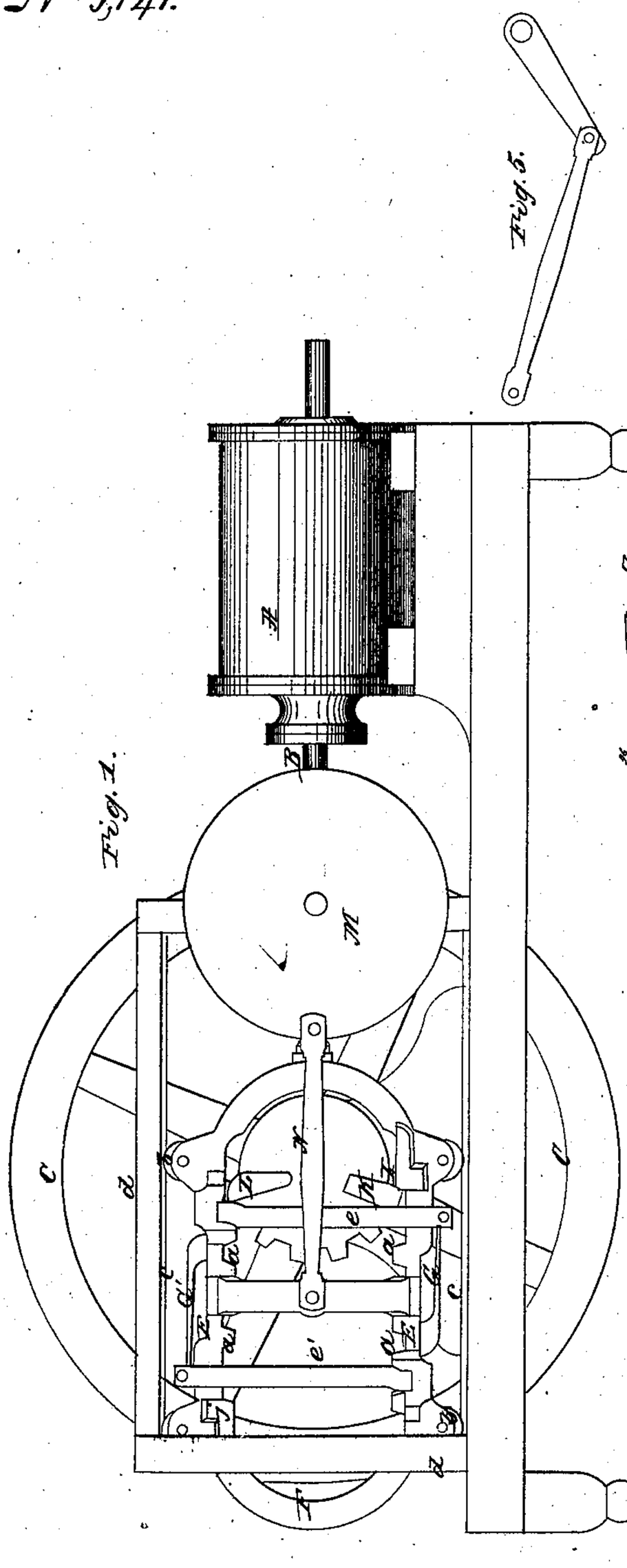
J. & T. G. McLaughlin,

Converting Motion.

No. 5,741. Patented Aug. 29, 1848.



UNITED STATES PATENT OFFICE.

JOHN McLAUGHLIN AND THOMAS G. McLAUGHLIN, OF KENSINGTON, PENNSYLVANIA.

METHOD OF CONVERTING RECTILINEAR INTO ROTARY MOTION.

Specification of Letters Patent No. 5,741, dated August 29, 1848.

To all whom it may concern:

Be it known that we, JOHN McLAUGHLIN and THOMAS G. McLAUGHLIN, of Kensington, in the county of Philadelphia and State of Pennsylvania, have invented a new and useful improvement in the steam-engine, being a mode of giving a revolving motion to the crank-shaft from the reciprocating motion of the piston without the aid of the ordinary pitman-rod and crank, which is described as follows, reference being had to the annexed drawings of the same, making part of this specification.

Figure 1, is a side elevation of part of a horizontal engine, with the improvement attached. Fig. 2, is a longitudinal section through the center of the cogged frame, attached to piston rod. Fig. 3, is a top view of ditto. Fig. 4, is a cross section of ditto at the line *x x* of Fig. 3. Fig. 5, is a modification of the mode represented in Figs. 1 and 3, for arresting the movement of the cogged frame, and piston, at their terminus. Fig. 6, is a top view of a double cogged frame, applied to the main shaft of a steamboat, for giving a reverse motion to the same.

Similar letters in the several figures refer to corresponding parts.

In deriving a rotary motion, from the reciprocating motion of the piston of the ordinary cylinder engine, by means of a pitman rod and crank, it is believed that a large amount of the power of the steam, acting on the piston, is lost in its transfer to the crank shaft, from the fact that this power is acting on the crank shaft at obtuse and acute angles with the line on which the piston moves, variable in their characters as the crank revolves, except at the instants when the crank is at right angles with the line of the piston rod, and on the dead points of its revolution. Now the object of our improvement, is to cause the power acting on the piston, to act on the main shaft, at all times, at right angles with the line on which the piston moves, and thus save the power, usually lost from the cause above mentioned.

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

A is the cylinder; B the piston rod. C fly, or balance wheel, D main shaft.

