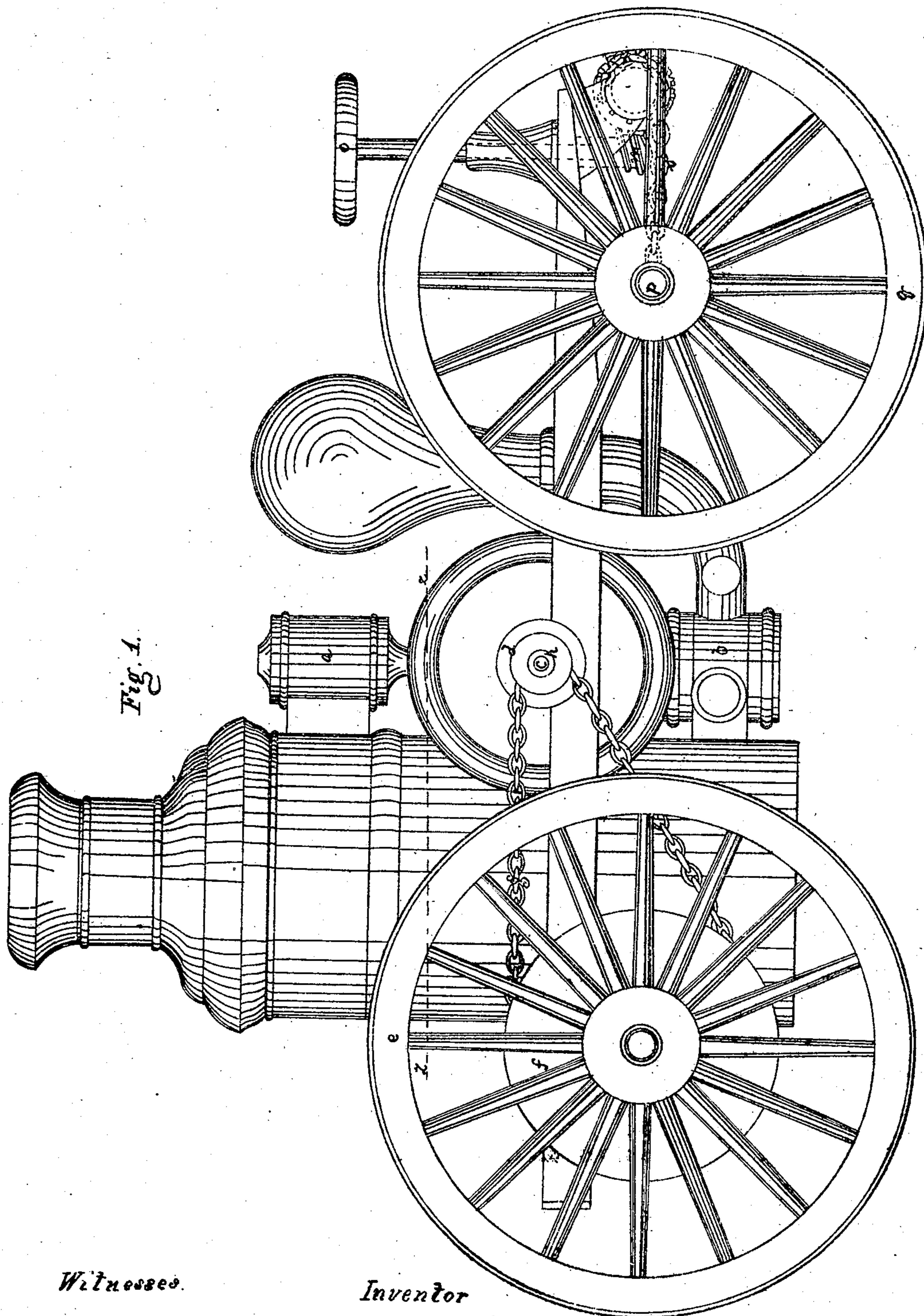


N. S. Bean.
Self Propelling Engine.
N^o 75348
Patented Mar. 10, 1868



Witnesses.
E. Warren Brown.
L. H. Lortimer.

