(No Model.)

3 Sheets—Sheet 1.

J. H. ELWARD.

TRACTION ENGINE.

No. 253,023. Patented Jan. 31, 1882.

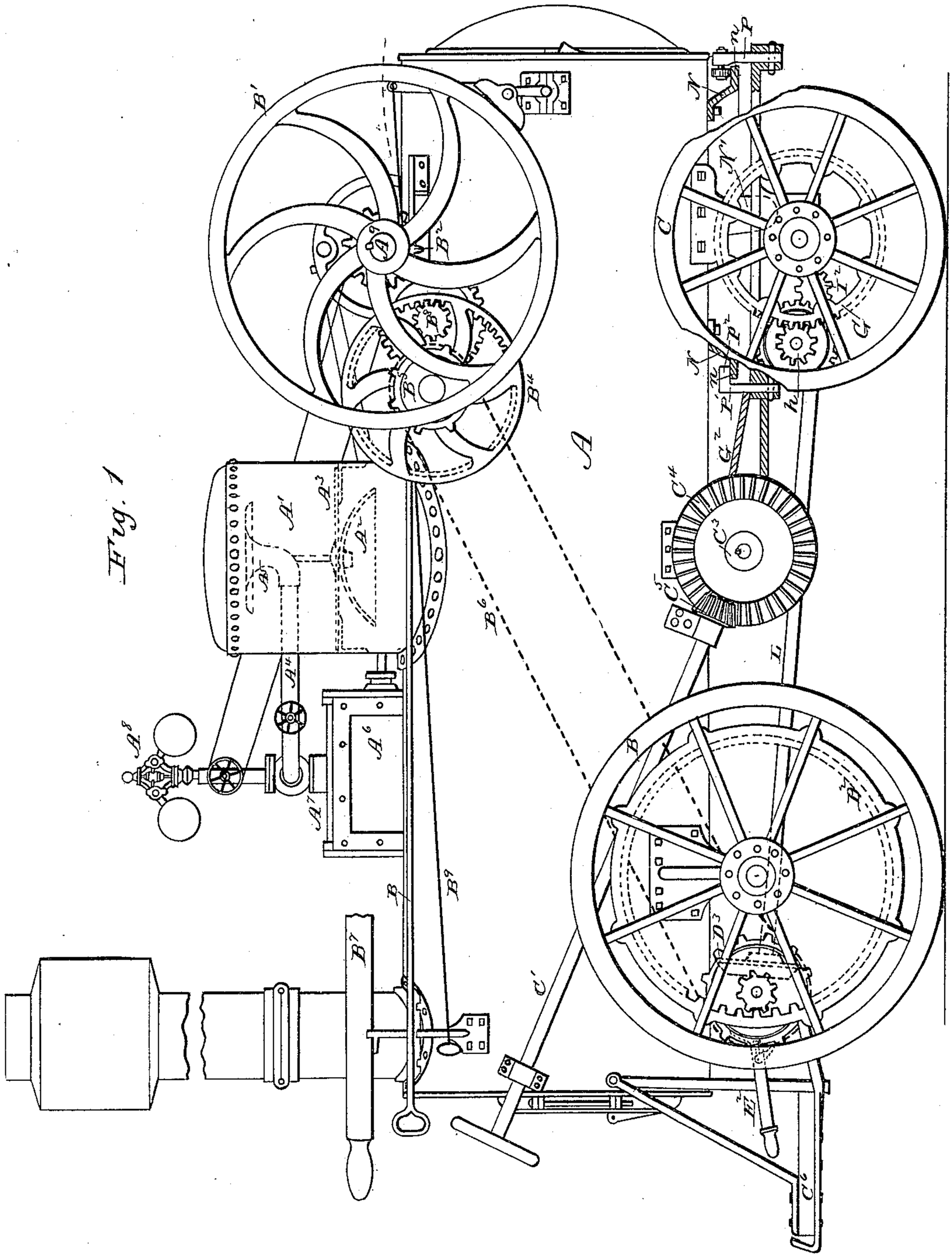

Fig. 1

Witnesses

