

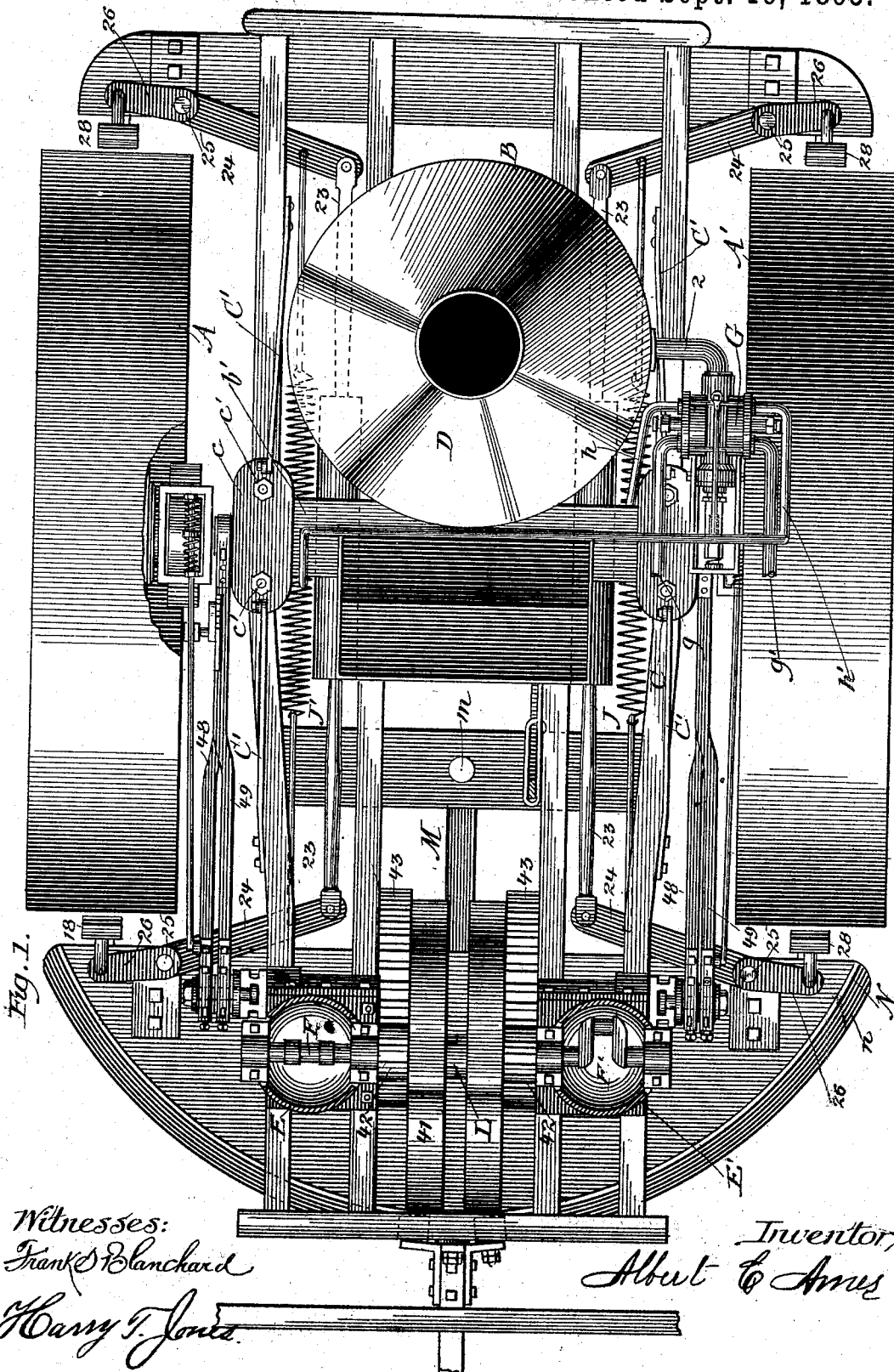
(No Model.)

6 Sheets—Sheet 1.

A. C. AMES.
TRACTION ENGINE.

No. 505,151.

Patented Sept. 19, 1893.



Witnesses:
Frank S. Blanchard
Harry T. Jones.

