No. 842,786. PATENTED JAN. 29, 1907.

M. J. HOGAN.

TRACTION ENGINE.

APPLICATION FILED SEPT. 19, 1903. RENEWED JUNE 2, 1906.

4 SHEETS—SHEET 1.

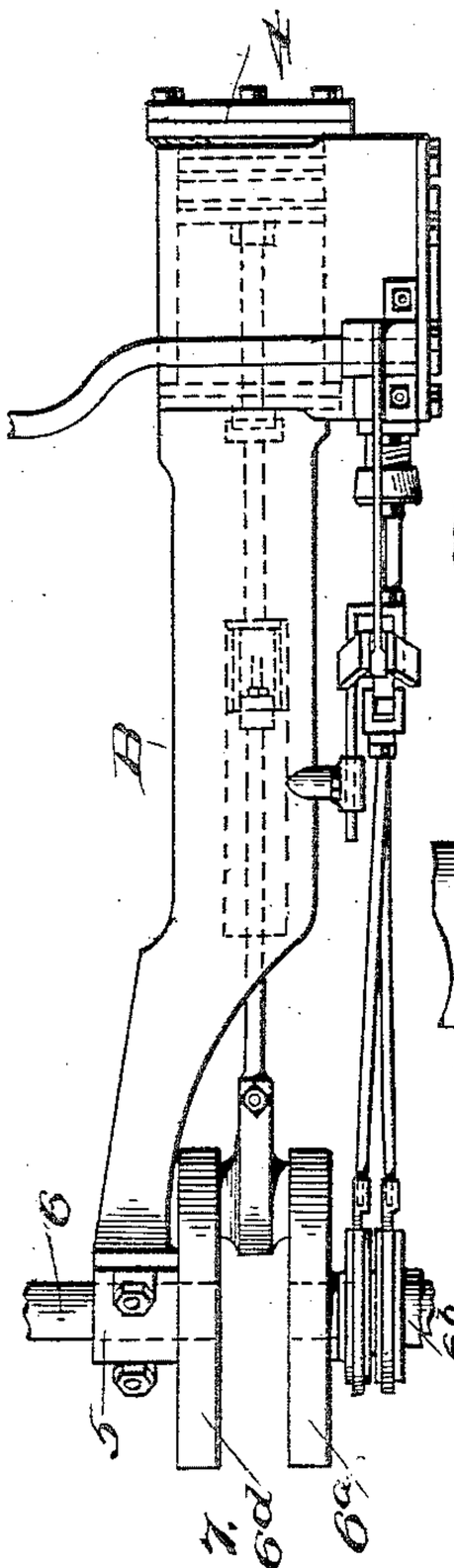

Fig. 1.

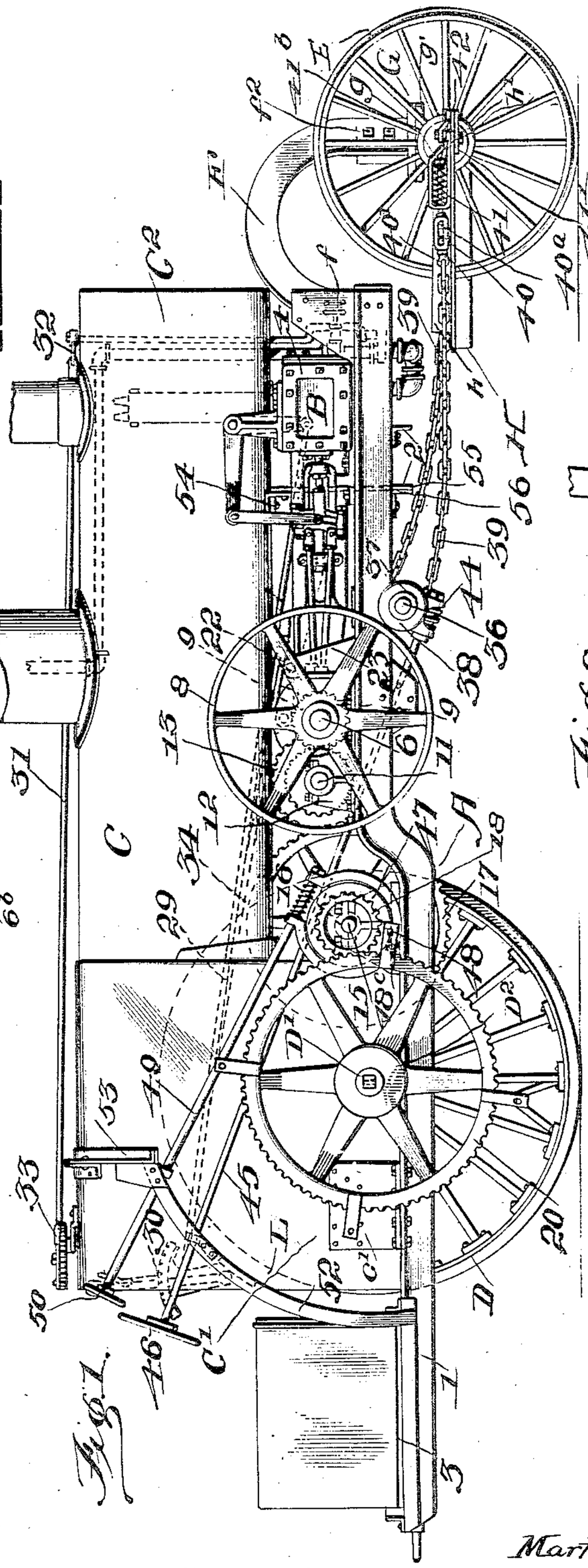

Fig. 2.