Inventor
N. S. Bean
By his Atty.
Crosby, Hallett & Gould

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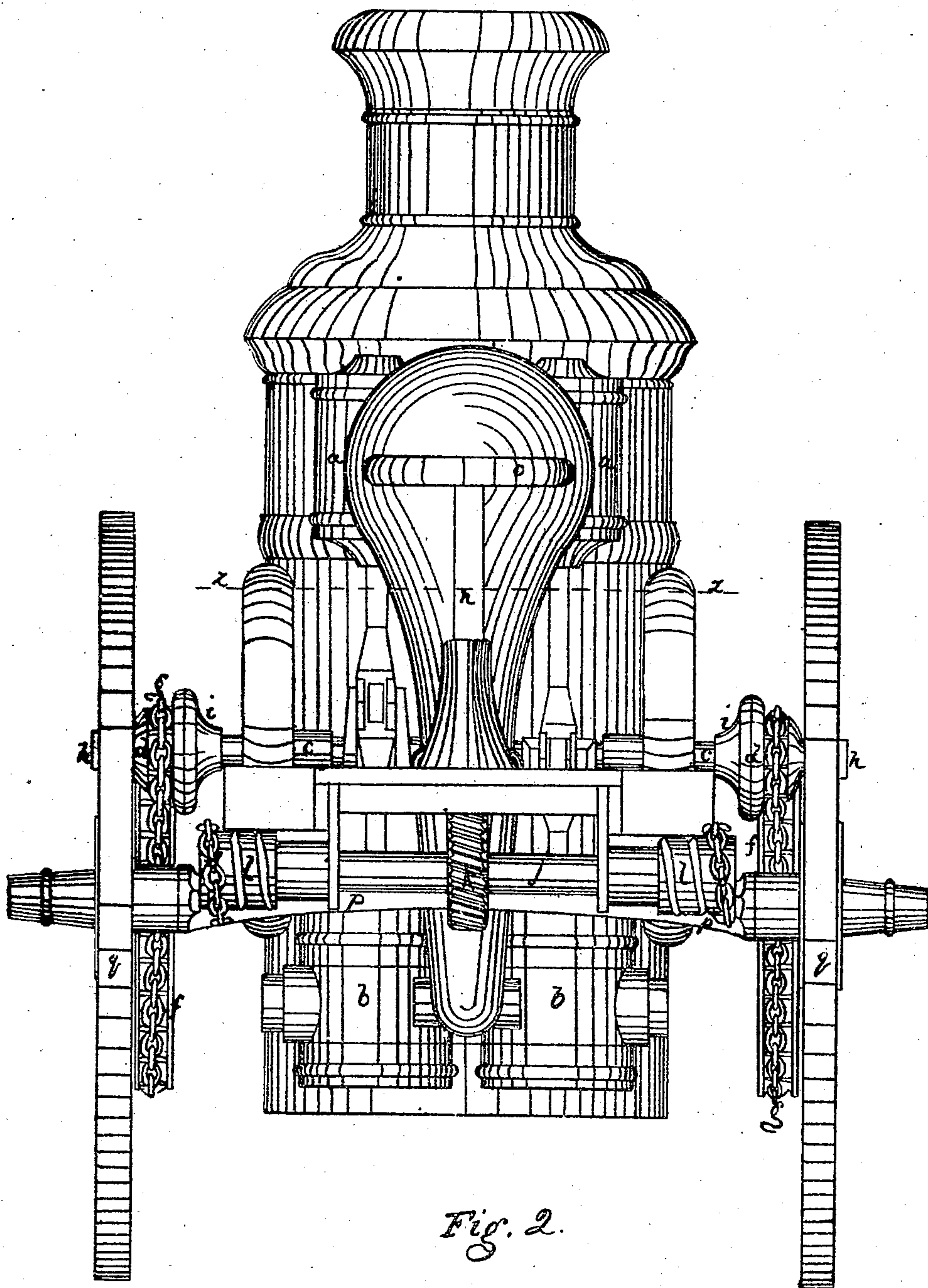


Fig. 2.

