No. 687,670. Patented Nov. 26, 1901.

G. E. WHITNEY.

ENGINE.

(Application filed Feb. 7, 1901.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1

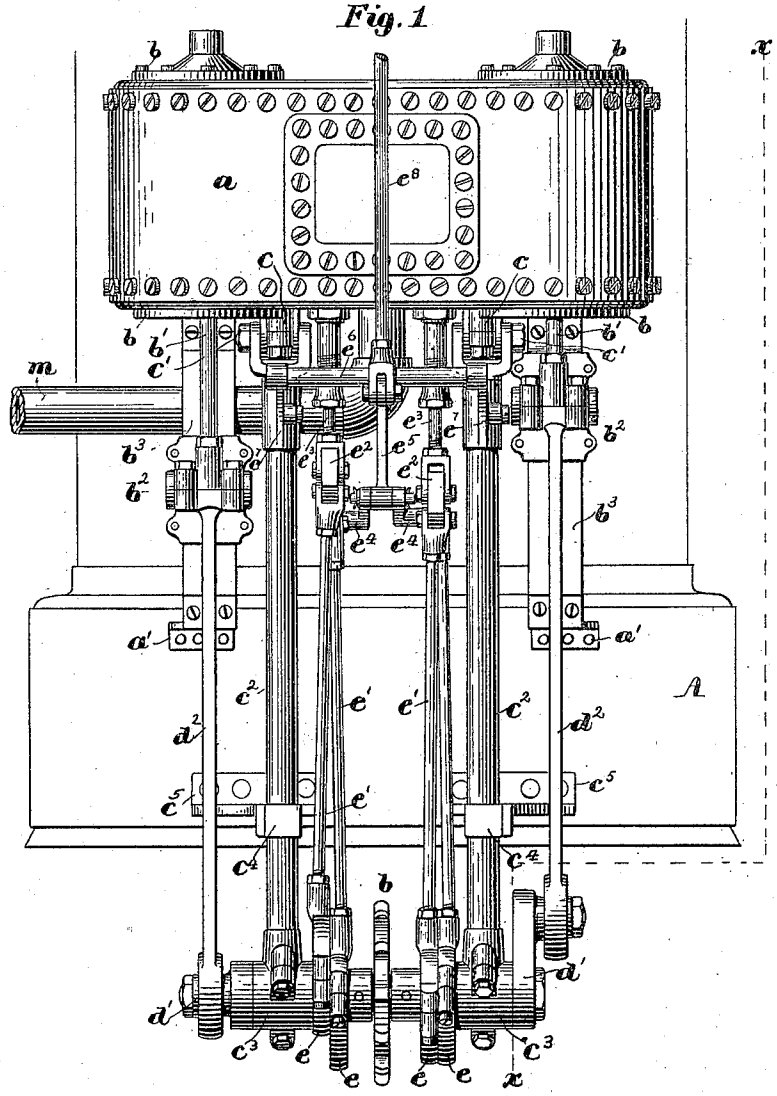
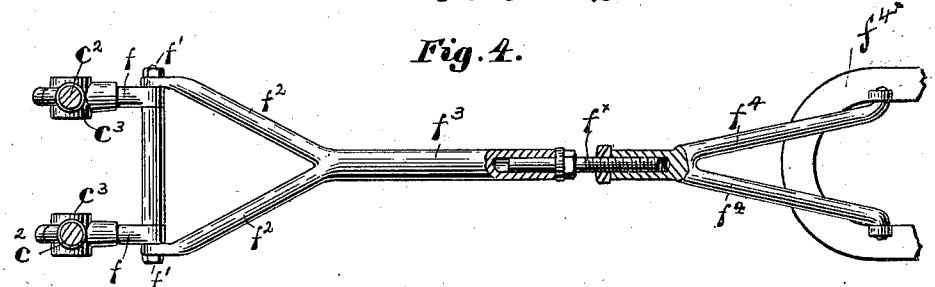


Fig. 4.



Witnesses:
Walter B. Lombard
A. L. Chaney

Inventor:
George E. Whitney,
by Munn & Emery
Atty.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 687,670. Patented Nov. 26, 1901.