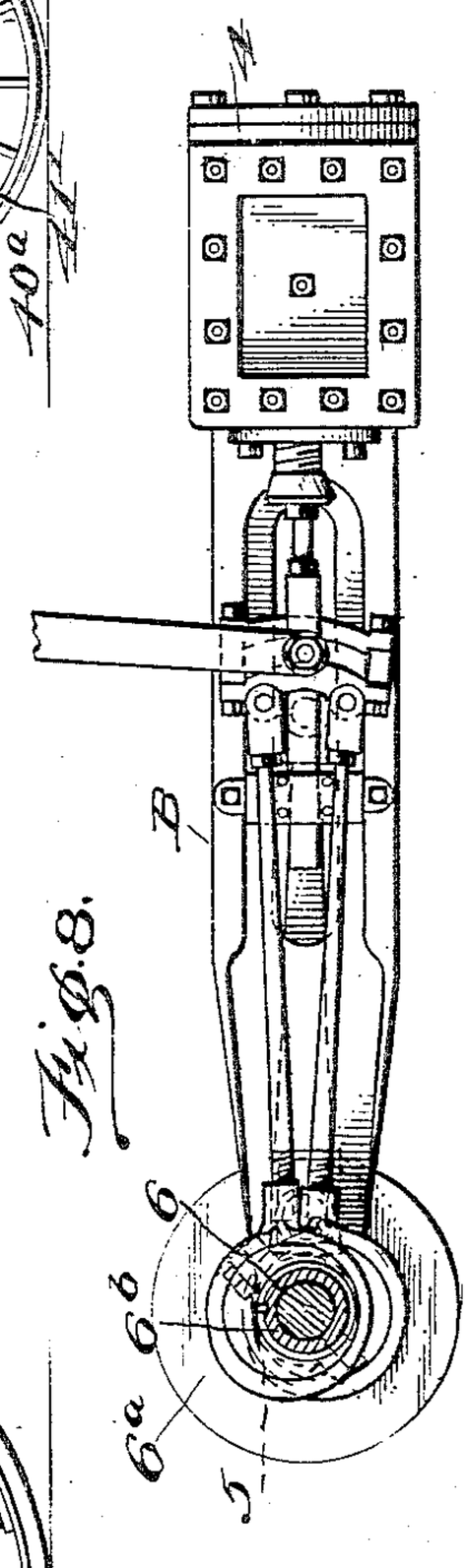

Fig. 3.

Witnesses:
W. W. Tuckley
A. C. Meynes.

Inventor
Martin J. Hogan

By Attorney
H. H. Olsen.

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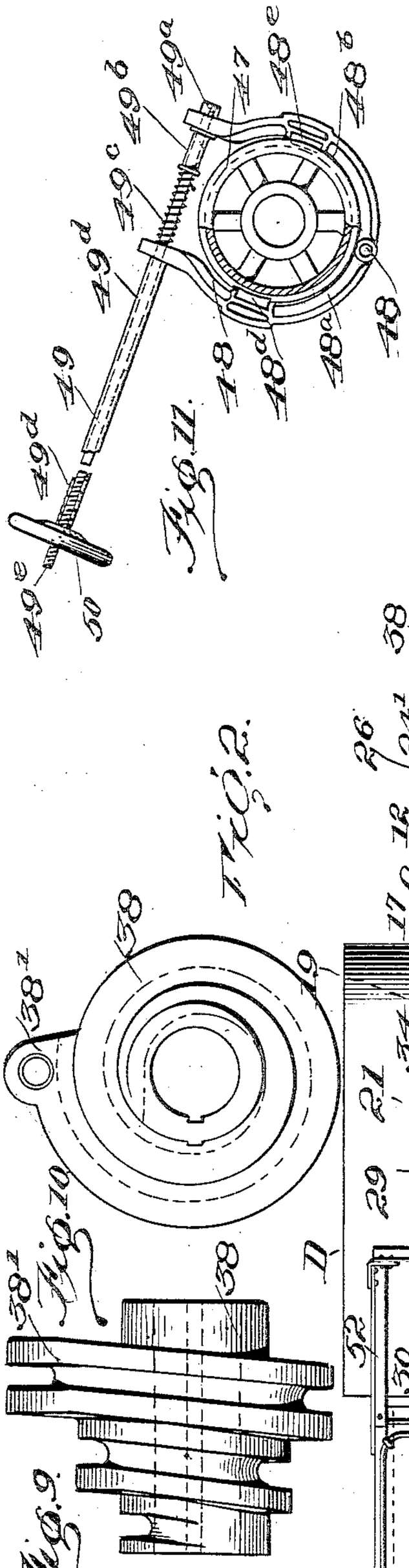

Fig. 11.

Fig. 12.

Fig. 10.

Fig. 9.