Inventor,
Albert C. Ames

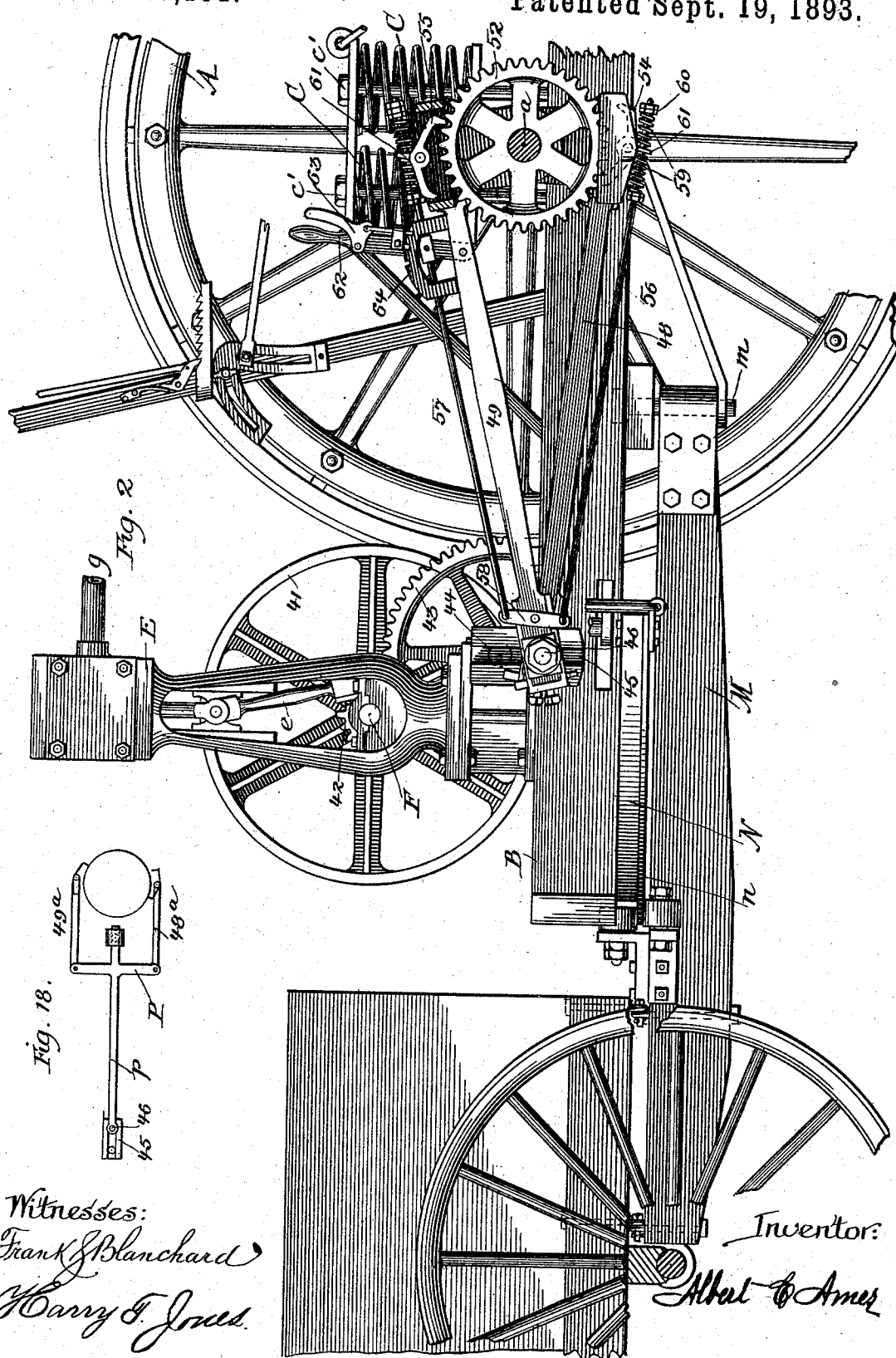
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6 Sheets—Sheet 3.

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Fig. 3.

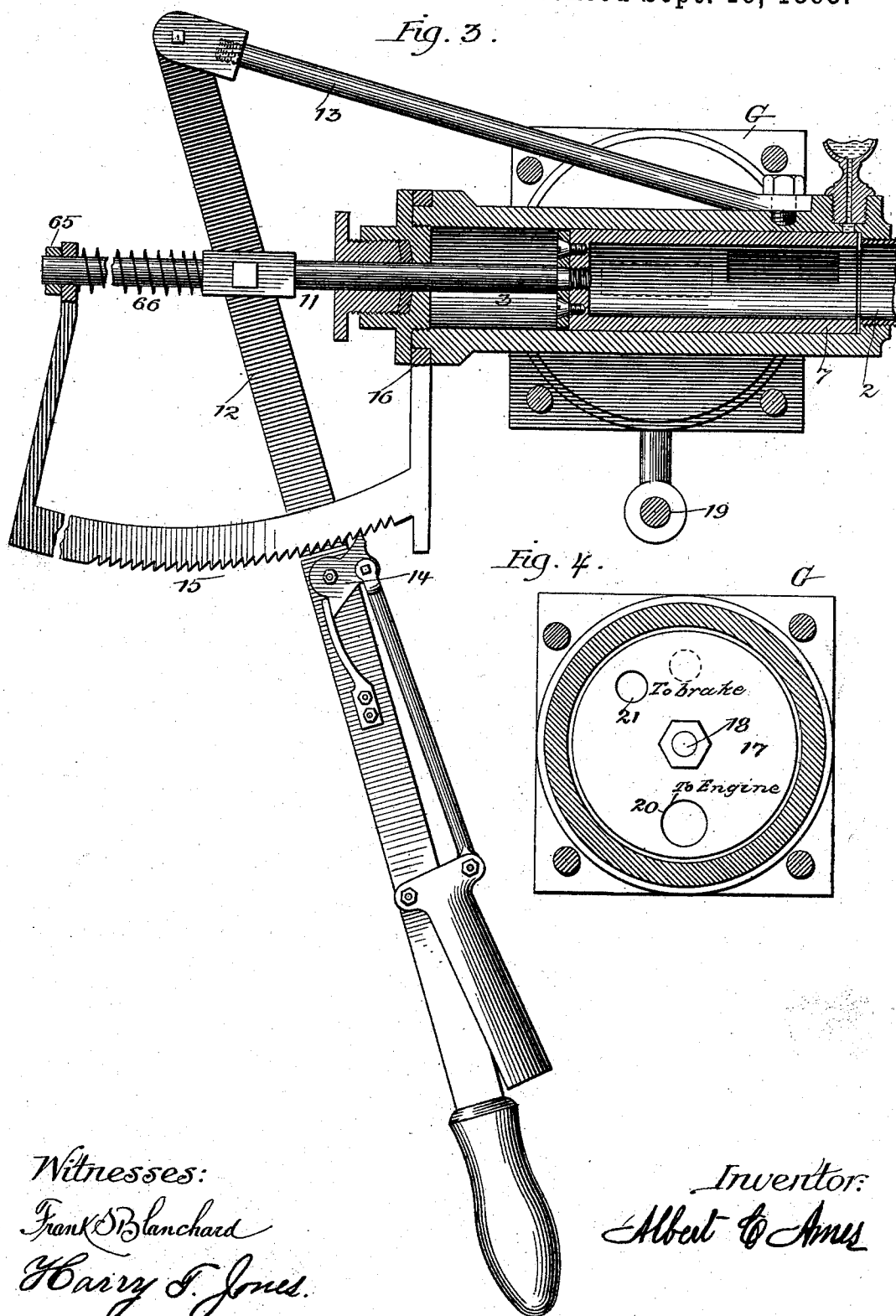
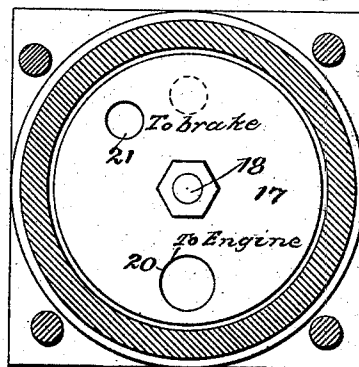