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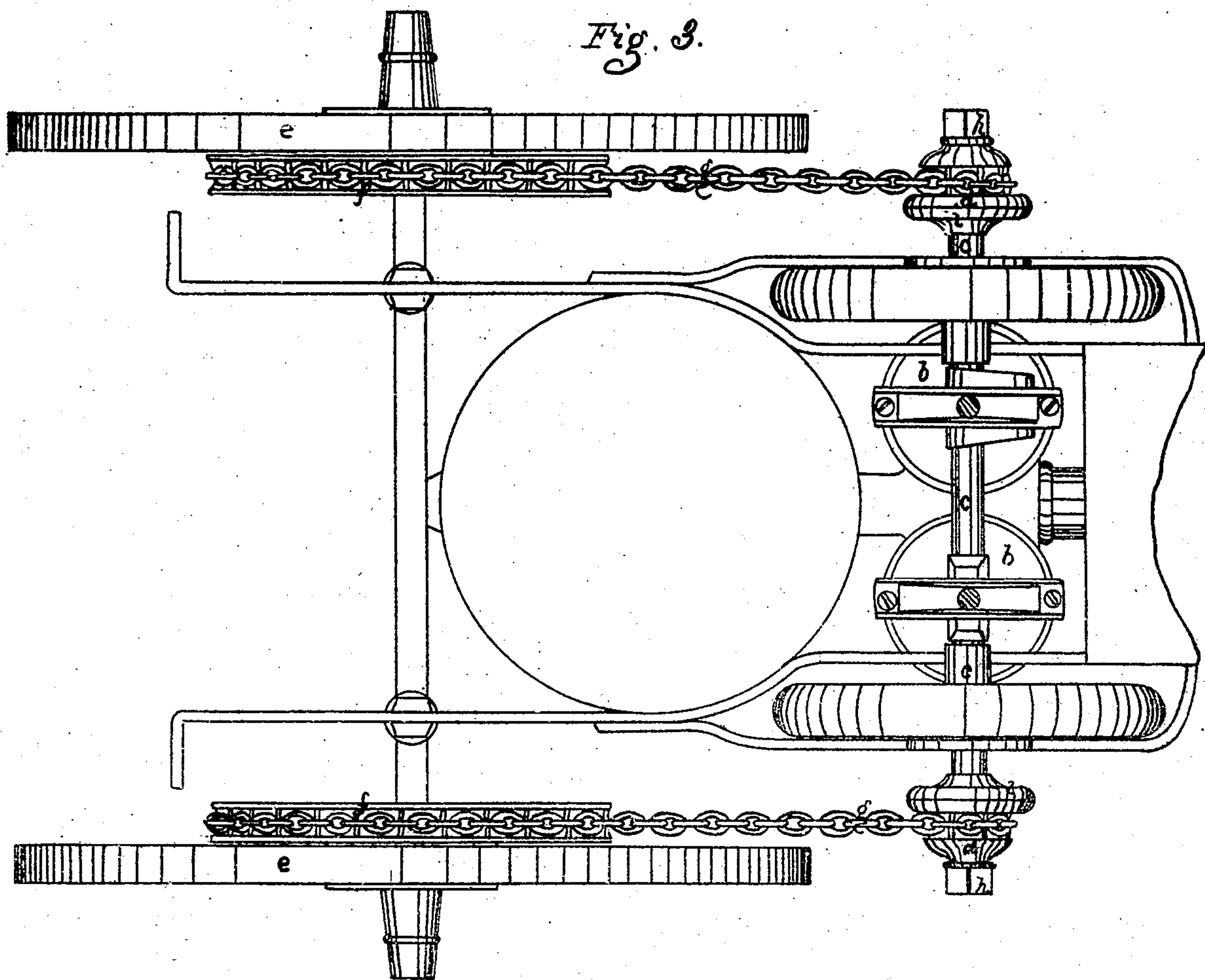
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Fig. 3.



Inventor

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United States Patent Office.

N. S. BEAN, OF MANCHESTER, NEW HAMPSHIRE.

Letters Patent No. 75,348, dated March 10, 1868.

IMPROVED SELF-PROPELLING ENGINES.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, N. S. BEAN, of Manchester, in the county of Hillsboro, and State of New Hampshire, have invented certain new and useful Improvements in Self-Propelling Steam Fire-Engines; and I do hereby declare that the following, taken in connection with the drawings which accompany and form part of this specification, is a description of my invention sufficient to enable those skilled in the art to practise it.

In that now well-known type of steam fire-engines, in which the steam-cylinders and pump-cylinders are vertical, and in which one piston-rod serves, by elongation, for one pump and one steam-cylinder, it is desirable to produce such an arrangement of means as will convert the engine into a self-propeller without the addition of extra steam-cylinders for the propulsion of the engine, considered as a vehicle, over the road.

A portion of my invention consists in the combined arrangement of the parts, by which, from the vertical steam-cylinder or cylinders, which work the vertical pump or pumps, by direct continuation of the piston-rod or rods, the wheels of the vehicle may be rotated to propel the engine over the road.

Various appliances have been used for controlling the position of the wheels by which the vehicle is steered or guided, but, so far as I know, all of such appliances have needed the constant application of exertion on the part of the driver to keep the angle of the wheels with the vehicle from being changed by the jar consequent on the passage of the engine over the road; and another part of my invention consists in the combination and arrangement of devices, by which, while the driver is enabled to change the inclination of the wheels at will, the jar occasioned by locomotion is inoperative to change the position of the steering-wheels. Of the drawings—

Figure 1 shows enough of a steam fire-engine to illustrate an embodiment of my invention in side elevation.

Figure 2 is an end elevation of the same, and

Figure 3 is a plan of the rear part of the engine, taken below the plane of the line *z z*, seen in figs. 1 and 2.

In the description which follows, I propose to confine myself as closely as possible to the parts which are connected with my present invention, passing by other known parts necessary in the construction of steam fire-engines.