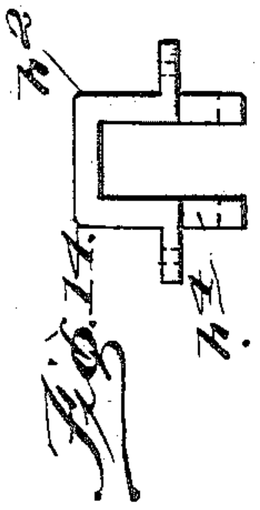

Fig. 14.

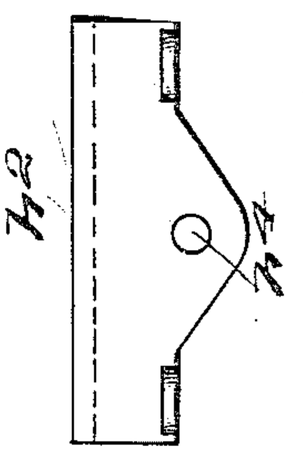

Fig. 13.

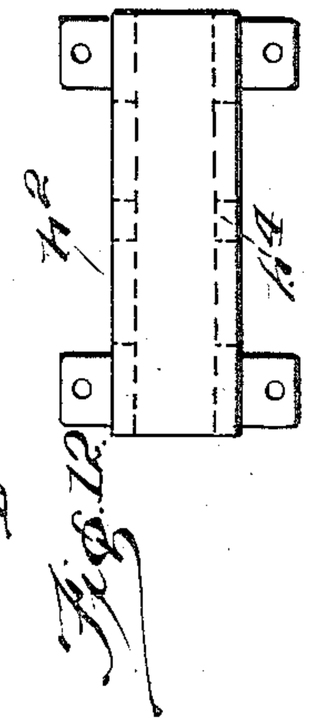

Fig. 15.

Witnesses:
R. W. Ashley
H. C. Meyers.

Inventor
Martin J. Hogan

By Attorney
H. H. Bliss.

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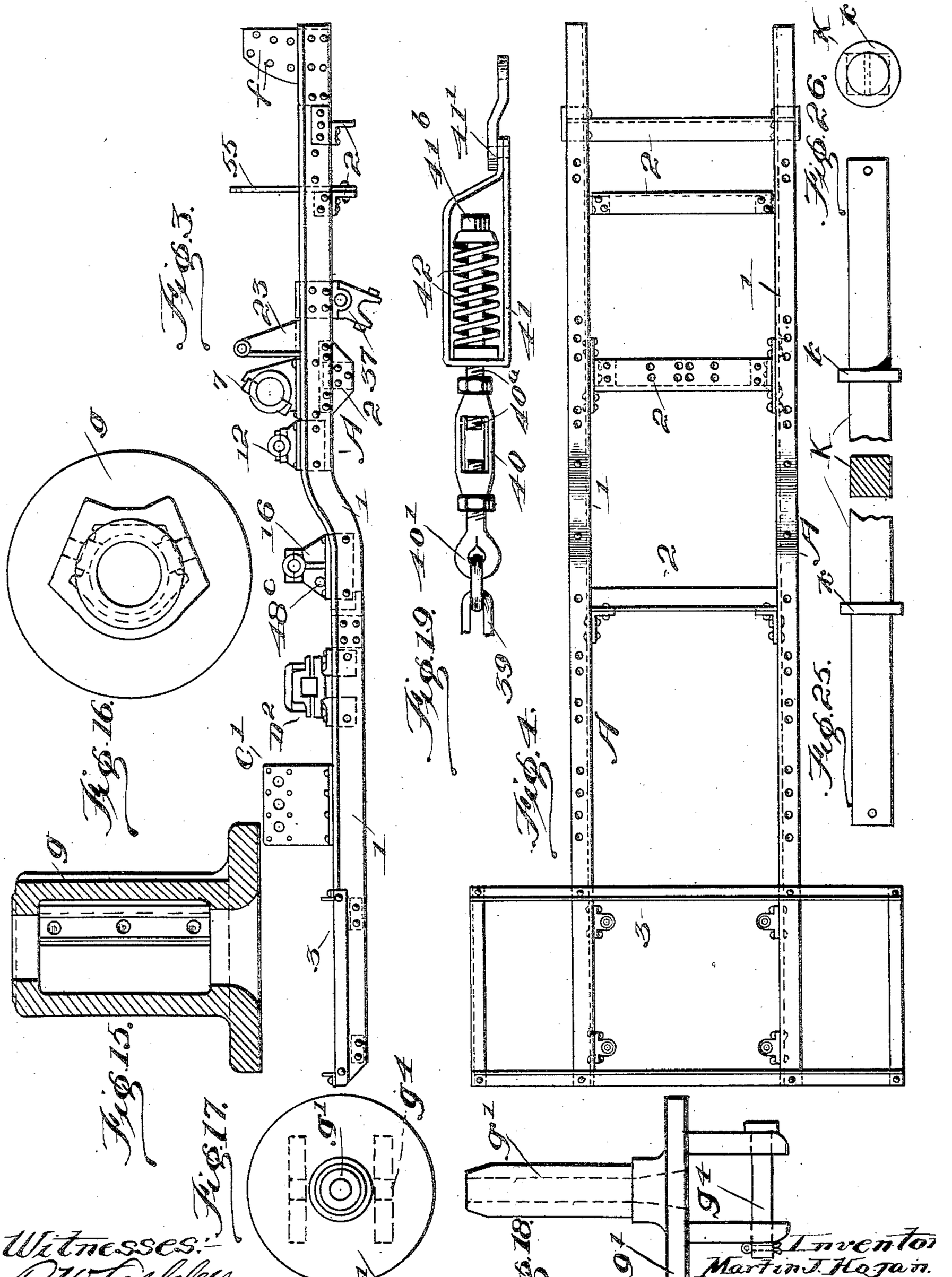
4 SHEETS—SHEET 3.



