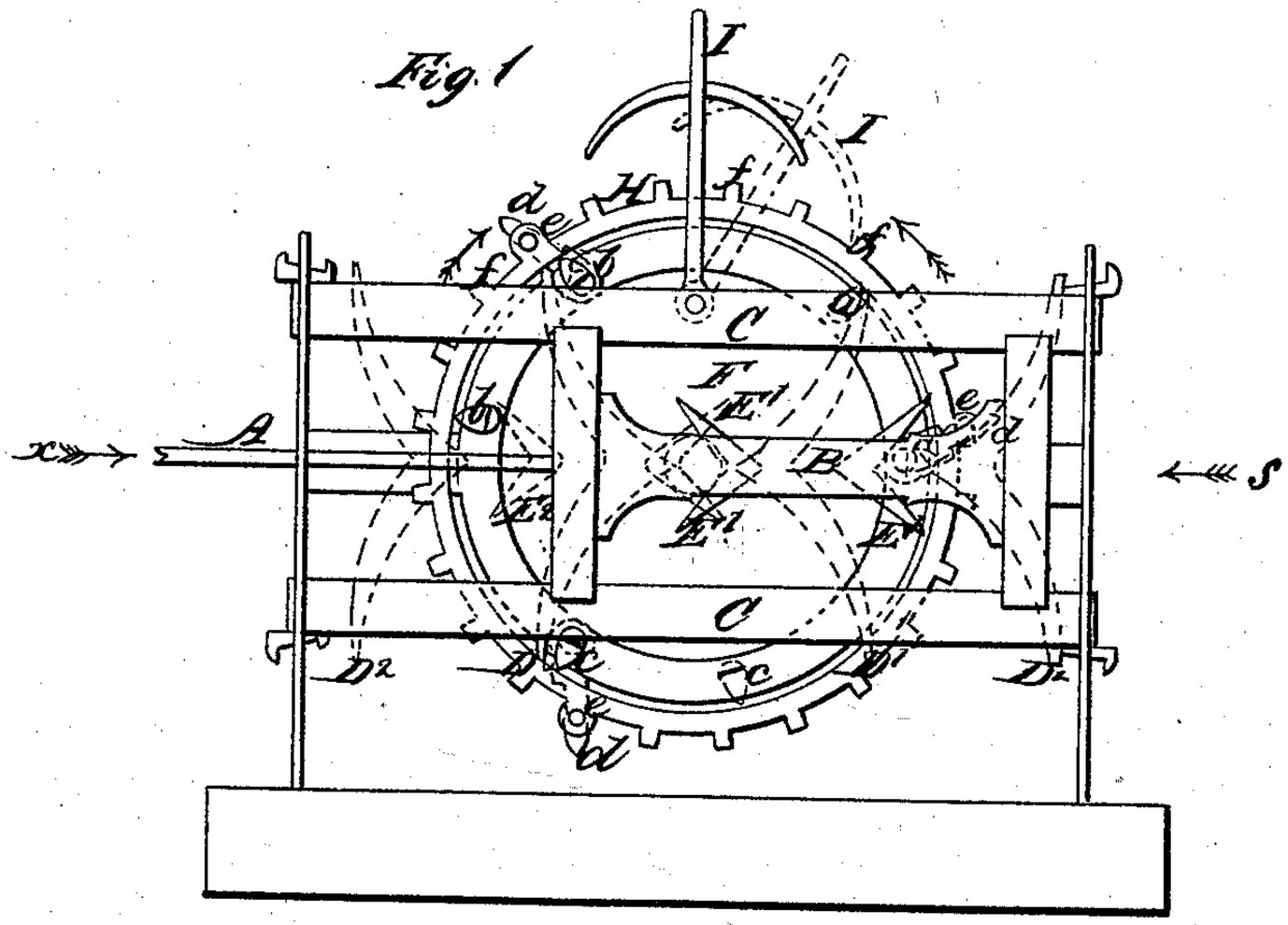

Fig. 2

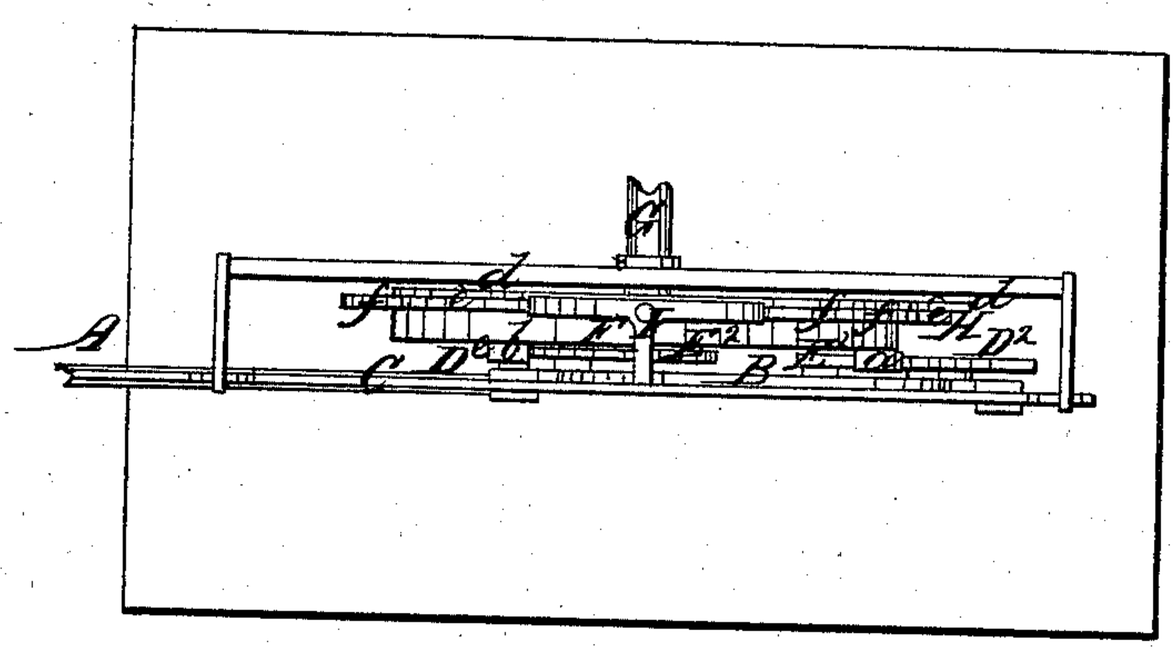

Fig. 4

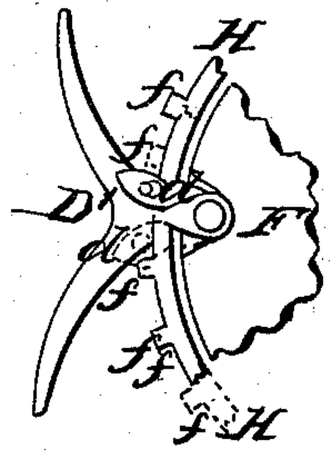

Fig. 3

UNITED STATES PATENT OFFICE.

J. V. STRAIT, OF LITCHFIELD, OHIO.

MODE OF CHANGING RECIPROCATING INTO ROTARY MOTION.

Specification of Letters Patent No. 8,233, dated July 22, 1851.

To all whom it may concern:

Be it known that I, J. V. STRAIT, of Litchfield, in the county of Medina and State of Ohio, have invented a new and useful Method or Manner of Converting a Reciprocating Rectilinear Motion into a Rotary Movement, or Vice Versa, as Required; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1, is a front elevation. Fig. 2 is a plan. Fig. 3, is a detached partial front elevation, and Fig. 4, is a detached partial back view of the portion represented in Fig. 3.

Similar letters of reference in the several figures refer to corresponding parts.

The nature of my invention refers to the production of the effects expressed in the above title and which are accomplished by a combination of mechanical devices or parts that may serve as a substitute for the crank, and consists in the employment of parts formed with curved or inclined surfaces which, having a reciprocating rectilinear motion, act against, or are operated on by cams situated on the face of a disk, or its equivalent, which being made movable, admits of the motions thus produced, being made in reverse directions; and by which conversion of mechanical movements as specified, the rotary motion is maintained without the occurrence of the usual "dead centers" or points peculiar to the crank.

To enable others skilled in the art to make and use my invention I will proceed to describe its construction and operation.

A, is a rod which may represent the piston rod of a steam engine that, being attached to, serves to operate a cross head or frame B, which having a reciprocating rectilinear motion, travels against and between slides or guides C, C, secured to a suitable stationary framing. On the inner face of the cross head B, are firmly secured curved or inclined double arms or forks D^1, D^2, and between, and near to them, similar but shorter forks E^1 E^2. These forks are made so as to form angular surfaces on the inner or outer edges of either of them, and where necessarily of angular shape their surfaces may be straight inclines or curves, as shown.

