No. 45,330. PATENTED DEC. 6, 1864.

D. LYNAHAN.

MECHANICAL MOTION.

Fig. 2

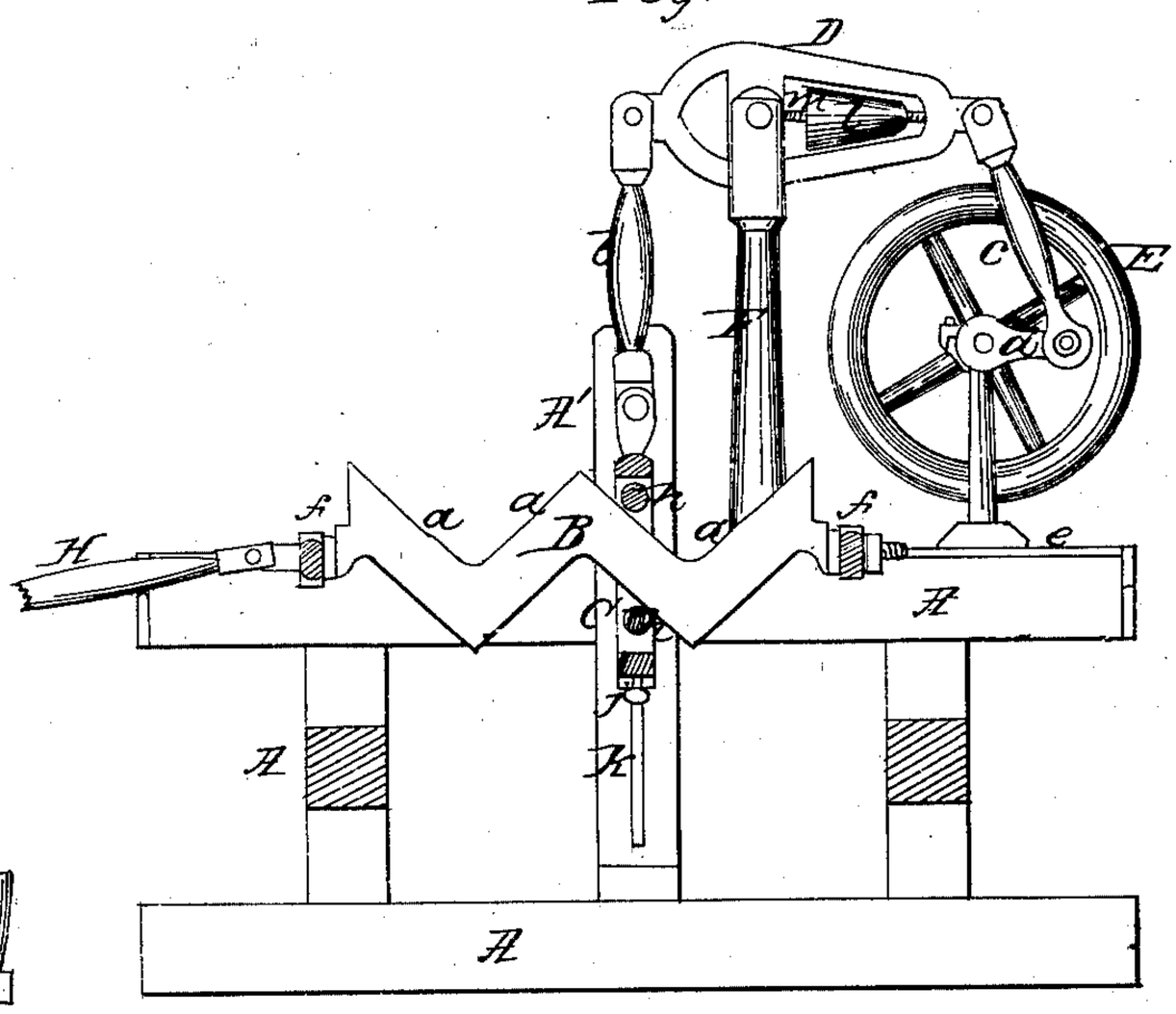


Fig. 3.

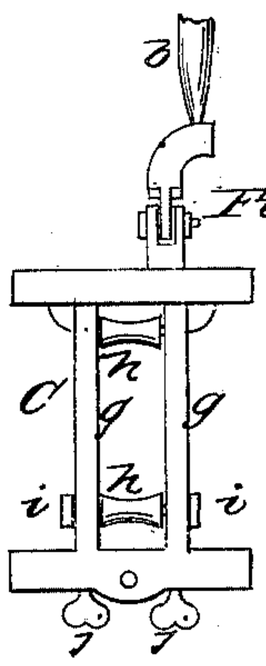


Fig. 1.