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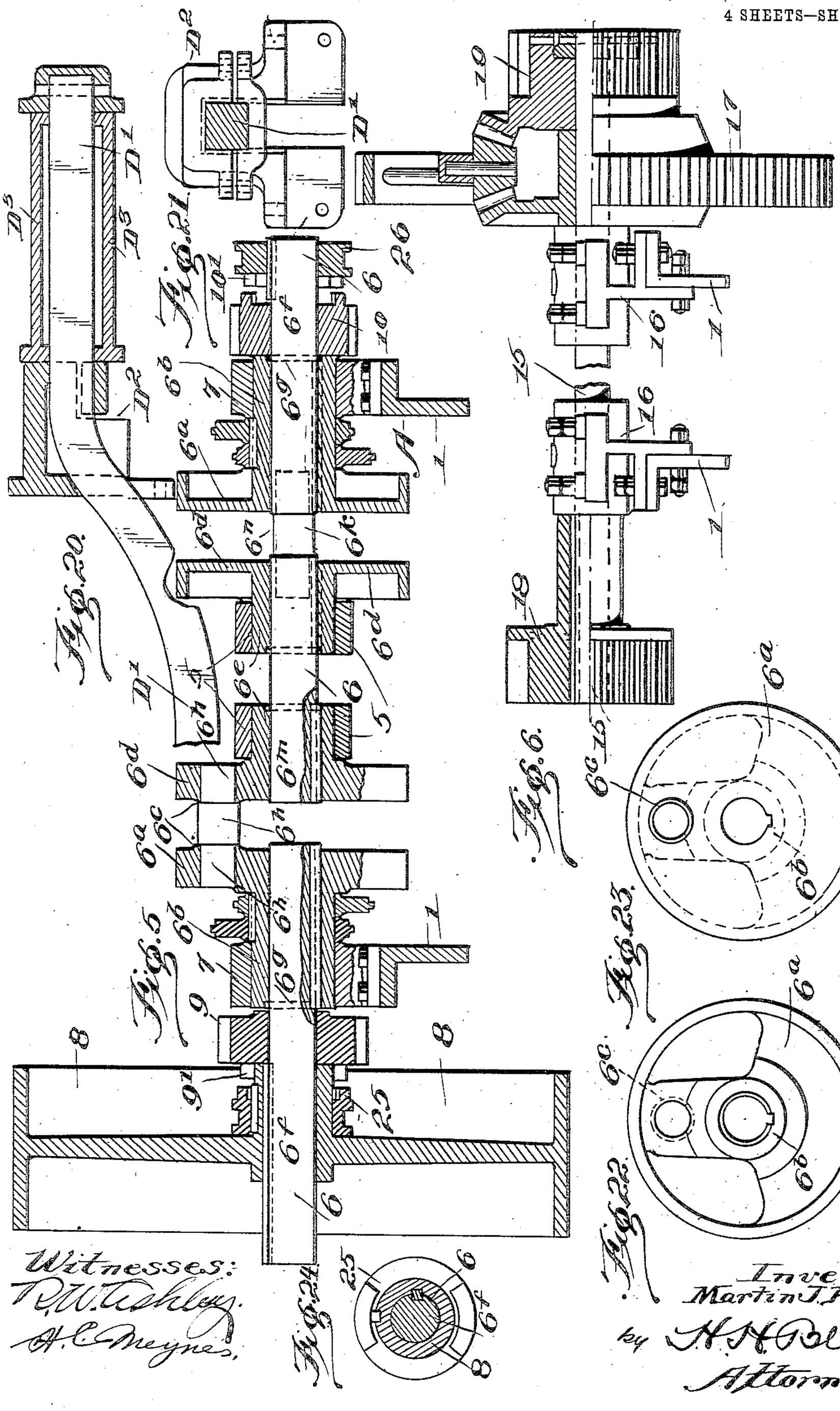
4 SHEETS—SHEET 4.



Witnesses:
P. W. Ashley.
H. C. Reynes.

Inventor
Martin J. Hogan
by H. A. Bliss.
Attorney.

UNITED STATES PATENT OFFICE.

MARTIN J. HOGAN, OF CANTON, OHIO.

TRACTION-ENGINE.

No. 842,786. Specification of Letters Patent. Patented Jan. 29, 1907.

Application filed September 19, 1903. Renewed June 2, 1906. Serial No. 319,922.

To all whom it may concern:

Be it known that I, MARTIN J. HOGAN, a citizen of the United States, residing at Canton, in the county of Stark and State of Ohio, have invented certain new and useful Improvements in Traction-Engines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to improvements in traction-engines.

It has for its object to provide a traction-engine adapted for very heavy work and to so arrange the driving parts as to obtain the greatest efficiency therefrom and entirely relieve the boiler from the strains incident to it when the engines or motors are secured to the shell thereof.