The steam-cylinders *a* are shown as vertical, and as working direct upon the pumps *b*, giving rotation to a cranked shaft, *c*, by means of yokes, in which work blocks, which are fitted to the cranks in a manner common and well known to engine-makers. From this rotating crank-shaft one or more of the wheels of the engine, considered as a vehicle, are rotated to propel the vehicle over the road. On the shaft *c* are fitted sprocket-wheels *d*, and on the wheels *e*, of the vehicle, are fitted sprocket-wheels *f*, and the endless chains *g* pass over each pair of sprocket-wheels *d* and *f*, so that it will be seen that when the pistons of the cylinders *a* reciprocate, rotation of the wheels *e* must result, and the said wheels will act as drivers. The sprocket-wheels *d* are so fixed upon the shaft *c* as to be easily loosened thereon, so that shaft *c* can rotate in the hubs of said sprocket-wheels without rotating them, as is necessary for the engine to stand still and throw water. In the drawings, the sprocket-wheels *d* are shown as arranged to be clamped, by turning up the nuts *h*, on the shaft *c*, which clamp the inner faces of said sprockets against the outer faces of the flanges *i*, which are made fast on shaft *c*; or, instead of holding the sprockets *d*, so that they will, by friction alone, rotate with shaft *c*, keys, through said sprockets and shaft, may be used, with or without the nuts *h* and flanges *i*, and then, to let the shaft rotate freely without rotating the sprocket, *d* the keys must be removed when it is desired to have the vehicle stationary. I prefer to have the wheels *e* loose, or so as to rotate upon a fixed axle, rather than fixed upon a rotating axle, as, with the sprocket-wheels *f*, fixed to wheels rotating on a fixed axle, corners and curves can be turned by the vehicle with facility. But in the arrangement which I have stated that I prefer, if both wheels *e* are rotated, where two steam-cylinders are employed, the shaft *c* should be divided, so as to allow a difference in the piston-velocity of each cylinder, to permit the required difference of rotation of the driving-wheels needed in turning angles or corners, and to prevent slip of the drivers, and consequent strain of the parts. Indeed, where the shaft *c* is continuous, whether rotated from one or two steam-cylinders, I prefer to drive the vehicle with but one driving-wheel loose upon a fixed axle, keeping the vehicle to its course by means of the steering-wheels.

I have shown and described the simplest and most efficient means known to me for rotating the driving-wheels direct from the steam-cylinders which work the pumps, but whether said means or others, such as a system of gearing, be employed, I consider that the first part of my invention is embodied.

The engine-shaft *c* and the wheels *e* might be connected by an arrangement of gearing, involving the employment of bevel-gears, a shaft, and universal joints to accommodate to the movement of the springs of the vehicle, but this arrangement would be complex and expensive, and not so efficient as the simple arrangement of the endless chain, shown and described.

The steering-wheels, whether arranged as leading or trailing-wheels, are mounted to rotate on a pivoted axle, and this axle is changed as to its angle with the vehicle, and is kept in any position where set, as follows: On the shaft *j* is fixed a worm-gear, *k*, and two small windlass-barrels *l*. Rotation is given to the shaft *j* by means of a worm, *m*, fixed on the vertical shaft *n*, on which is secured the hand-wheel *o*, in a position to be conveniently operated by the driver. The axle *p*, of the steering-wheel, *q*, is connected by chains *s* to the windlass-barrels *l*, the chains being drawn taut and coiled around the windlass-barrels in opposite directions, so that as one of said chains, *s*, is uncoiled from one windlass-barrel, the other chain will be coiled upon the other windlass-barrel, thus drawing the axle *p* into any desired position, to change the direction of movement of the vehicle, and, it will be seen, that nothing except force, applied to rotate wheel *o*, can change the position of axle *p*, and that the jolts and concussions received upon the wheels *q*, in the progress of the vehicle over the road, are expended in efforts through the chains *s*, windlass-barrels *l*, shaft *j*, worm-gear *k*, and worm *m*, to raise or lower the shaft *n*, and not to turn it.

I claim, in a steam fire-engine, in which the steam and pump-cylinders are arranged as described, operating the wheels of the engine to propel it over the road, substantially as specified.

Also, the arrangement, on the shaft driven by the steam-cylinders which work the main pumps of steam fire-engines, of the driving-wheel *d*, or its equivalent, so that it can be made fast or loose on said shaft, substantially as and for the purpose specified.

Also, the combination of the axle of the steering-wheels with the hand-wheel *o*, by means of the chains *s*, windlass-barrels *l*, shaft *j*, worm-gear *k*, worm *m*, and shaft *n*, substantially as and for the purpose specified.

N. S. BEAN.

Witnesses:

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F. T. E. RICHARDSON.