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Fig. 2

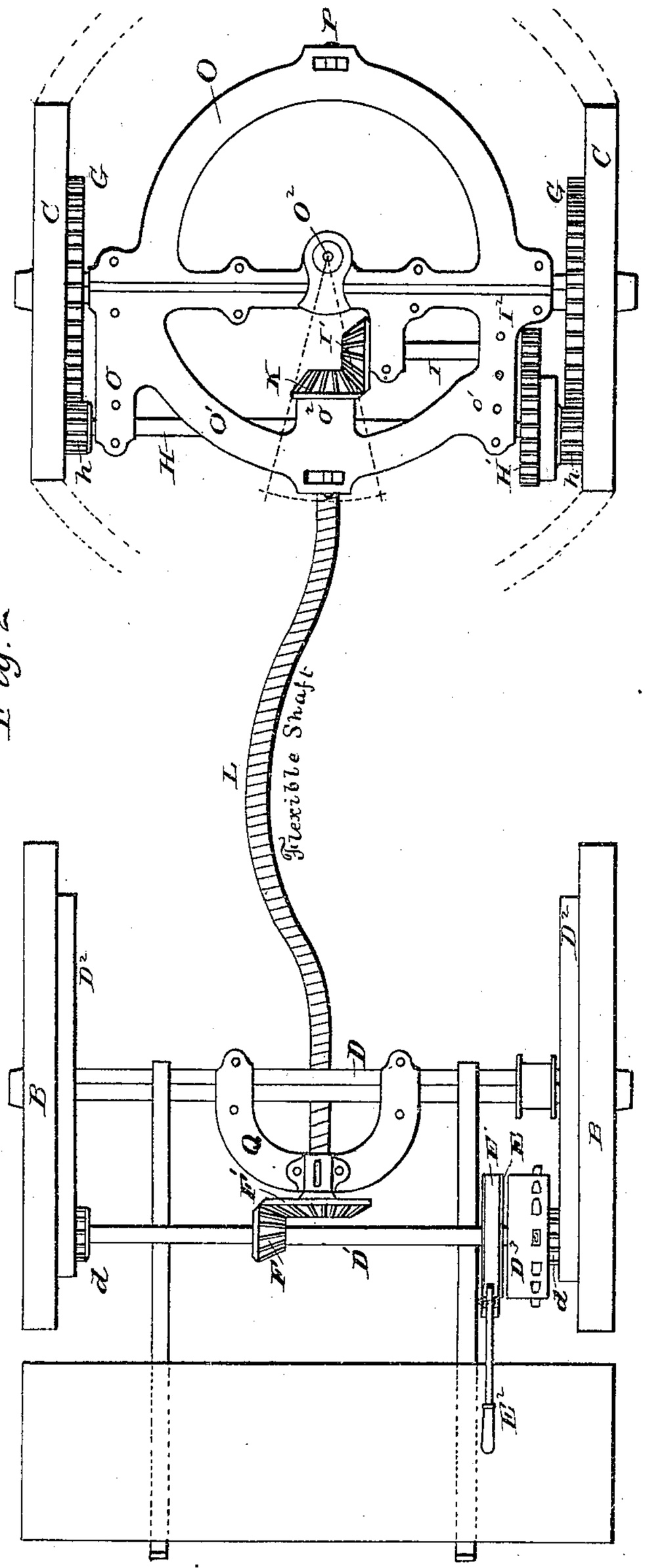

Fig. 3

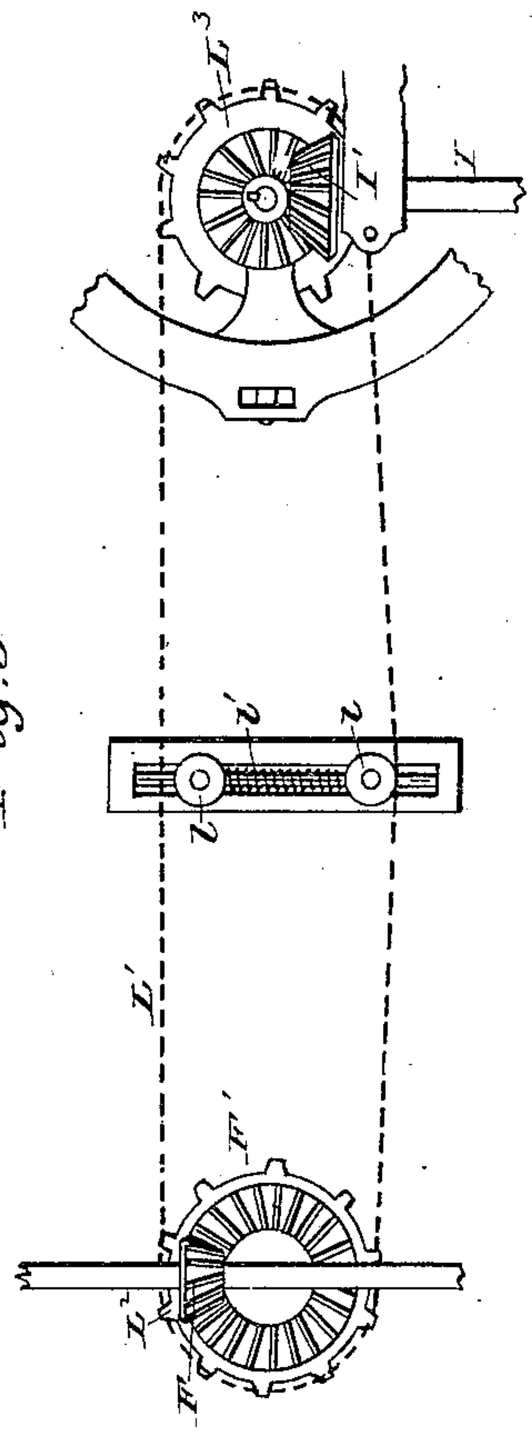

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Fig. 4.