F, is a disk secured at its center on the back to a shaft G, which being supported on suitable bearings, may be extended and made to form the driving shaft.

a, *b*, *c*, are cams projecting from the front face of the disk F, the points of them being set outward; they are attached to the disk at their broader and inner ends by spindles extending at right angles from them through the disk, so that they may be slightly turned by means of levers *d*, *d*, *d*, which are attached through slots in them by pins fitted in snugs *e*, *e*, *e*, to a ring H, provided with teeth or projecting points *f*, *f*, *f*.

I, is a handle or lever of T form secured by joint to the framing and whose bent arms serve to press against the points *f*, *f*, *f*, and so by moving the ring H, to operate the cams *a*, *b*, *c*.

The operation and further description is as follows: Motion being given to the framing B, in the direction indicated by arrow *s*, and the cams *a*, *b*, *c*, so set and positioned as that at the outer extremity of the stroke of the frame B, the outer end of the cam *a*, will lap, on the upper limb of the fork, close to its outside or angular point, as seen in Fig. 1, but as seen more clearly in blue, Fig. 3, then a circular movement will be given to the disk F, as indicated by red arrow, through the travel (together with the frame B) of the fork D′, in the direction of the arrow, *s* which motion will be continued by the action of the fork D^1, on the cam *a* until the forks and cams arrive at or a little beyond the positions of them, shown in red lines Fig. 1, when the cam *b*, having entered between the forks D^2, and E^2, is acted upon, for the completion of the stroke in direction of the arrow *s*, by the interior edge of the upper limb of the fork E^2, which will operate the disk F, (in the course of the red arrow) until the cam *b*, arrives at the center of the fork E^2, when the stroke of the frame B, being reversed so as to travel in direction of the arrow *x*, the lower limb of the fork D^2, will take up or cause to be continued the motion (in the course of the red arrow) of the disk F, by acting upon the cam *b* in a similar manner to the action of the fork D^1, on the cam *a* until the cam *c*, by the fork E^1, as was the case by the fork E^2, on the cam *b*, the several cams *a*, *b*, *c*, being thus acted upon alternately and causing three double strokes of the frame B, necessary to perform one revolution of the disk F.

When the motion of the disk F, is required to be reversed so as to travel in direction of the blue arrow, the lever I, is worked to one side as shown by its position in red lines Fig. 1, causing, by continuing the pressure, through the bite of its bent arm on one of the teeth or points *f*, *f*, *f*, the ring H, to be slightly turned and with it the levers *d*, *d*, *d*, to be moved in the manner indicated by red outline Fig. 4, which will cause the cams *a*, *b*, *c*, to be also slightly turned to the positions as represented in dotted outlines of them Fig. 1, but as more clearly seen in Fig. 3 by the representation (colored dark) of the cam *a*, in one of and its lower position, when, by the movement of the frame B, in direction of the arrow *s*, (at the commencement of its stroke,) the cam *a*, will be acted upon by the lower instead of the upper limb of the fork D^1, giving motion in an opposite direction, *i. e.*, in the course of the blue arrow, to the disk F, through the altered position of the several cams which will cause the lower limbs of the forks D^1 E^2, and upper limbs of the forks D^2, E^1, to operate upon them instead of the upper limbs of D^1 E^2, and lower limbs of D^2 E^1, as was the case in producing the motion of the disk F, in direction of the red arrow. When required to reverse again to the motion first described the lever I, is worked to the opposite side to that shown by its position in red lines, so that the ring H, may be worked back and the cams *a*, *b*, *c*, made to recover their desired or original position.

The operation thus far described is explanatory only of the converting of a reciprocating rectilinear motion into a rotary one, but it is evident that to produce a vice versa action, this is done, without any alteration of parts, by simply making the disk F, the driver instead of the rod A; the same arrangements for reversing the motion being equally applicable; or for the purpose of reversing, any other suitable arrangement for operating the movable cams may be used, as thought desirable, and any number of cams and forks employed, according to the required relative velocities of the two motions, that is, number of rotations to reciprocating strokes.

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

1. The employment of curved or inclined forks D^1, D^2, and E^1, E^2, having a reciprocating rectilinear movement operating on or operated by cams *a*, *b*, *c*, in the manner and for the purposes herein set forth.

2. The use of cams *a*, *b*, *c* constructed or attached so that they may be turned or set in order to produce a change in direction of the motion, and acting in connection with forks D^1, D^2, and E^1 E^2 (or their equivalents) substantially, for the purposes expressed, as shown and described.

In testimony whereof I have hereunto signed my name before two subscribing witnesses this 23 day of April 1851.

JOEL V. STRAIT.

Witnesses:
R. W. FENWICK,
C. S. S. GRIFFING.