Fig. 4.



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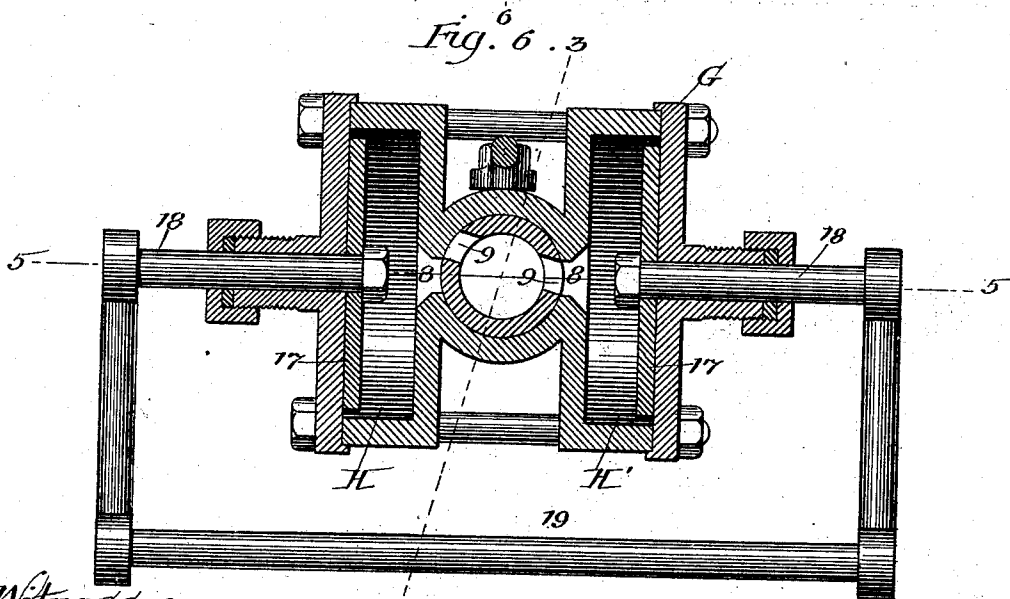
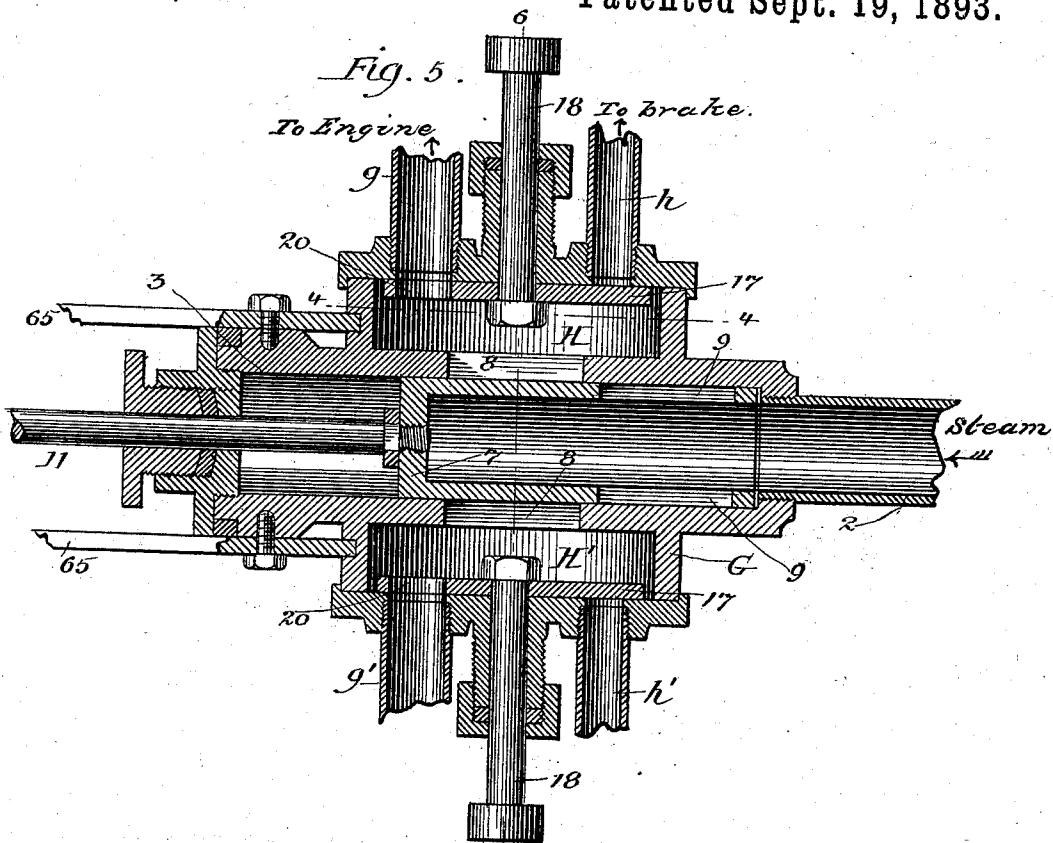