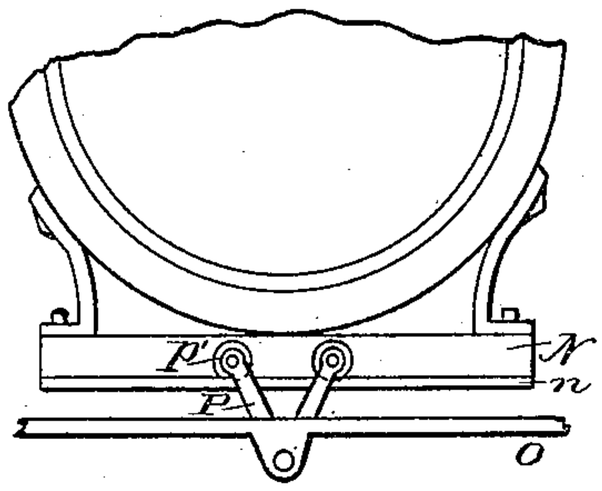


Fig. 5

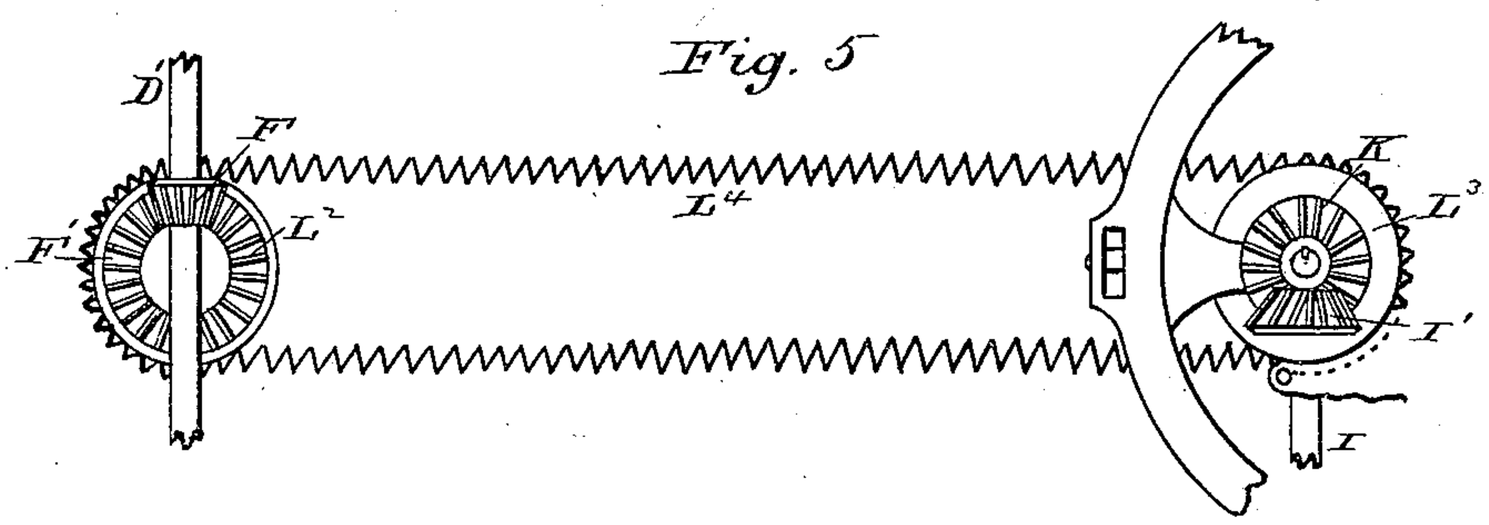
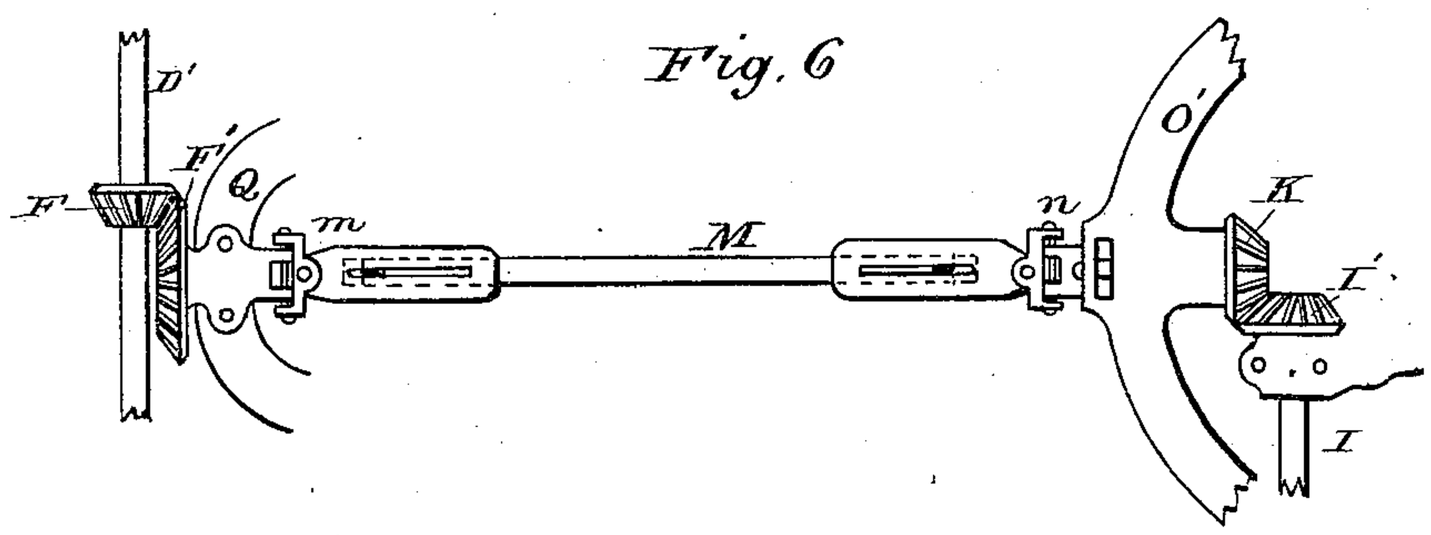