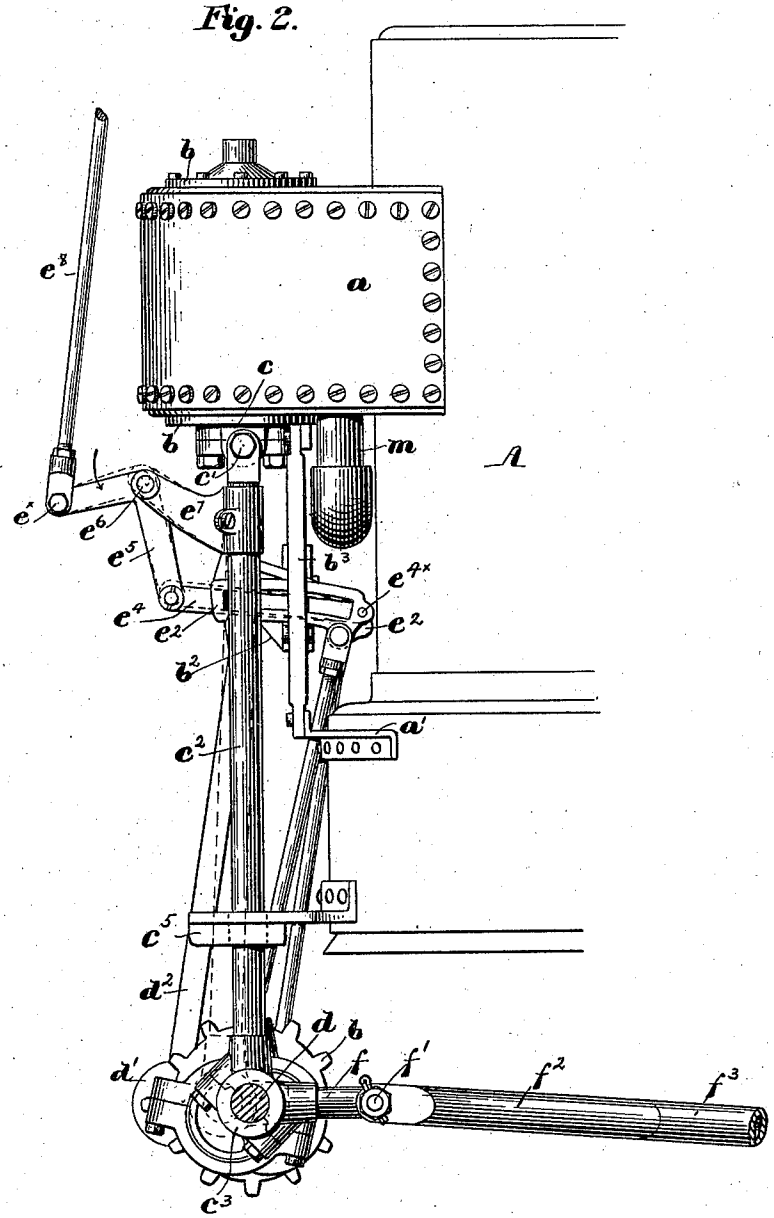
G. E. WHITNEY.

ENGINE.

(Application filed Feb. 7, 1901.)

(No Model.) 3 Sheets—Sheet 2.

Fig. 2.



Witnesses:
Walter E. Lombard
A. L. Chesley

Inventor:
George E. Whitney,
by Frederick L. Emery
Atty.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C

No. 687,670. Patented Nov. 26, 1901.

G. E. WHITNEY.

ENGINE.

(Application filed Feb. 7, 1901.)

(No Model.) 3 Sheets—Sheet 3.