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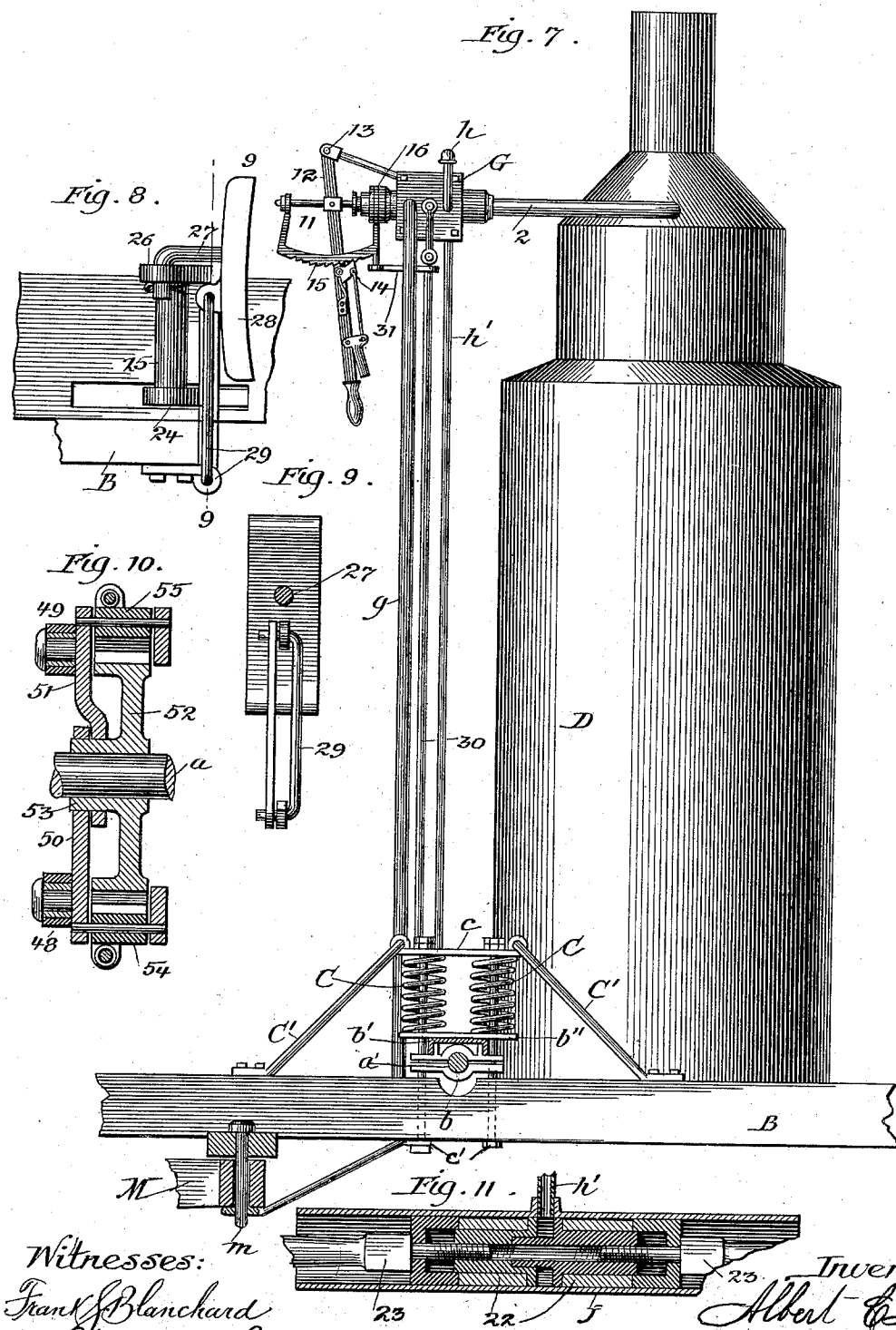
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6 Sheets—Sheet 5.