E is a cast iron cogged frame, made parallel at top and bottom, and rounding or semi-circular at its ends, and secured firmly to the end of the piston rod. This frame is provided with a series of cogs *a* on the inner edges of its upper and lower parallel parts, the cogs on the lower part, being immediately under the spaces between those on the upper part, and is caused to move backward and forward with the reciprocating motion of the piston, being guided in its movements by grooved friction rollers *b* moving between parallel ribs *c* secured on the upper surface of the main frame of the engine and to a frame *d* erected on the main frame.

F′ F² are movable cogs having oblong shanks, inserted in corresponding openings in the cogged frame. These cogs project from the edges of the frame, the same distance as the stationary cogs *a*, and form a continuation of the same, one being on the upper parallel part of the frame, and the last in the upper row of cogs or farthest from the piston, and the other being on the lower part of the frame, and the first of the lower row, or nearest the piston. The shanks of these cogs move loosely in the mortises in the cogged frame which is bushed around said mortises to insure strength, and are secured to the ends of metallic sliding bars *e* extending from the top to the bottom of the cogged frame, and moving at their opposite ends in mortises, formed in projections on the sides of the cogged frame.

G are springs secured to the upper and lower parts of the cogged frame, and pressing against the ends of the shanks of the movable cogs, for keeping them in their proper places.

H is a partially cogged wheel, secured on the main shaft, at the point where the crank is usually attached. The cogs on this wheel extend about two-fifths around, the remainder of its periphery being plain.

I is a segmental cam, formed on the periphery of the wheel, immediately in front of the first cog, for operating the movable cogs.

J are right angled metallic knees, or plates secured on the outer side of the cogged frame, on the same horizontal line with the cogs, and one next to each movable cog, and the same distance from the same, as the spaces between the cogs.

K is a flat metallic bar or plate, secured on the face of the cogged wheel, on a line radial with the center of the same, and in

such a manner as to project beyond the periphery of said cogged wheel, the same distance as the cogs, and to come in contact with the abrupt edge of the triangular knee, on the lower part of the cogged frame, the instant the last cog of the wheel becomes disengaged from the upper part of the cogged frame, and to come in contact, in the same manner, with the upper knee, at the opposite terminus of the stroke.

L is another flat bar or plate, secured on the face of the cogged wheel immediately next the last cog, and projecting beyond the periphery of said wheel the same distance, in such a manner as to act against the abrupt projections *f* of the sliding bars *e*, alternately, at the end of each stroke of the piston.

M is a metallic wheel, larger in diameter than the stroke of the piston, and secured on a horizontal shaft turning in suitable boxes in the frame.

N is a pitman rod, attached at one end to a metallic curved bar, secured to the cogged frame by a wrist-projecting from the face of the wheel just mentioned, at a distance from the center of the same, equal to one half the extent of the stroke of the piston, so as to arrest the piston and cogged frame, when they reach the extent of their stroke.

Operation: The piston and cogged frame E being at the end of a stroke, as represented in Figs. 1 and 2, the valves are changed, and the piston and frame are driven back on their return stroke, causing the loewr movable cog F^2 to act against the first cog 1 of the partially cogged wheel, and the remaining cogs, on the lower part of the cogged frame, to engage respectively with those on said wheel, and to give motion to the same, until the segmental cam I in front of the first cog 1, presses against the lower part of the upper movable cog F′, and forces it upward and allows said forward cog to pass it, when the spring G′ pressing against the upper part of the shank of said cog, immediately forces it to its original position, and simultaneously with the descent of said cog, the flat bar K on the face of the cogged wheel, is caused to strike the upper right angled knee J′ with the force of the momentum of the fly wheel, and the last cog on the wheel, and flat bar or plate L become disengaged from the lower part of the cogged frame, and the abrupt projection of the sliding bar, *e*′, and the motion of the piston and cogged frame is reversed, which causes the upper movable cog F′, to act against the first cog on the wheel, and the cogs on the upper part of the cogged frame, to engage with those on the wheel, until the lower movable cog F^2, is pressed down by the segmental cam I, in front of the first cog on the wheel, and said movable cog F^2 is pressed to its first position, when the stroke is reversed. In this manner a continuous, and regular motion is kept up, the pitman rod attached to the cogged frame and revolving wheel, serving to arrest the progress of the cogged frame, piston, and the other parts that reciprocate with them, at the terminus of each stroke, and the full force of the steam acting on the piston, is applied to the main shaft, at all times, at right angles to the line upon which the piston moves.

When it is desired to apply this mode of deriving a revolving motion from a reciprocating one, to the engine of a steam boat, or other engine, where a reverse motion is required, it will be necessary to use two cogged frames, connected together, as represented in Fig. 6, and to provide the main shaft with two partially cogged wheels, and a clutch, arranged between them so as to engage either at pleasure.

What we claim as our invention and desire to secure by Letters Patent, is—

1. The arrangement of the movable cogs, F′, F^2, attached to the sliding bars, *e*, springs, G segmental cam I on cogged wheel, flat bars or plates K L, on the face of said cogged wheel, and triangular knees J, on the outer side of the cogged frame E, in combination with the cogged frame, in the manner and for the purpose herein set forth.

2. We also claim the combination of the pitman rod N, metallic wheel M, and cogged frame E, for arresting said frame, and attachments at the terminus of each stroke as described.

JOHN McLAUGHLIN.
THOMAS G. McLAUGHLIN.

Witnesses:
JOHN CLOUDS,
JOHN DORLAN.