In various parts of the country at the present time a demand has arisen for traction-motors of a high horse-power. These traction-engines have been mainly used for agricultural purposes, tilling the soil, and driving separators, threshers, and the like; but of late a demand has grown up for engines of very high power for haulage purposes at lumber-camps and mines. They are often called upon to travel over very rough roads and are subjected to severe strains and stresses which call for a rigid construction and most efficient arrangement of the working parts. The high horse-power demanded from them not only requires the use of large and heavy engines, but also high steam-pressures, this being found more economical in the operation of the engines. It is well known when the engines are mounted on the boiler that not only is the latter weakened by their weight and vibrations, but that every bolt that passes through the boiler-shell decreases the boiler-pressure to which it may be subjected with safety and tends to make the boiler more liable to leakage.

In my present construction I have so arranged and correlated the engines, the working parts, and the boiler that the latter is not subjected to any strains from the engines or from their vibrations, and I provide a boiler which is practically boltless.

Figure 1 is a side elevation of an engine embodying my improvements, the traction-wheel on the front side thereof being removed in order to show the parts behind it. Fig. 2 is a plan view of the same with the boiler shown in dotted lines. Fig. 3 is a side elevation of the framework detached, showing the bearings for the different shafts and the plates for securing the boiler and the gooseneck steering mechanism in position. Fig. 4 is a plan view of the framework. Fig. 5 is a view, partly in section, of the crank-shaft and parts of the engine associated therewith. Fig. 6 is a view, partly in section, of the counter-shaft and the parts associated therewith. Fig. 7 is a plan view, and Fig. 8 is a side elevation, of one of the engines detached. Figs. 9 to 26 show details.

In the drawings, A indicates the framework or supporting structure for the mechanism as an entirety, B the engines, and C the boiler. The side parts of this framework, as shown, are longitudinal beams or sills 1 1. At intervals these longitudinal beams are joined by cross-beams 2, which serve not only as girths, but also to support some of the operative parts of the machine.

3 is the engineer's platform, secured on the rear end of the frame, as shown.

The frame is supported by the traction-wheels D at the rear end and the steering-wheels E at the front end thereof. The traction-wheels are mounted independently of each other on sleeves D^3, secured in position on the rear axle D′. This axle is square in cross-section and is rigidly secured in position in the brackets D^2, which are secured to the framework.

The front end of the frame is supported on the axle of the steering-wheels, preferably in the way shown in the drawings. F F are gooseneck bars rigidly secured at *f* to the beams 1 and extending upward and outward therefrom and curved downward at e^2. *g* is a pedestal to which the lower forward ends f^2 of the goosenecks are secured. It also forms one part of the swivel-joint or fifth-wheel for the front axle, being secured to the framework H, carried by the axle K, on which the steering-wheels E are mounted. *g′* is the king or swivel pin adapted to fit into the pedestal *g* and to rotate about the axis of the pedestal. This framework H consists, preferably, of a curved horizontally-arranged bar *h*, having secured to its ends the bearing-blocks *h′*, in which the ends of the shaft K are mounted. h^2 is a saddle for the front axle K, it being rigidly secured to the front end of the longitudinal bars h^3, which at their rear ends are secured to the bar *h*. The king-pin *g′* has secured to it the flange g^2, which rests upon the saddle h^2, and the legs g^3 g^3, which extend down on either side of the said saddle and are pivotally connected

thereto at g^4. The saddle h^2 is adapted to fit between the enlargements k on the axle or portion of the axle between the enlargements if square in cross-section, as indicated, and the portions at either side of it being circular in cross-section. The steering-wheels E have extended hubs e' at either side of the wheel, the outer of said hubs being adapted to receive the inner projections or bosses h^4 h^5 of the bearings h' and the inner hub being adapted to fit over the enlargements k on the axle. This arrangement of parts insures against the lateral vibration of the steering-wheels on their axles. It will be seen that by means of this construction I provide not only for the use of relatively large steering-wheels which are adapted to turn under the frame when the engine is being turned, but also for a free use of a driving-belt on the band-wheel, the steering-wheels being out of the vertical planes of the belt-wheel. The belt is used when a thresher or other machine is to be driven by the engine.

The engines B, preferably two in number and having their cranks at ninety degrees to each other, are arranged at the front of the framework and have their cylinders 4 rigidly secured to the beams 1 and the foremost cross-beam 2. The engine-frames extend rearwardly and carry crank-shaft bearings 5, secured to a cross-beam 2 near the center of the framework. 6 is the crank-shaft mounted in said central bearings 5 on the engine-frame and having its ends mounted in bearings 7 7, secured to the longitudinal beams 1, one on each side of the frame.

8 is a fly-wheel and belt-wheel keyed to the crank-shaft.

I employ a power-transmitting mechanism by means of which power at two different speeds may be imparted to the driving-wheels. A variable-speed device is of great importance, especially when the engine is called upon to do extremely heavy work in haulage or to get itself out of a rut or bit of bad road.

9 and 10 are pinions loosely mounted on the crank-shaft 6. Each of these carries on its outer face one element 9′ or 10′ of a clutch, the other elements of which will be hereinafter described.