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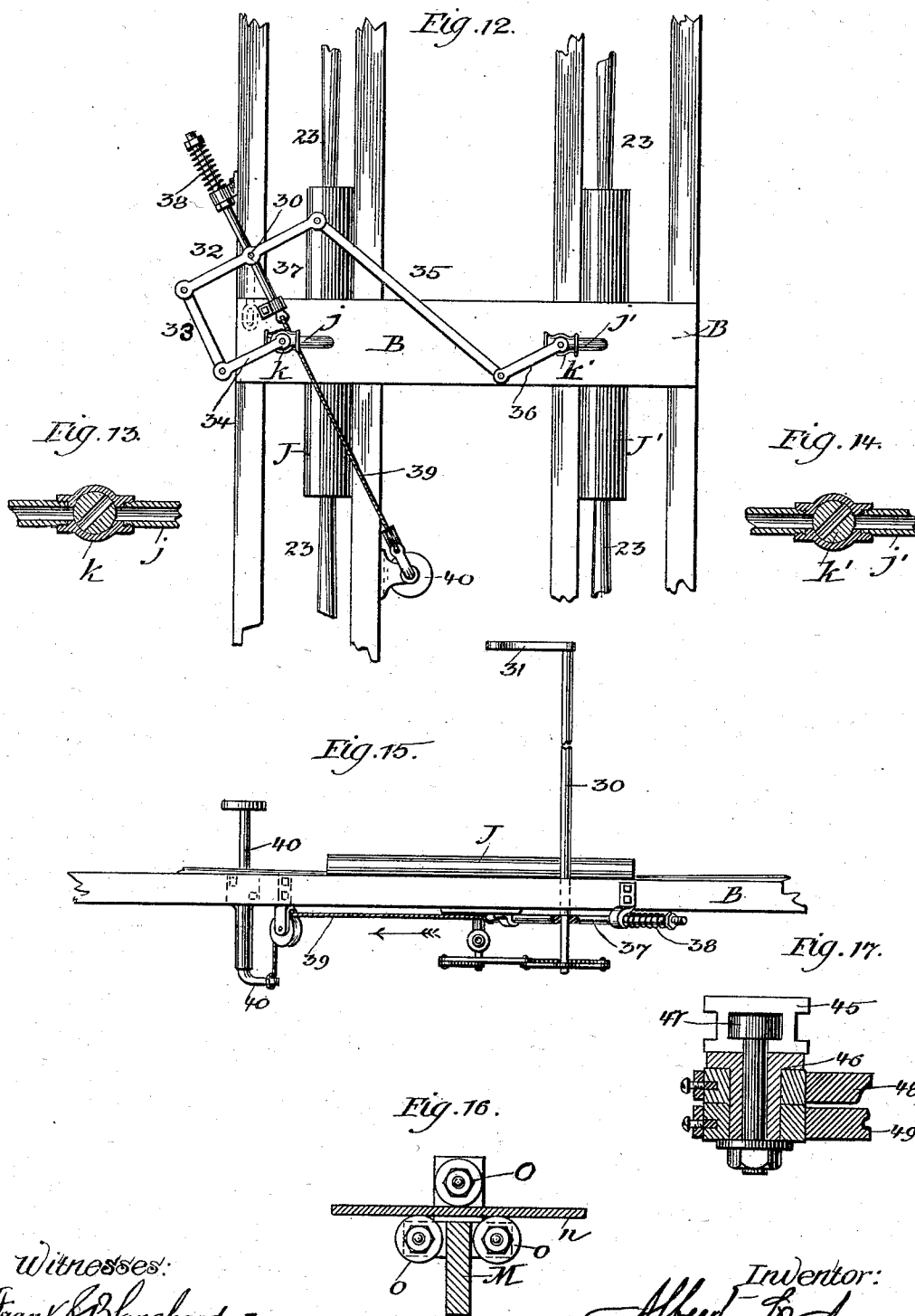
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6 Sheets—Sheet 6.

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UNITED STATES PATENT OFFICE.

ALBERT C. AMES, OF CHICAGO, ILLINOIS.

TRACTION-ENGINE.

SPECIFICATION forming part of Letters Patent No. 505,151, dated September 19, 1893.

Application filed June 27, 1890. Serial No. 356,998. (No model.)

To all whom it may concern:

Be it known that I, ALBERT C. AMES, a citizen of the United States, residing in Chicago, county of Cook, State of Illinois, have invented a new and useful Improvement in Traction-Engines, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 is a top or plan view, the engines being in section. Fig. 2 is an enlarged partial view, being a longitudinal section showing many of the parts in elevation. Fig. 3 is an enlarged detail showing the valve and operating lever, being a section on line 3, 3, of Fig. 6. Fig. 4 is an enlarged detail, being a section through the valve at line 4, 4, of Fig. 5. Fig. 5 is an enlarged detail, being an enlarged section through the valve on line 5, 5, of Fig. 6. Fig. 6 is an enlarged section on line 6, 6, of Fig. 5. Fig. 7 is an enlarged detail, being a side elevation of the boiler and valve. Fig. 8 is an enlarged detail, showing the mechanism for supporting and operating the brake-shoe. Fig. 9 is an enlarged detail, being a section on line 9, 9, of Fig. 8. Fig. 10 is an enlarged detail, being a section through the driving mechanism. Fig. 11 is an enlarged detail, being a longitudinal section through the brake cylinder. Fig. 12 is an enlarged detail, being an under side view of devices for operating the brake-cylinder valves. Figs. 13 and 14 are enlarged details, showing the positions of the valves of the brake cylinders. Fig. 15 is an enlarged detail, being a side elevation of the devices for operating the brake cylinder valves. Fig. 16 is an enlarged detail, showing the anti-friction wheels for supporting the frame. Fig. 17 is an enlarged section through the wrist pin and connecting rod; and Fig. 18 is a reduced diagram view showing a modification.

This invention relates to traction engines designed to supply motive power for plows, thrashing machines, and other agricultural implements; many of the improvements, however, may be applied to various other forms of engines.

The objects of this invention are to provide a traction engine in which the weight of the engine will be borne mainly by the driving wheels and in which one driving wheel may be driven or braked independently of the

other; or, in which the driving wheels may be driven in unison; to provide improved mechanism for communicating motion from the engine to the carrying or driving wheels; to provide improved valve mechanism for the engines and for the brakes; and to provide various other improvements hereinafter more specifically set forth. I accomplish these several objects as illustrated in the drawings and as hereinafter described.

That which I claim as new will be pointed out in the claims.

In the drawings: A represents one carrying wheel, and A' the other carrying wheel. These wheels are secured upon their respective axles *a, a'*, which are in effect a single axle divided about midway of its length.

