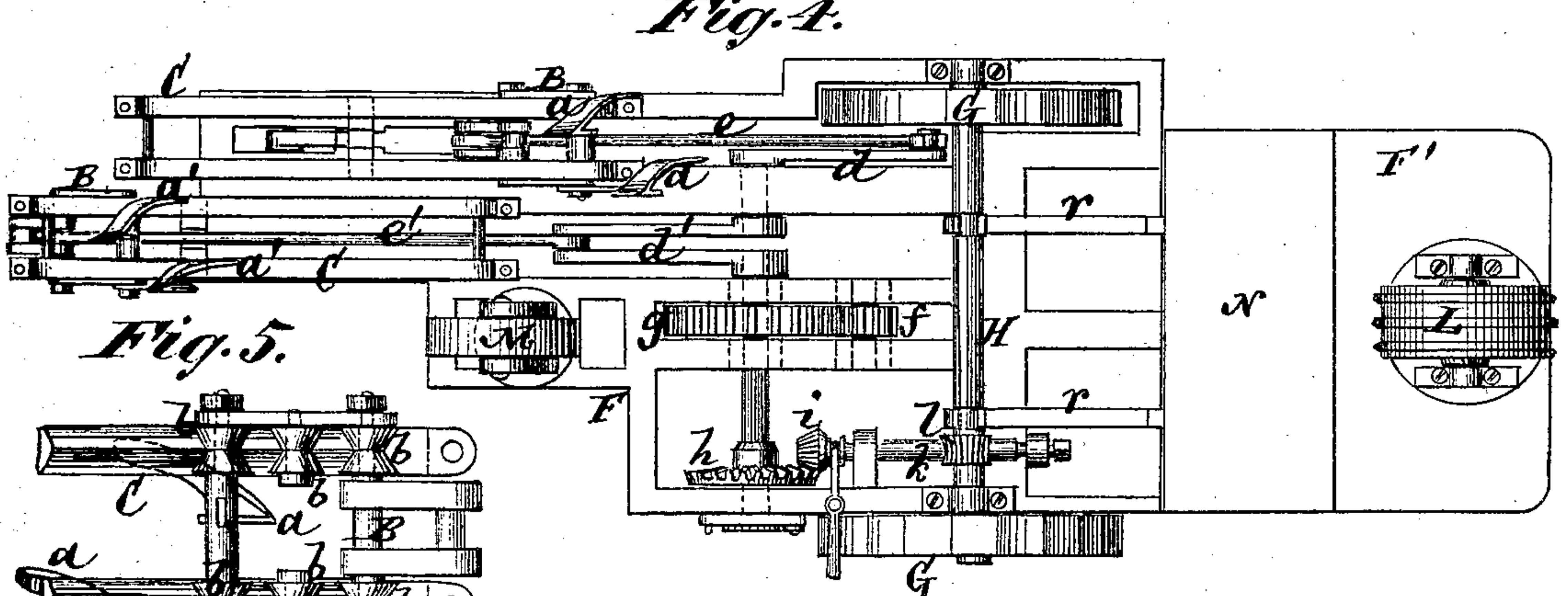
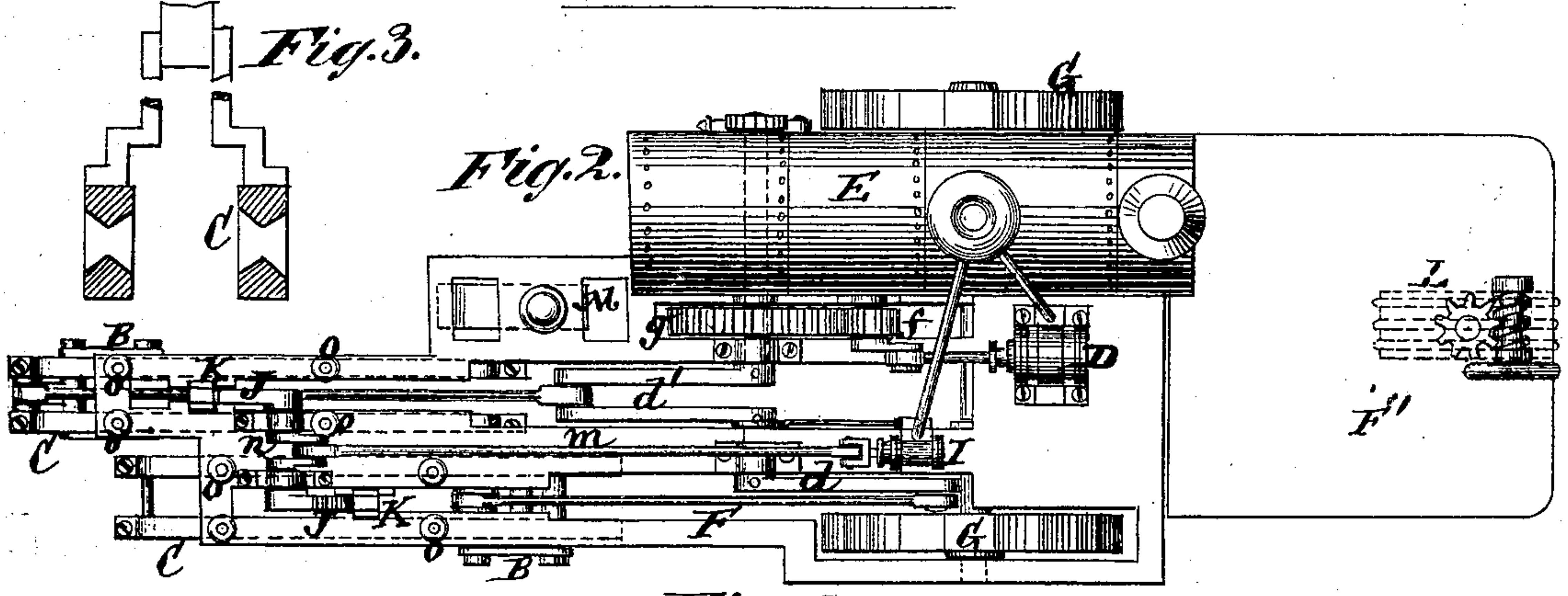