Fig. 6



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UNITED STATES PATENT OFFICE.

JOHN H. ELWARD, OF STILLWATER, MINNESOTA.

TRACTION-ENGINE.

SPECIFICATION forming part of Letters Patent No. 253,023, dated January 31, 1882.

Application filed September 19, 1881. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. ELWARD, a citizen of the United States, residing at Stillwater, in the county of Washington and State of Minnesota, have invented certain new and useful Improvements in Traction-Engines for Steam-Plows; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

Figure 1 is a side elevation of a traction-engine embodying my improvements. Fig. 2 is a plan view of the front and rear trucks and mechanism for transmitting power from the rear wheels to the front. Figs. 3, 5, and 6 show modified forms of said transmitting mechanism. Fig. 4 is a detail view.

In the drawings I have shown a traction-engine many parts of which are or may be similar to those shown in another application of mine now pending.

A represents the boiler; B, the rear driving-wheels; C, the front wheels; A′, the steam-dome; A^2 A^3, the devices for removing water from the steam; A^4, the steam-pipe; A^5, the bell-shaped nozzle of said pipe; A^6, the steam-chest; A^7, the cylinder; A^8, the governor; A^9, the main shaft; B′, the fly-wheel or band-wheel of said shaft; B^2 B^3 B^4 B^5, the train of gearing for communicating power to the drive-chain B^6; B^7 B^8 B^9, levers for operating various parts of the driving mechanism; C′, the shaft for operating the steering devices; C^2, the steering rope or chain wound upon shaft C^3, rotated by wheels C^4 and C^5; and C^6, the engineer's platform.

D represents the shaft, upon which are mounted the rear driving-wheels, B B.

D′ is the countershaft, mounted parallel to the shaft D, and in rear thereof. It carries pinions *d d* on the ends, which engage with the spur-wheels D^2, secured to the ground-wheels B B.

The driving-chain B^6 engages with a sprocket-wheel, D^3, which is part of a compensating-gear that may, in construction, be similar to those now well known.

E represents a brake-wheel; E′, a brake-band engaging with said wheel; and E^2 is a brake-lever for operating the band. By means of these devices the motion of the machine upon the ground can be stopped if any accident should happen to the driving-chain or any other part of the driving mechanism.

One of the objects of the present invention is to apply the power from the engine to the ground-wheels more efficiently, and this I accomplish by means of the following devices:

F is a bevel-pinion upon the counter-shaft D′. F′ is a bevel-wheel meshing with said pinion.

G G are spur-wheels formed with or secured to the front ground-wheels, C C.

H is a counter-shaft mounted in rear and parallel to the shaft or axle of the wheels C C. It carries pinions *h h* at the end, engaging with wheels G G. This shaft H is rotated by a second counter-shaft, I, carrying near the middle line of the machine a bevel-pinion, I′, and at the outer end a spur-pinion, I^2. At H′ there is a compensating-gear on shaft H, which may be similar to those now known, said compensating-gear being driven by the spur-wheel I^2 on shaft I.

K is a pinion, by which power is imparted to the shaft I, said power being transmitted from the wheel F, above described.