B represents the main frame of the machine which is suspended from the axles *a, a'*, by means of boxes *b*. A channel iron *b'* as best shown in Fig. 7, rests upon the boxes *b*, and upon the channel iron rests a cross piece *b''* which supports springs C that bear against a cross-plate *c* connected with the frame B by means of bolts *c'*. The channel iron *b'* firmly holds the divided axle *a, a'*. The cross plate *c* and bolt *c'* are braced by means of braces *C, C'*. The frame B is made of suitable form and of suitable material to support the operating parts of the engine.

D is the boiler which is supported upon the frame B.

E, E', are two steam engines which are preferably vertical engines, and in the arrangement shown are mounted on the rear portion of the frame B. These engines respectively are provided with piston rods *e* which are connected with crank-shafts *F, F'*.

G is the valve chest. This valve chest G is connected with the engine E by a steam pipe *g* and with the engine E' by a steam pipe *g'*. Steam is admitted to the valve chest G from the boiler D through a pipe 2, as shown in Figs. 1 and 7.

The valve chest G is provided with a tubular chamber 3 and with two chambers H, H', which are located on opposite sides of the chamber 3. The chambers H, H', are connected with the chamber 3 by means of passages 8, as shown in Figs. 5 and 6 and indicated by dotted lines in Fig. 3.

In the chamber 3 is located a rotatable and

longitudinally movable valve 7 which is hollow, as shown in Figs. 5 and 6, so as to receive steam from the pipe 2, and is provided with side openings 9 which correspond to the passages 8, as best shown in Fig. 6. The valve 7 is provided with a stem 11 which extends through a stuffing box at the end of the chamber 3, as shown in Fig. 3. The stem 11 is pivotally connected with a lever 12, as shown in Figs. 3 and 7, which lever is pivoted at one end to a rod 13. The free end of the lever 12 is provided with a pawl 14 which is adapted to engage with a rack 15. The rack 15 is supported upon the valve chest G by means of a collar 16, as shown in Fig. 7, and at its outer end receives the valve stem 11. The operator can move the valve 7 longitudinally in the chamber 3, thereby admitting more or less steam to the passages 8 through the openings 9. By rocking the stem 11 and valve 7 by means of the lever 12, he can admit more or less steam through the opening 9 and passage 8 into either of the chambers H, H', as shown in Fig. 6, thereby admitting a large amount of steam to the chamber H and a corresponding small amount to the chamber H', or a large amount to the chamber H' and a corresponding small amount to the chamber H, as may be necessary and desired for purposes hereinafter set forth.

In the outer end of each chamber H, H', are two openings, one for the pipe leading to the engine, as *g*, and one, as *h*, for the pipe leading to the brake cylinder hereinafter set forth. In the outer end of each chamber H, H', is a rotatable disk 17 each of which disks 17 is mounted upon a stem 18, and the outer ends of the stems 18 are connected by means of a bail 19, as best shown in Fig. 6. Each disk 17 is provided with two holes, one, 20, corresponding to the opening in the end of the chamber leading to the engine, and the other, 21, corresponding to the opening leading to the brake cylinder. These openings 20, 21, are so arranged that only one of them will register with its corresponding opening in the end of the chamber at a time, as shown in Fig. 4. When the holes 20 of the disks 17 register with the steam passages *g*, *g'* the steam admitted into the chambers H, H', will go to the steam engines E, E', and when the holes 21 register with the openings *h*, *h'*, steam will go to the brake cylinders hereinafter described. Steam will not be simultaneously admitted to the brakes and engines, but when steam is admitted to one, it will be shut off from the other. Two brake cylinders J, J', are secured upon the frame B, as best shown in Fig. 12. Steam is admitted to the cylinder J from the chamber H' through the pipe *h'* and steam is admitted to the cylinder J' from the chamber H through the pipe *h*.

Each cylinder J, J' is provided with two piston heads 22, which work in opposite directions and the port from the pipe *h* or *h'* is between the two piston heads 22. Each piston head is provided with a piston rod 23

which rods, as shown, in Fig. 1, extend forward and backward and each is connected to a lever 24. Each lever 24 is secured upon a third rock-shaft 25, as best shown in Fig. 8. Each rock shaft 25 is provided with an arm 26 and to each arm 26 is secured a rod 27 on which is mounted a brake-shoe 28 which brake-shoe is further supported by a link 29 secured to the brake-shoe and at the other end to the frame B. By this arrangement a brake-shoe and operating mechanism are provided on each side of each wheel A, A'.

The cylinder J is provided with a discharge pipe *j* which is provided with a valve *k* and the cylinder J' is provided with a discharge pipe *j'* which is provided with a valve *k'*.

30 is a rod which is connected at its upper end by an arm 31 with the rack 15, as shown in Fig. 7. This rod 30 at its lower end is provided with a swinging arm 32. The arm 32 is connected with the stem of the valve *k* by means of a link 33 and arm 34 and with the stem of the valve *k'* by means of a link 35 and arm 36. The rod 30 at its lower end is supported upon a horizontal rod 37, which is mounted in suitable bearings in the frame B. This rod 37 is provided with a spring 38 which normally holds the rod in the position shown in Fig. 12. To one end of the rod 37 is secured a cable or rope 39 which passes over a pulley and is attached to a pedal 40 as best shown in Fig. 15.