11 is a counter-shaft mounted in bearings 12 12, secured to the beams 1. This shaft carries at its opposite ends the gears 13 and 14, the former of which meshes with the pinion 9 and the latter of which meshes with the pinion 10. 15 is another counter-shaft having its axis of rotation in a horizontal plane somewhat below the horizontal plane of the axes of the shafts 6 and 11. This shaft 15 is mounted in bearings 16, likewise secured to the beams 1. It has a compensating gear at 17, which, being of a common or of any preferred form, need not be described. The master-wheel of the compensating gear meshes with the gear 14 on the counter-shaft 11. At the end of this second counter-shaft or compensating-gear shaft 15 are the driving-pinions or bull-pinions 18 and 19, each being loose as to the other and each driven by one of two elements of the compensating gear. The pinion 18 meshes with the driving-gear or bull-gear 20 and the other with the gear 21. These gears are rigid with their ground-wheels, respectively, the latter being mounted independently of each other to provide for compensation.

22 is a longitudinally-movable bar or rod transversely mounted in bearings 23, secured to the beams 1. This rod carries at its ends the arms or forks 24 24′, of which the former engages the clutch-jaw 25 and the latter of which engages the clutch-jaw 26, both of the latter being splined to the crank-shaft 6.

27 is a bell-crank lever pivotally secured at 27′ to one of the engine-frames and having one of its arms pivoted at 28 to the rod 22, the other arm being pivoted to the rod 29, which extends rearward and is connected to a hand-lever 30, mounted at one side of the engineer's platform. It will be seen that when this hand-lever is thrown forward the rod 27 is shifted and brings into engagement the clutch-jaws 25 and 9′, so that the power from the crank-shaft is transmitted through the pinion 9, gear 13, and gear 14, and thence to the ground-wheels. This will cause the mechanism to advance at its higher speed. Drawing the lever 30 rearward causes the engagement of the clutch-jaw 26 with the clutch-jaw 10′ on the pinion 10, which provides for the transmission of power at the slower speed.

When it is desired to use the engine merely for developing power for operating some other mechanism, the fly-wheel is belted to the driving-wheel of the other mechanism and the hand-lever 30 is thrown to its midway position, at which point both clutch-jaws 25 and 26 are out of engagement.

To control the steam, I provide a rod 31, connected at its outer end with a lever-arm 32, which is adapted to operate a throttle-valve in the steam-supply pipe. The inner end of this rod is provided near the engineer's platform with an ordinary form of hand-lever 33, having the pawl 33^a adapted to engage with the segment-rack 33^b.

At 34 is a rod which extends longitudinally of the engines and has its front end connected to the train of devices for shifting the eccentrics to reverse the engines. At its rear end this rod is provided with a hand-lever 35, operable from the engineer's platform.

The steering device is constructed as follows: 36 is a shaft mounted in bearings 37, secured to the beams 1. At its ends this shaft carries the winding-drums 38. The chains 39 have their rear ends rigidly secured to the drums, and their forward ends are se-

cured to the eyebolts 40′ of a turnbuckle 40. 41 is a loop or rectangle of metal pivoted at 41′ to the bar *h* of the frame H. The bolt 40^a of the turnbuckle projects through the rear end wall of this loop. 42 is a spring surrounding the bolt 40^a within the loop and adapted to exert pressure against the end wall of the loop and against the nut 41^b on the bolt. The winding-drums for the steering mechanism are of the peculiar form shown in Figs. 9 and 10. The winding-surface is tapered in form and helically grooved to receive the coil of the chain as they are wound on the surface of the drum, the chain being connected between the projections or ears 38′ at the end of the largest helical flange of the drum. The shaft 36 has rigidly secured to it the worm-wheel 43, which meshes with the worm 44 on the steering-rod 45. This rod extends rearward and is provided with a hand-wheel 46, operable from the engineer's platform.

47 is a brake wheel or drum rigidly secured to the shaft 15. 48 is the brake-band on the drum provided with an operating-rod 49, having the hand-wheel 50, which is operable from the engineer's platform. This brake device is constructed as shown in Fig. 11. The brake-band 48 consists of two arms or straps 48^a and 48^b, pivoted to a stud at 48^c, which is secured to the bearing-bracket 16. The rod 49 extends through apertures in the free ends of these brake-arms and has a bolt 49^a, adapted to bear against the end of the arm 48^b. 49^b is a sleeve on the rod 49, arranged between the ends of the brake-arms, and 49^c is a spring abutting against said sleeve and the outer end of the arm 48^a. A tube or hollow shaft 49^b is fitted over the rod 49 and is adapted to bear at the one end upon the arm 48^a and at the other end against the hand-wheel 50, the said wheel being threaded to receive the threaded end 49^e of the rod 49. It will be seen that by rotating the wheel in one direction the lever-arms 48^a and 48^b will be brought together, forcing the brake-shoes 48^d and 48^e against the periphery of the brake-wheel, while when rotated in the other direction the arms will be separated under the action of the spring 49^c. The bearings for the rear ends of the steering-rod 45, the brake-rod 49, the rod for shifting the eccentrics, and the rod for operating the speed-gear clutches are supported by a supplemental frame, (indicated as an entirety by L.) This frame consists of the upwardly-extending bars 52, secured to the framework of the platform 3. At their upper ends bars 52 are secured to a transversely-extending bar 53. This frame also serves to support the canopy structure for the engine.