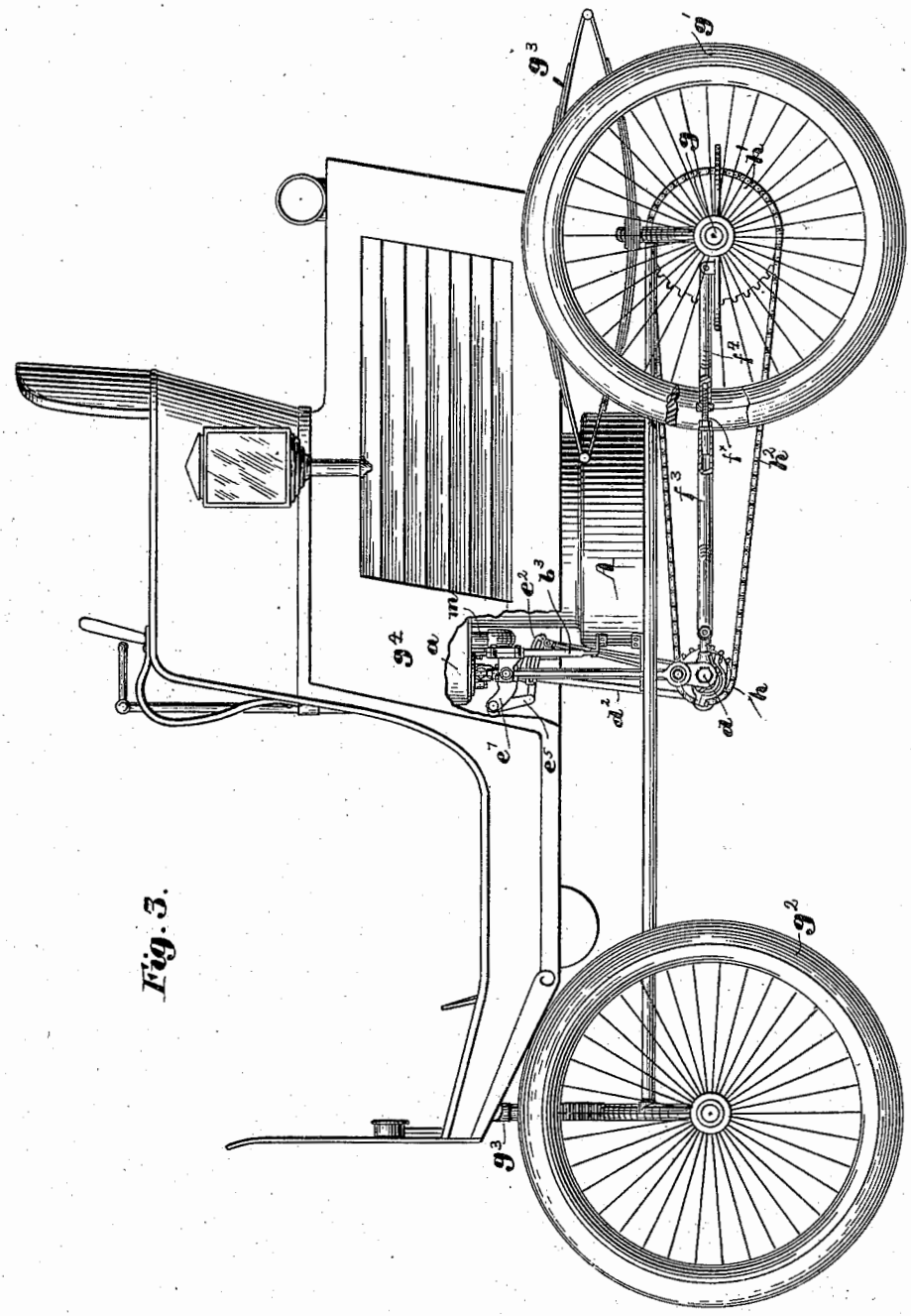


Fig. 3.

Witnesses:
Walter E. Lombard
A. L. Chesley

Inventor:
George E. Whitney,
by Frederick L. Emery
Atty.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

GEORGE E. WHITNEY, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO WHITNEY MOTOR WAGON COMPANY, OF KITTERY, MAINE, A CORPORATION OF MAINE.

ENGINE.

SPECIFICATION forming part of Letters Patent No. 687,670, dated November 26, 1901.

Application filed February 7, 1901. Serial No. 46,290. (No model.)

To all whom it may concern:

Be it known that I, GEORGE E. WHITNEY, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Engines, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention has for its object to provide a novel and improved engine to be operated by steam or other fluid under pressure.

My invention is particularly adapted for use in connection with motor-vehicles, and I shall therefore disclose said invention as applied to such a vehicle, it being understood, however, that my invention is applicable to any other purpose to which it may be found adapted.

I will first disclose my invention in the best embodiment thereof now known to me, but without limiting myself thereto.

Referring to the drawings, Figure 1 is a front elevation of an engine constructed in accordance with my invention. Fig. 2 is a section on the irregular dotted line x x, Fig. 1, with one of the cross-heads and connecting-rods removed. Fig. 3, in side elevation, shows my engine carried by a motor-vehicle, a part of the latter being broken away to disclose more fully the parts of the engine; and Fig. 4, a detail of the distance member shown in Fig. 3.