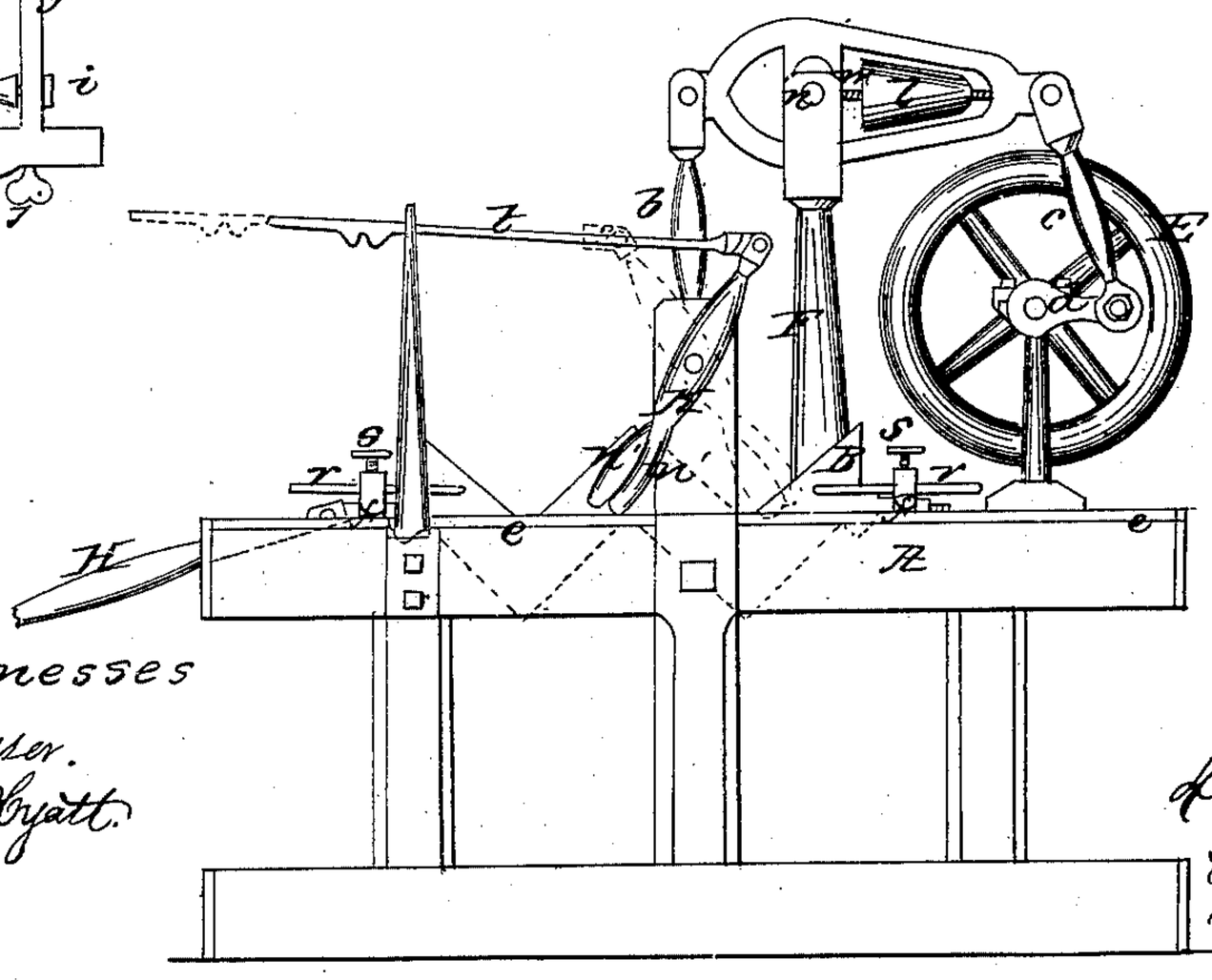
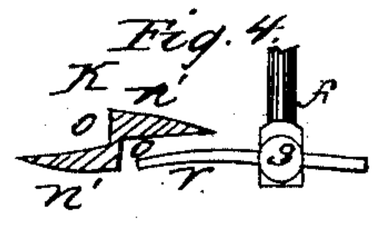


Fig. 4.



Witnesses

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UNITED STATES PATENT OFFICE.

DANIEL LYNAHAN, OF BUFFALO, NEW YORK.

MECHANICAL MOTION.

Specification of Letters Patent No. 45,330, dated December 6, 1864.

To all whom it may concern:

Be it known that I, DANIEL LYNAHAN, of Buffalo, in the county of Erie and State of New York, have invented a new and useful Improvement in Converting Reciprocating into Rotary Motion; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a side elevation of my machine. Fig. 2 is a vertical longitudinal section thereof. Fig. 3 is a detached view of the gate C, in a view transverse to that of Fig. 2. Fig. 4 is a horizontal section of the lower arm of the valve lever K, and a plan of one of the reversing stops, *r*.

Like letters of reference indicate corresponding parts in all of the figures.

My invention has for its object to convert the motion of any power which acts reciprocatingly, like the steam engine, into a rotary motion, and in so doing to accelerate the same over a crank motion, by increasing the number of revolutions in relation to the movements of the power employed.

It consists in the employment of a reciprocating bar or frame formed of a double series of inclined planes, or grooves of equivalent form, to which a reciprocating motion is imparted, which acts upon a reciprocating gate that is connected, by means of the working beam or other suitable lever, and pitman and crank, with the fly wheel. Also, in the employment of an adjustable weight to the working beam for the purpose of equalizing the friction of the gate on the inclined planes; and in attachments for operating the valves of the engine which drives the reciprocating frame, when such is employed.