The fire-box C′ of the boiler C rests upon the longitudinal beams 1 and is rigidly secured thereto in any suitable manner. I have shown it rigidly secured to the brackets *c′*, which are in turn rigidly secured to the beams 1 of the frame. The front end C^2 of the boiler is supported on and secured to the cross beam or bar 54, which is in turn supported by the standard 55, rigidly secured to one of the transverse beams or bars 2.

The parts of a traction-engine of my improved construction can be rapidly and accurately assembled. It is well known that where the engines and shafting and gearing are mounted on the boilers considerable difficulty is experienced in properly alining the numerous parts, owing to the curvature of the boiler; but in the present construction the engines can be quickly and accurately positioned on the frame entirely irrespective of the boiler.

The engines and the small movable parts immediately connected therewith are so arranged that access to the latter (the cross-heads, connecting-rods, eccentrics, eccentric-rods, eccentric reversing-gear, &c.) can be readily had at any time, and as is well known it is frequently necessary with traction-engines to have such access to these parts in order to cleanse and repair them and keep them in proper adjustments. The steam-chests and valve-boxes are on the outer sides of the cylinders, and thus they are also exposed and readily accessible. The two cranks are at or comparatively near the center of the crank-shaft, the gearing parts being arranged outside of these and near the ends of the shaft, and, as above explained, the boiler is boltless and is relieved entirely of the strains and stresses arising from the thrusts and reactions of the engines and those arising from the vibrations of the traction mechanism, the engines, the shafts, the gearing, and the bearings for the operating-rods and levers being all supported on the main frame entirely independently of the boiler.

The crank-shaft 6 is constructed as shown in Fig. 5. It is made up of the four disks or crank-heads, the outer pair of which 6^a have the extended tubular portions or journals 6^b and the relatively small bosses 6^c, the inner pair of the crank-heads 6^d having the less-extended tubular portions or journals 6^e and the relatively small bosses 6^c. The rest of the shaft is made up of sections of steel shafting, the two relatively long sections 6^f 6^f being keyed to the crank-heads 6^a. Each of these sections carries an enlargement 6^g, which is fitted into a recess in the end of one of the extended tubular portions or journals 6^b. The two crank-heads 6^a and 6^b are connected by a relatively short shaft-section 6^h, having the enlarged portion 6^k, which fits against the bosses 6^c 6^c, this crank-section 6^h having the crank-heads driven onto it. The inner pair of crank-heads 6^d are connected together by a section of steel shaft 6^m, which is keyed to said heads. This short section has the enlarged portion 6^n, the ends of

which are received in recesses in the ends of tubular projections 6^e 6^e. It will be seen that by this construction I have provided a crank-shaft of great strength and one the parts of which can be separately machined and then assembled, thus avoiding the expense incident to the construction of large steel crank-shafts in which the parts are integral. The crank-head may be cast with the openings in them for the steel shaft-sections, and the said openings may be drilled and reamed to proper size and where necessary key-seated to receive the shaft. The sections of steel shaft are all of lengths suitable for quick handling in the lathe and key-seating machine.

It is well known that considerable difficulty is experienced in properly centering and turning up steel crank-shafts made from a single ingot, and it is to avoid this difficulty and the time and expense involved in the making of said crank-shafts that I have devised the construction herein described, in which the parts may be separately made and then assembled.

It is understood that I do not limit myself to the exact number of parts herein shown in the construction of a crank-shaft embodying my improved invention, as a shaft with any number of crank-pins in any desired positions in the crank-circle relative to each other can be built up without departing from the spirit of my invention.

What I claim is—

1. In a traction-engine, the combination with a horizontally-disposed boiler, of a frame upon which said boiler rests, said frame being rigid throughout and comprising longitudinal side beams equally spaced apart from the front to the rear end of said boiler, engines supported on the frame independently of the boiler and having a common crank-shaft arranged beneath the boiler and a fly-wheel secured to said crank-shaft at one side of said frame, traction-wheels for supporting the rear end of said frame, shafting and gearing supported upon the frame independently of the boiler, and interposed between the engines and the traction-wheels, and front steering-wheels both situated in vertical planes between the vertical planes of the sides of the frame, substantially as set forth.

2. In a traction-engine, the combination of a horizontally-disposed boiler, a frame upon which the boiler rests, engines supported upon the frame independently of the boiler and having a common crank-shaft mounted beneath the said boiler and a fly or belt wheel secured to said crank-shaft at one side of said frame, traction-wheels supporting the rear end of said frame, shafting and gearing supported upon the frame independently of the boiler and interposed between the engines and the traction-wheels, and front steering-wheels mounted on an axis in front of the said engines, one at either side of the central vertical, longitudinal plane of the frame, and both nearer to the said plane than the said belt-wheel, substantially as set forth.

3. In a traction-engine, the combination of a horizontally-disposed boiler, a frame upon which the boiler rests, engines supported upon the frame independently of the boiler and situated one at either side of the front end of said frame, traction-wheels supporting the rear end of said frame, shafting and gearing interposed between the engines and the traction-wheels and supported upon said frame independently of the boiler, a power-transmitting belt-wheel carried by said shafting at one side of said frame, and front steering-wheels both situated nearer to the central, longitudinal, vertical plane of the frame than the said belt-wheel and entirely in front of said engines, substantially as set forth.