I have shown several forms of devices for transmitting power from said wheel F to said pinion K. In Figs. 1 and 2 I have shown a method of transmitting said power by flexible shaft at L, said flexible shaft being connected with the bevel-wheels. In Fig. 3 I have shown that form of mechanism which I prefer to use, it consisting of a chain, L′, and sprocket-wheels L^2 L^3. In this case the wheels F and K are mounted on vertical axes, and the sprocket-wheels L^2 L^3 are formed with or secured to them, respectively. When devices of this character (shown in Fig. 3) are employed, with them is combined an automatic chain device consisting of pulleys or rollers *l* and a spring or springs, *l′*, adapted to force the said pulleys or rollers apart. The pulleys or rollers *l l* engage with and bear against the chain L′ and tend to expand it at the central part, and thus keep it in proper working relation. In Fig. 5 the transmission is accomplished by means of a spring-chain L^4, which is connected

to the wheels F and K by grooved pulleys or wheels L^2 L^3, the flexibility of the spring-chain in this case taking up the slack of itself. In Fig. 6 the transmitting devices consist of two short shafts connected with the wheels F and K, respectively, and a tumbling rod or shaft, M, connected to the short shafts by knuckle-joints, or other suitable joints, at *m*, the joints having slots and the shaft pins sliding in said slots, as shown in the drawings, whereby extension is permitted. Each of the devices shown for transmitting the power from the rear driving mechanism to the front is automatically extensible—that is to say, is of such nature that if the distance between the bevel-wheels F′ and K should increase, the transmitting mechanism can be elongated and yet continue to carry power properly. Moreover, each of the transmitting devices is also flexible—that is to say, at one or more points in each case it is possible to bend the line of transmisson in any direction without interfering with the proper carrying of the power. It will be seen that by any of these transmitting devices power can be transmitted from the rear counter-shaft to the front wheels in such manner as not to have the front wheels interfered with in their turning, but permit them to be readily moved into any desired position.

I am aware that heretofore a chain has been used for transmitting power from the rear to the front axle of a traction-engine, such devices being shown in patent to J. Robingson, No. 15,820, September 30, 1856; but in the construction there shown, and in others substantially similar thereto, the chain used for transmitting the power from one axle to the other was not arranged so as to be automatically extensible. In my construction I attain many advantages by having the point at which power is imparted on the front truck-frame to this gearing somewhat behind the point around which said truck-frame turns relatively to the boiler, and I have devised the automatically-extensible power-transmitting devices above described, that I may preserve the said advantages. This extensible transmitting mechanism prevents the straining and breakage that would result if a chain of unvarying length were employed, as has been done heretofore. Moreover, in the machines previously used the power-transmitting devices have been situated at a point considerably above the axles of the traction-wheels, in some cases (as in patent last above mentioned) being situated above the boiler itself.

To attain the purposes for which my engine was devised it is necessary that the axles and the power-transmitting mechanism should be as nearly as possible in the same plane. By means of the beveled gearing which I have devised and shown this arrangement of the axles and the transmitting devices can be readily attained. When a construction like that in Fig. 3 is employed pulleys *l* and spring *l′* operate not only to expand the chain so as to keep it tightly in position upon the sprocket-wheels, but also to allow an automatic extension of the chain when the movements of the front truck require it. The sprocket-wheels being situated in horizontal planes, it is necessary to have devices analogous to those at *l l′*, to assist in properly holding the chain upon the wheels, and to hold one strand or leg of the chain as tight as the other, so that the motion can be reversed at any time without experiencing any slack of the chain upon either side.

I will now describe the mechanism which supports the front driving-gear, and which permits the front axle and wheels to rock and otherwise move without cramping any of the other parts.