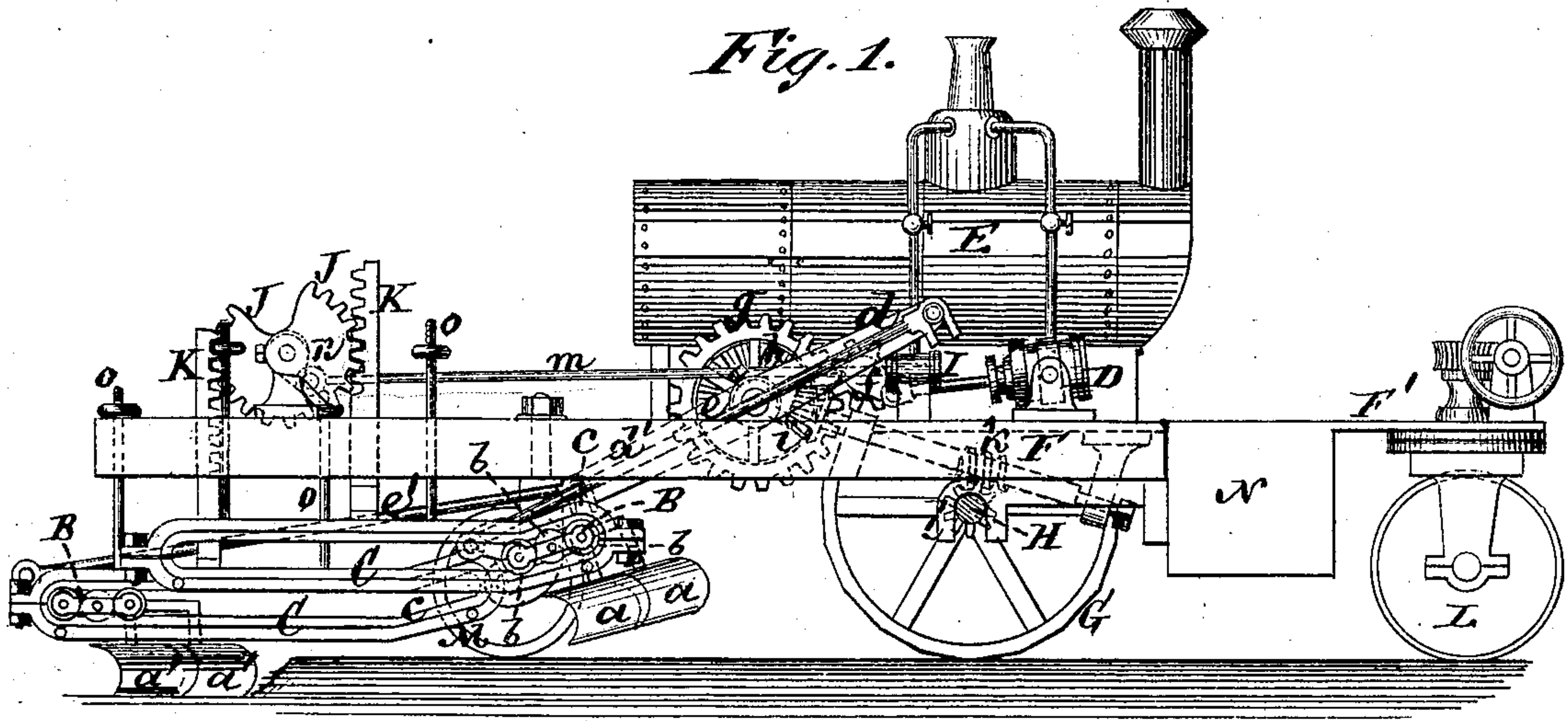