When the parts above described are in their normal position, the valves *k*, *k'*, of the exhaust ports *j*, *j'*, are both closed, as shown in Figs. 13 and 14 and when the operator turns the valve stem 11, lever 12, and rack 15, the rod 30 will be rocked by means of the arm 31, which will open one of the valves *k*, or *k'*, and close the other, so that when steam is admitted to one brake cylinder only its exhaust valve will be closed while the exhaust valve of the other brake cylinder is open. When steam is admitted to both brake cylinders both valves *k*, *k'* will be closed and when it is desired to open the valves *k* and *k'* simultaneously and quickly, the engineer by pressing down upon the pedal 40 will draw the rod 37 with the link 32 in the direction indicated by the arrow in Fig. 13 which will cause the links 33 and 35 to swing both arms 34 and 36 and open both valves *k*, *k'*.

The shaft F drives the wheel A by an improved mechanism which I will hereinafter describe, and the shaft F' drives the wheel A' by a similar mechanism so that the description of the mechanism for driving the wheel A from the shaft F of the engine E will be sufficient for both wheels A, A'.

The shaft F is provided with a fly-wheel 41 and with a pinion 42. This pinion 42 gears with a larger pinion 43 secured upon a shaft 44 mounted in suitable bearings upon the frame B. The outer end of the shaft 44 is provided with a crank arm 45 on which is adjustably secured a wrist pin 46. The wrist pin 46 is adapted to be clamped to the crank

arm 45 at different distances from the shaft 44 so that a longer or shorter stroke may be given. The wrist pin 46 is adjustably secured to the crank arm 45 by means of a bolt 47, as best shown in Fig. 17. Upon this wrist pin 46 are mounted two connecting rods 48 and 49. The connecting rod 48 is pivotally connected with a swinging arm 50 at its forward end and the connecting rod 49 is pivotally connected with a swinging arm 51 at its forward end.

52 represents a gear wheel which is mounted upon the axle *a* as shown in Fig. 2. This wheel 52 is provided with a hub 53 upon which are mounted the arms 50 and 51, as best shown in Fig. 10. The arm 50 is provided with a pawl 54 adapted to engage with the wheel 52, and the arm 51 is provided with a pawl 55 adapted to engage with the wheel 52 on the opposite side from the pawl 54. On the arm 50 is mounted a rod 56, and on the arm 51 is mounted a rod 57. These rods 56 and 57 at their rear ends are connected with a swinging lever 58, as best shown in Fig. 2, which lever 58 is pivotally mounted upon the connecting rod 49. Each of the pawls 54 and 55 are double pawls and each is provided with a projection 61 against which press two springs 59 and 60 which are mounted upon the rods 56 and 57 and act to press the pawls in engagement with the wheel 52, as hereinafter set forth. The rotation of the shaft 44 and arm 45 will draw the connecting rods 48 and 49 backward when in the position shown in Fig. 2, and when the center is passed will move them both forward. When they are drawn backwardly the pawl 54 on the arm 50 will engage with the wheel 52 on the lower side moving it a certain number of teeth while the pawl 55 will slip over the teeth. As soon as the wrist pin 46 passes the center the pawl 55 on the arm 51 will engage with the teeth on the upper side of the wheel 52, and the pawl 54 will slip over the teeth of the wheel 52. This will cause the pawls 54 and 55 to alternately engage with the teeth of the wheel 52, thereby driving the wheel.

62 is a lever pivotally mounted upon the rod 49 provided with a spring pawl 63 adapted to engage with a segment 64, also mounted upon the rod 49. The lever 62 is pivotally connected with the rod 57, as best shown in Fig. 2. By means of the lever 62 the rods 56 and 57 can be shifted thereby shifting the positions of the projections 61 on the pawls 54 and 55. When the pawls 54 and 55 are in the position shown in Fig. 2, the wheels 52 and the wheels *A, A'*, will be driven forward. When the lever 62 is shifted into the middle position, the pawls 54 and 55 will be held out of engagement with the wheels 52 by the springs 59 and 60. When the lever 62 is shifted into the farther notch from the positions shown, the opposite ends of the pawls 54 and 55 will engage with the wheels 52 and thereby reverse the wheels 52 and wheels *A, A'*.

The distance of the wrist pin 46 from the

shaft 44 may be varied in order to increase the length of movement of the arms 48 and 49. In an engine which I have designed the pinion 42 makes about four revolutions while the wheel 43 is making one. By placing the wrist pin 46 near the shaft 44 the pawls 54 and 55 may be caused to engage with the wheel 52 one tooth each, so that the wheel 52 will be rotated a distance of two teeth each rotation of the shaft 44. By increasing the distance from the shaft 44 to the wrist pin 46, the pawls 54 and 55 will be caused to move the wheel 52 a greater distance and in the engine which I have designed each may be caused to move the wheel six teeth at the greatest stroke. This construction gives an adjustment whereby the amount of power exerted on the wheels 52 may be varied as may be necessary according to the traction of the wheels *A, A'*, the speed at the same time being correspondingly varied.

The engines *E, E'*, operate independently of each other for the purpose of driving the wheels *A, A'*, independently of each other. By operating the valve *G* as hereinbefore described, one wheel may be driven much faster than the other thereby turning the machine to the right or to the left and by the same valve, steam may be shut off from the engines and a brake applied to both wheels *A, A'*, or to either separately, thereby turning the machine to the right or left. The steam pipes from the valve *G* to the brakes *J* are crossed (that is, the pipe from one side leads to the brake cylinder on the opposite side,) so that the operation of the valve will be the same for the engines and for the brakes in steering.