As represented in the drawings, A is the frame of the machine, B, the reciprocating bar, with double inclined planes *a a;* C, the reciprocating gate, working on ways, *k*, between the two upright posts or standards A′ of the frame; D, is the working beam, connected by the pitmen *b* to the gate, and *c* to the crank *d*, on the shaft of the fly wheel E.

The bar B is provided with a cross-head *f* at each end, and there are ways *e e* on the horizontal side timbers of the frame A on which these cross-heads slide, being fitted by means of grooves. The gate C is so constructed that the bar B has ample space to work between the two upright members *g*, *g*, with friction rollers *h*, *h*, which traverse the upper and lower surfaces of the inclines *a*, *a*, to reduce the friction. The lower of these rollers is hung in movable bearings *i*, *i*, which are adjusted up and down in slots in the sides by means of the set screws, *j*, *j*. The cross pieces of the gate have grooves in their ends which slide on ways on the uprights A′ of the frame, one of which is shown at *k*, Fig. 1.

The working beam D, is supported on a standard F, which rises from the main frame. Its center of oscillation, *n*, is not equi-distant with the two extremities, and in the longer arm or division is placed a horizontal screw rod *m*, which passes through the center of the weight *l*, which has a corresponding internal screw thread, so that by turning the weight on its axis it moves to or from the center *n*. By this device the weight of the gate C and pitman *b*, is adjusted to an exact counterpoise, so as to reduce the friction on the bar B to the minimum amount, and render it equal on both the upper and lower sides of the same, so that the operation will be steady and uniform.

When the pitman H, is connected with the piston rod of a steam engine or any other power having a reciprocating motion, the effect of that motion on the bar B is to cause the gate C, to traverse the double inclined planes *a*, *a*, producing an equal number of vertical movements to one movement of the bar. These movements acting through the balanced working beam and crank, impart two full revolutions to the fly wheel, whereas, had its crank been connected directly with the pitman H, but half a revolution would have been obtained. It is hardly necessary to remark that increasing the number of double inclines in the series will give a corresponding increase to the revolutions of the fly wheel, and thus the motion may be increased at will. An engine having a long piston stroke is best adapted to this purpose, as then the inclinations on the bar B may be less acute, and friction avoided.

Another object and advantage of having one arm of the working beam D, longer than the other is, that thus increasing it enables any length of the crank *d* to be used that

may be best adapted to the diameter of the fly wheel, without varying the height of the planes *a*, *a*.

It is obvious that a slot in a solid bar of corresponding shape to the double inclined planes, or a series of curves, will produce an equivalent effect, provided a roller or pin from the gate is made to pass through it.

The advantage of converting reciprocating into rotary motion and accelerating the latter *ad libitum* without recourse to wheels and pinions is apparent for many purposes. Aside from the economy of cost, and space saved, my improvement may, when properly constructed, be made to work noiselessly.

Although my apparatus is equally well adapted to any other reciprocating power, yet it will be oftenest used with the steam engine, and for this purpose I connect with it apparatus for operating the steam valves of an engine, so that the latter may be simplified and reduced in cost by dispensing with the eccentric, or other valve motion ordinarily used. For this purpose I apply the vertical rock-lever K, to one of the uprights A′. Its lower arm is formed as shown in the section Fig. 4, with transverse planes *o*, *o*, on opposite sides, and flanges *n′*, *n′*, to each.

The cross heads *f f* are extended outward over the frame A, so as to be on a line with the rock-lever K, and a stop-rod *r* is passed horizontally through each, which is held in position by the hand-screw *s*. To the upper arm of the rock lever the connecting rod *t*, is jointed, which is connected with the valves either directly or through other levers and connecting rods. The bar B in moving in one direction carries the stop *r* against the side *o* of the rock-lever, moving the rod *t* in one direction; in moving the reverse way the stop on the other cross head strikes the opposite side of the lever K and reverses the motion of the valve rod *t*, as indicated by red lines on the drawings. By adjusting the stops *r r* in or out, the motion of the valve may be increased or diminished.

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

1. The reciprocating bar B, provided with a series of double inclined planes or their equivalent, in combination with the vertically reciprocating gate C, working beam or lever D, and fly wheel E, arranged and operating substantially as set forth.

2. I also claim, in combination with the reciprocating bar B, provided with a series of double inclined planes, the reciprocating shaft or pitman H, or its equivalent, when said combination has for its object the conversion of a reciprocating into rotary motion independent of the power which operates said shaft, substantially as set forth.

3. I also claim the balance weight *l*, and screw rod *m*, in combination with the gate C and bar B, constructed substantially as and for the purposes herein specified.

4. I also claim the extension of the cross-heads *f*, *f*, provided with the adjustable stop rods *r r* in connection with the rock lever K, and valve rod *t* constructed, arranged and operating substantially as and for the purposes described.

In witness whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

DANIEL LYNAHAN.

Witnesses:

S. Henry Runcie,

Thomas Murray.