J. W. EVANS.
Steam-Plows.

No. 149,210.

Patented March 31, 1874.



Witnesses
John Pecker
Fred Haynes

James W. Evans
by his Attorneys
Brown & Allen

UNITED STATES PATENT OFFICE.

JAMES W. EVANS, OF NEW YORK, N. Y.

IMPROVEMENT IN STEAM-PLOWS.

Specification forming part of Letters Patent No. **149,210**, dated March 31, 1874; application filed November 22, 1873.

To all whom it may concern:

Be it known that I, JAMES W. EVANS, of the city, county, and State of New York, have invented an Improvement in Steam-Plows, of which the following is a specification:

This invention relates to steam-plows, the initial feature of which is to reverse the direction of the resistance of the plows, and thus convert said resistance into a means of assisting the progress of the machine—that is to say, the plows cut the ground in an opposite direction to the movement of the machine—or, in other words, plow backward, substantially as described in Letters Patent issued to me October 5, 1858.

The invention consists in a combination, with the propelling-engine, of a separate engine for lifting the plow-frames when the plows are making their back action, and so that the valve of the plow-lifting engine is worked from the propelling-engine, including also devices for holding the plows straight, with facility for turning them at the end of the stroke. The arrangement also is such that the pitmen which operate the plows are connected to the front of the latter, thereby giving longer pitmen for a given length of machine and bringing the plows closer to the main shaft. The invention likewise comprises a tank and front platform hung to rock on the main axle, so as to ride over obstacles without lifting the whole machine. The driving and bearing wheels, too, are so short a distance apart that the plows are nearly always parallel with the surface over which the machine is moving, while the mechanical means employed for lifting the plow-frames consist for the most part simply of racks and toothed sectors, substantially as hereinafter described.

In the accompanying drawing, Figure 1 represents a side elevation of a steam-plow, constructed in accordance with my invention; Fig. 2, a plan or top view of the same; Fig. 3, a vertical or transverse section, on a larger scale, through one of the plow-frames; Fig. 4, an inverted plan of the machine; and Fig. 5, a plan view, on the same scale as in Fig. 3, of the lower half of one of the plow-frames in part, with the one set of plows applied thereto and means for guiding them.

Similar letters of reference indicate corresponding parts.

The machine represented in the drawing has four plows, *a a' a'*, arranged in two gangs or sets side by side, each set, *a* or *a'*, being carried, respectively, by a slide, *B*, fitted with three or more reversely-conical rollers, *b b*, on each side of it, which rollers travel along the plow-frames *C* that are of a slotted construction, and so that they form *V*-shaped guides for the rollers to run upon, and are mainly straight, but with upwardly curving or inclined extremities *c*, the object of which will be hereinafter explained.

The plows *a a'*, or slides *B* carrying them, are driven simultaneously in reverse directions—that is, forward and backward alternately—by cranks *d d'* and rods *e e'*. These cranks derive their motion from the propelling-engine *D* through gearing *f g*, and may be pitched so that they give a cutting motion of the plows of about six feet while the machine moves forward two feet, thus making a loss of two feet of the throw of the cranks on the plows; or, in other words, plowing only four feet for their six feet of cutting stroke.