N represents a frame attached to the under side of the boiler, at the front end, and provided with flanges *n n*. This frame N may be formed in two pieces or parts, one in front of the front axle and one in rear thereof. Said front axle is attached to it, between the wheels C C, by means of a circle or skeleton-frame composed of the segment O in front of the axle, the part O′ in rear of the axle, the arms *o o′* for supporting the counter-shaft H, the arm o^2 for supporting pinion K, and with a socket-bearing at O^2. The boiler is provided with a downwardly-projecting bearing-piece, N′, which rests in the socket-bearing at O^2 and is secured by means of a king-bolt. The flanged frame-work N N is connected to the ring or skeleton-frame O O′ by means of pivoted arms P and P′. The arm P is forked, as shown in Fig. 4, and pivoted to the lower frame, O, in the socket *p*. (Shown in Fig. 2.) At the upper ends of the fork are carried anti-friction rollers *p′*, which rest upon the front flange *n*. The arm P′ is formed with a part, p^2, at an angle to the shank, which rests upon the rear-flange *n*, and is adapted to slide freely thereon. By means of these devices I hold all the mechanism for driving the front wheels in proper position and prevent any displacements or cramping of the machinery, and at the same time permit the front wheels to rock and conform to the surface of the ground over which the engine passes.

It will be seen that the driving parts K, I′, I, I^2, H, *h*, and H′ are always held relatively to the wheels C C in the same plane.

When a shafting of either the nature shown in Fig. 2 or that in Fig. 6 is employed and the rear wheel, F, is mounted on a horizontal axis, it can be supported by means of a bracket, Q, attached to the rear axle. When chain mechanism is employed the said wheel F may be supported by a bracket depending from the boiler in such manner as to hold the wheel on a vertical axis.

What I claim is—

1. The combination of the following elements, namely: a boiler, an engine thereon, a rear truck, a driving mechanism mounted on said truck for moving the rear wheels, a front truck movable relatively to the boiler and en-

gine, a driving mechanism on said front truck for moving the front wheels, and an automatically-extensible power-transmitting mechanism connecting the driving mechanism on the rear truck with the driving mechanism on the front truck, substantially as set forth.

2. The combination of the following elements, namely: the rear truck, a driving mechanism on said truck for moving the rear wheels, a front truck, a driving mechanism mounted thereon for moving the front wheels, the sprocket-wheels L^2 and L^3, arranged to approach and recede from each other, the sprocket-chain L, and devices, substantially as set forth, for expanding the chain.

3. The combination of the rear truck, the counter-shaft D′ on said truck, the wheels on said shaft engaging directly with the rear traction-wheels, the compensating-gear on said shaft, the front truck, the counter-shaft H on the front truck, the wheels on said shaft H, which engage directly with the front traction-wheels, the compensating-gear on said shaft H, the short counter-shaft I, the bevel-gearing on the rear truck, the bevel-gearing on the front truck, and the flexible power-transmitting devices between the trucks, substantially as set forth.

4. The combination of the front traction-wheels mounted loosely, the front counter-shaft, H, engaging directly with said wheels, the compensating-gear on said shaft, the rear traction-wheels, mounted loosely, the counter-shaft D′, engaging directly therewith, the compensating-gear on said shaft D′, and the extensible power-transmitting mechanism between said shafts H and D′, substantially as set forth.

5. The combination, with the driving mechanism which moves the rear traction-wheels and the chain L, of the counter-shaft H, engaging with the front traction-wheels, the compensating-gear on said counter-shaft H, and the shaft I, mounted upon the front truck, and arranged, as set forth, to receive the power from the chain L and impart it to the compensating-gear on the shaft H, substantially as set forth.

6. In a traction-engine, the combination of a driving mechanism for the rear wheels, a driving mechanism for the front wheels, a power-transmitting mechanism, a frame-work for supporting upon the front wheels the mechanism which drives them, the pivotal bearing of the boiler resting upon said frame-work, and the arms P P′, arranged to loosely connect said frame-work to the boiler, substantially as set forth.

7. The combination of the frames N *n*, attached to the boiler, the frame O O′, supported upon the front wheels, the mechanism for driving said wheels, and the angle-arms P P′, arranged to rest upon flange *n*, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN H. ELWARD.

Witnesses:
N. S. GOODHUE,
J. L. W. FULTON.