4. In a traction-engine, the combination of a rigid frame having longitudinal side beams joined at intervals by cross-bars, a horizontally-disposed boiler secured on said frame, a prime mover secured upon the frame entirely independently of said boiler, traction-wheels supporting the rear end of said frame, shafting and gearing connecting said prime mover and said traction-wheels and supported upon said frame entirely independently of said boiler, a forward extension secured to and supported by said frame independently of said boiler and situated between the vertical planes of the sides of the frame, a steering-axle suitably connected to the front end of said forward extension, and steering and supporting wheels mounted on said axle entirely in front of said prime mover and less distant apart than said traction-wheels, substantially as set forth.

5. In a traction-engine, the combination of a rigid frame, a horizontally-disposed boiler secured to said frame, a prime mover secured upon the frame entirely independently of said boiler and having a crank-shaft arranged transversely beneath said boiler, and a power-transmitting belt-wheel carried by said crank-shaft at one side of said frame, traction-wheels for supporting the rear end of said frame, shafting and gearing connecting said crank-shaft and traction-wheels, and supported upon said frame entirely independently of said boiler, a forward extension secured to and supported by said frame and arranged out of alinement with said belt-wheel, a steering-axle suitably connected to the front end of said forward extension, and steering and supporting wheels mounted on said axle, one at either side of the central, vertical, longitudinal plane of the frame and nearer thereto than said belt-wheel, substantially as set forth.

6. In a traction-engine, the combination of a frame, a horizontally-disposed boiler secured on the said frame, engines secured upon the said frame at either side thereof and beneath and entirely independently of said boiler, a common crank-shaft for the said engines mounted on said frame beneath said boiler, a belt or fly wheel on said crank-shaft arranged at one side of said frame, traction-wheels supporting the said frame near its rear end, power-transmitting devices between said crank-shaft and said traction-wheels, a forward extension secured to said frame independently of said boiler and situated between the vertical planes of the sides of the frame, a steering-axle suitably connected to said forward extension in the central, vertical, longitudinal plane of the said frame, and steering-wheels mounted on said steering-axle, one at either side of said central, vertical, longitudinal plane, and both nearer to the said plane than the said belt-wheel, substantially as set forth.

7. In a traction-engine, the combination of a frame, a horizontally-disposed boiler secured on said frame, engines secured upon said frame at either side thereof and beneath and entirely independently of said boiler, a common crank-shaft for said engines mounted on said frame beneath said boiler, a belt or fly wheel on said crank-shaft and arranged at one side of said frame, traction-wheels supporting said frame at its rear end, power-transmitting devices interposed between said crank-shaft and said traction-wheels, a forward extension carried by said frame and extending in front of the said engines thereon and to a point in the vertical, central plane of the frame, a steering and supporting axle, means for pivotally connecting said axle to said forward extension on a vertical axis in said central, vertical, longitudinal plane of said frame, and supporting and steering wheels mounted on said axle, one at either side of said central, vertical, longitudinal plane of the frame and less distant therefrom than the said fly or belt wheel, substantially as set forth.

8. In a traction-engine, the combination of a frame comprising side bars equally spaced apart from end to end and joined at intervals by cross-bars, a forward extension carried by said frame, traction-wheels arranged to support the rear end of said frame, a steering-axle suitably connected to said forward extension at its front end, steering-wheels mounted on said axle, one at either side of its connection with said forward extension, engines, one secured at either side of the front end of said frame, a common crank-shaft for the engines mounted transversely on said frame, a fly or belt wheel secured to said crank-shaft, and arranged at one side of said frame and out of alinement with the steering-wheel on that side of the frame, power-transmitting devices interposed between said crank-shaft and said traction-wheels, and a horizontally-disposed boiler secured on the frame independently of the engines and gearing thereon, substantially as set forth.

9. In a traction-engine, the combination of a frame comprising longitudinal side beams joined at intervals by cross-bars, traction-wheels arranged to support the rear end of said frame, two engines secured to said frame near the front end thereof, a common crank-shaft for the engines, mounted transversely on the frame, a fly or belt wheel secured to said crank-shaft and arranged at one side of said frame and in line with the traction-wheel on the same side of the frame, power-transmitting devices interposed between said crank-shaft and said traction-wheels, a forward extension carried by said frame and out of alinement with said belt-wheel, a steering-axle suitably connected to said forward extension in front of said engines, and steering-wheels, each mounted on said axle at either side of its connection with said forward extension and nearer to the central, vertical, longitudinal plane of the frame than said belt-wheel, substantially as set forth.

10. In a traction-engine, the combination of a frame comprising longitudinal side beams joined at intervals by cross-bars, traction-wheels arranged to support the rear end of said frame, two engines secured to said frame near the front end thereof, a common crank-shaft for the engines mounted transversely on the frame, a fly or belt wheel secured to said crank-shaft and arranged at one side of said frame and in line with the traction-wheel on the same side of the frame, power-transmitting devices interposed between said crank-shaft and said traction-wheels, a forward extension carried by said frame and out of alinement with said belt-wheel, a steering-axle suitably connected to said forward extension in front of said engines, and steering-wheels, each mounted on said axle at either side of its connection with said forward extension and nearer to the central, vertical, longitudinal plane of the frame than said belt-wheel, and having its periphery intersecting the plane containing the side beams of the said frame, substantially as set forth.

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

MARTIN J. HOGAN.

Witnesses:
H. L. SEEGER,
CHAS. A. STOLBERG.