The propelling-engine *D*, which, together with the boiler *E*, is carried by the main frame *F*, is only of small size, and moves at a high velocity, and consequently, in common with its appurtenances, is of light weight, the necessary power or reduced velocity being given to the angled driving-wheels *G G* by bevel-gears *h i*, screw *k*, and worm-wheel *l*, the latter being on the main axle or shaft *H* of the machine.

The propelling-engine *D* may be of the oscillating kind, and it is preferred to construct the frame *F*, on which it—the boiler—and a separate smaller slide-valve engine, *I*, are mounted, of boiler-iron.

The smaller engine *I* simply serves to lift and hold the plows in their required position—that is to say, to alternately lift or raise and lower the plow-frames *C* at the ends of the plows' stroke or strokes, and so that either one set of plows is lifted out of the ground after they have made their forward or cutting stroke to put them in position for making their back stroke clear of the ground, while the

other set of plows is lowered to enter the ground prior to commencing or when beginning their cutting stroke, either set of plows, when entering the ground, being turned and caused to enter gradually after the fashion of shovels by the run of the slides B which carry them down the curved or inclined ends *c* of the plow-frames, the triplicate arrangement of rollers *b b* on both or opposite sides of each slide B facilitating such action, and giving a steady bearing to the slides as they move along the plow-frames C.

To effect the lifting and lowering of the plow-frames C the valve of the engine I is worked, either directly or indirectly, by the propelling-engine D—as, for instance, by an eccentric on the secondary shaft of the propelling-engine or otherwise—said valve being shifted at the ends of the plows' stroke to reverse the action of the engine I, and so that, during each intermittent action of the latter, a corresponding motion will be communicated, by a rod, *m*, and crank, *n*, to two reverse-toothed sectors, J J, arranged to gear with racks K K, attached to the plow-frames C C. These racks may not only serve to raise and lower the plow-frames, but also, in common with rods *o o*, to guide the said frames when moving up or down; and it is preferred to construct or provide them with screws, so that they may be adjusted to vary the depth of the plows' insertion in the earth, as required. The rods *e e'*, by which the necessary forward and backward motions are communicated to the slides B, are connected with the latter at their forward ends, or in front of the plows, whereby a longer rod or pitman may be used than if elsewhere attached, and the plows are brought closer to the main shaft. There are four wheels in all to the machine, namely, the many peripherically-angled driving-wheels G G, a front steering-wheel, L, and a bearing or swivel rear wheel, M. These several wheels are situated at such a short distance apart in the length of the machine that the plows are nearly always parallel with the surface over which the wheels are moving. To accomplish this, the bearing or swivel rear wheel M is arranged in such advance position relatively with the back end of the main frame F as to be in transverse line with or immediately in front, relatively to the motion of the plows, of the back ends of the

plow-frames. The steering-wheel L is carried by an independent forward extension or section, F', of the main frame. This sectional portion of the frame constitutes a front platform, and serves, moreover, to carry a water-tank, N, from which the boiler is supplied; likewise, if necessary, a compartment for fuel. Such applies weight to the steering-wheel, but being an independent extension of the main frame, and only connected therewith by hanging it, through arms or rods *r r*, on the main axle H, it is free to rise and fall in passing over obstacles or undulations in the surface of the ground without lifting the whole machine.

The plows are of a shape to turn the furrow and not lift the earth, and the machine can, by proper adjustment, be used as a stationary engine. As a steam-plow it is compact, simple of construction, easily handled, and comparatively inexpensive.

What I claim as my invention is—

1. In a steam-plow, the valve of the secondary or plow-lifting engine, in combination with the propelling-engine and mechanism for connecting the two, whereby the plows are raised and lowered automatically, substantially as described.

2. The combination, substantially as herein described, of the pitmen *e e'* with the plows or slides B B, carrying the latter, said pitmen being connected with the plow-slides in front of the plows, for the purposes specified.

3. The slides B B, provided with three or more rollers, *b b*, on either side, in combination with the plows carried by said slides, and the plow-frames C C, constructed to form straight guides with rising ends *c c*, substantially as herein described.

4. The combination of the reversely-arranged toothed sectors J J, the crank *n*, the racks K K, and the plow-frames C C, substantially as specified.

5. The independent forward section F' of the main frame, hung to rock on the main axle H, in combination with the steering-wheel L and tank N, carried by said section, substantially as and for the purposes herein set forth.

JAMES W. EVANS.

Witnesses:

THOMAS G. NORTH,
H. E. BAILEY.