As shown in Fig. 1, the shafts *F, F'*, may be connected by means of a clutch *L* between their adjoining ends, so that the driving mechanism connected with the shafts will be driven alike, thereby driving the wheels *A, A'*, alike and propelling the engine forward in a straight line. By connecting the adjoining ends of the shafts *F, F'* by a clutch *L* and throwing the pawls 54 and 55 on one side out of engagement with their wheel 52 by means of the lever 62, the power of both engines *E, E'*, may be exerted upon either wheel *A, A'*, alone.

As heretofore stated, the weight of the parts upon the frame *B* is nearly balanced upon the axles *a, a'*, but the weight in rear is somewhat greater than that in front. To support the rear end of the frame *B*, I connect therewith a reach *M* by a king-bolt *m*, as shown in Figs. 1 and 2. The rear end of the reach *M* may be connected with a truck, water-cart or other wheeled vehicle.

To the under side of the frame *B* at its rear end, I secure a circle *N* provided with a flange *n*, as shown in Figs. 1 and 2, and upon the reach *M*, I secure a bearing which is provided with two anti-friction rollers *o* upon which the flange *n* rests, and an anti-friction roller *O* which is arranged to engage with the upper face of the flange *n*, as best shown in Fig.

16. When the engines E, E' are driving the wheels A, A' forwardly, there will be a large amount of pressure upon the frame B at its rear end. By supporting the rear end upon a flange *n* resting on anti-friction rollers *o* mounted upon the reach M, the machine can be readily turned without causing any strain or friction upon the reach M. The anti-friction wheel *O* prevents the flange *n* on the circle N from being lifted, thereby preventing the frame B from being tilted forward when the engine is reversed or when some sudden jerk is given.

In Fig. 18 I have shown a modification of a device for transmitting power from the driving shaft to the wheel 52. In this form, two connecting rods 48^a, and 49^a, corresponding to the rods 48 and 49 of Fig. 2, are employed, but, instead of being pivotally mounted upon the wrist-pin 46, they are connected with a swinging lever P; and the swinging lever P is pivotally connected by means of a connecting rod *p* with the wrist pin 46. The connecting rod *p* may be guided in any suitable guides. The operation will be the same as that of the parts shown in Fig. 2, except that in some instances a more perfect operation will be secured.

By using the form of driving mechanism hereinbefore described, the frame B may be supported upon springs, as C, without interfering with the work of the driving mechanism.

When the reach M, is attached to a two-wheeled vehicle, it must be attached by an eye-bolt or hinge joint, as shown in Fig. 2, so that the reach will not be twisted in passing over uneven ground.

Both shafts F F' are provided with fly wheels 41, and the hubs of these fly wheels are provided with clutch sections to form the clutch L. The shafts F F', may be coupled by sliding one wheel 41, upon its shaft, it being secured to the shaft by a feather or spline. When the engine is used as a driving power for a thrashing machine the band runs over both wheels 41. I couple the shafts F F' so that the cranks of the engines E E', will be at right angles. The outer end of the valve stem 11, is supported by a bracket 65, which is secured to the valve chest G, as shown in Fig. 5. Between the lever 12, and segment 15, is placed a spring 66, which holds the valve 7, in against the steam pressure as best shown in Fig. 3.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a traction engine, the combination with a frame B and independent wheels A, A', on which the frame is supported, of two independent engines E, E', driving mechanisms between the engines E, E' and the wheels A, A', respectively, a reach M, whereby the traction engine is guided by the independent engines, substantially as specified.

2. The combination with a frame B and independent wheels A, A', of two independent

engines E, E', driving mechanisms between the engines E, E', and a coupling device L for coupling together the engines whereby the wheels A, A', can be driven in unison, substantially as specified.

3. The combination with a frame B and two independent wheels *a, a'*, of two independent engines E, E', mechanisms for driving the wheels A, A', from the engines E, E', respectively, a coupling device for coupling the two engines and a device for throwing one driving mechanism out of operation, whereby both engines may be caused to drive a single wheel, substantially as specified.

4. The combination with a frame B and two independent wheels A, A', of two independent engines E, E' for driving the wheels A, A', respectively, mechanisms for driving the wheels A, A' from the engines E, E', devices for throwing the driving mechanisms out of operation, and a device L for coupling the two independent engines, whereby the engines E, E' may be used for supplying power, substantially as specified.

5. The combination with two independent wheels A, A', and two independent brake cylinders J', J, and brake mechanisms between the cylinders J', J, and the wheels A, A', respectively, of a steam chest G provided with chambers H, H' connected with the brake cylinders J, J', respectively, a sliding and rotatable valve 7, and ports 8 and 9, substantially as specified.

6. The combination with a steam chest G provided with chambers H, H', of a sliding and rotatable valve 7, ports 8 and 9, levers 12 provided with a pawl 14, and a rotatable segment 15, substantially as and for the purpose specified.

7. The combination with independent brake cylinders J', J, and independent steam engines E, E', of a valve chest G provided with chambers H, H', rocking disks 17 provided with openings 20, 21, connections between the chest G and steam engines, and brake cylinders, and mechanism for rocking the disk 17, substantially as and for the purpose specified.

8. The combination with two independent wheels A, A', and two brake cylinders J', J, of exhaust ports *j, j'*, valves *k, k'*, a lever 12, connections between the valves *k, k'*, and the lever 12, and a steam chest G, substantially as specified.

9. The combination of two exhaust ports *j, j'*, and valves *k, k'*, of a swinging lever 32, links 33, and 35, and arms 34 and 36, substantially as specified.

10. The combination with two exhaust pipes *j, j'*, valves *k, k'*, of a swinging lever 30, links 33 and 35, arms 34 and 36, a rod 37 to which the lever 30 is pivotally connected, a spring 38, cable 39, and pedal 40, substantially as specified.

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