In the embodiment of my invention shown in the drawings, A is part of a generator of steam or other fluid under pressure, it being shown as part of a vertical tubular boiler, projecting from which, at the side, is a lateral extension a, within which are arranged the engine-cylinders, the heads of which are shown to be b b. This arrangement of boiler with a lateral extension containing the cylinders is substantially as shown in my United States Patent No. 601,218, dated March 22, 1898, to which reference may be had for a more detailed description of the construction of the same, it being sufficient to say at this point that cylinders thus arranged are kept hot by the steam from the boiler, which enters the surrounding extension or jacket, thus practically eliminating condensation and its attendant serious consequences. The cylinders contain usual pistons, the piston-rods b' of which are fitted at their outer ends with usual cross-heads b^2, that slide upon the guides b^3. These guides are shown as rigidly attached at their upper ends to the cylinder-heads and at their lower ends to brackets a' on the boiler A, so that the boiler constitutes one form of frame or foundation support for the cylinder end of the engine, including the guides, thus preserving the reciprocating parts of the engine in perfect alinement, which is necessary for the best results.

Located between the cylinders of the engine and preferably forming parts of the bottom cylinder-heads are the depending lugs c c, to which are jointed at c' the upper ends of the movable or swinging frame-tubes c^2, provided at their lower ends with bearings c^3, in which is journaled the crank-shaft d. These frame-tubes constitute the movable portion of the engine-frame. The crank-shaft d, carried in this movable frame portion, is provided at its opposite ends with usual cranks d', preferably set on the quarter and joined by the connecting-rods d^2 to the cross-heads b^2 referred to, whereby reciprocation of the pistons and piston-rods will act in usual manner to rotate the crank-shaft. The crank-shaft, between the tubular frame members c^2, (see Fig. 1,) is provided with usual eccentrics e e, connected by eccentric-rods e' with and to actuate the links e^2, the link-blocks of which are connected with the valve-stems e^3, that operate usual valves in the steam-chest between the cylinders in the boiler extension or jacket a referred to. This valve mechanism is of the usual type known as the "Stevenson link-motion" and need not be further described.

The links may be shifted for reversing the engine by means of reach-rods e^4, jointed at their outer ends to the bell-crank e^5, mounted upon the tumbler-shaft e^6, carried in suitable brackets e^7 on the frame-tubes c^2. The bell-crank e^5 is connected at $e^\times$ with a reversing-rod e^8, leading to a suitably-locked reversing-lever (not shown) accessible to the operator of the carriage, movement of said

reversing-rod acting to rock the said bell-crank and move the links from right to left, Fig. 2, to reverse the engine.

Referring to Figs. 2 and 4, the bearings at the lower ends of the frame-tube c^2 are provided with rearwardly-extended arms f, to which are jointed at f' the arms f^2 of a suitable distance-rod f^3. This distance-rod is connected at its opposite end, through its arms f^4, to some part, as $f^{4\times}$, attached to the center bearings of the axle g, which here constitutes a driven member, it being connected with the crank-shaft d of the engine by usual sprocket-wheels h h', Fig. 3, and chain h^2. This driven member or axle g, shown as the rear or driving axle of a motor-vehicle, is provided with usual driving-wheels g', there being the usual leading-wheels g^2, with suitable supports, the whole constituting a running-gear carrying upon springs, as g^3, the vehicle-body g^4, to which the boiler A is rigidly attached. While the wheels g' g^2 may be provided with usual cushions or yielding tires, I do not herein refer to such as any part of the yielding supports of the vehicle-body.

The distance-rod f^3 is made adjustable at $f^\times$ in suitable manner, whereby to vary its length, and thereby swing the crank-shaft and the lower end of the swinging frame portion c^2 in one or the other direction about its pivots c' to regulate the slack in the sprocket-chain or for such other purpose as may be required.

The frame-tubes c^2 (see Figs. 1 and 2) are provided with flat side bearing-surfaces c^4, that coöperate with guide-brackets c^5 on the boiler to steady the frame-tubes against lateral vibration, that would naturally result if the said frame-tubes were supported only at their upper ends, and of course the distance-rod f^3 prevents vibration in the direction of the length of the chain or in the plane of rotation of the crank-shaft. Oscillation of the engine about a vertical axis is further prevented by the widespread forked ends of the distance-rod, which engage the bearings for the crank-shaft near the ends of the latter. The lengths of the frame-tubes c^2 and of the connecting-rods are such that movement of the crank-shaft to the right or left, Fig. 2—*i. e.*, fore and aft of the vehicle—through the distance required for any ordinary adjustment of the drive-chain will not throw the said crank-shaft out of alinement with the axes of the cylinders sufficiently to cause any appreciable difference in the operation of the engine, and as such movement in the engine shown takes place in an arc of a circle having a long radius equal to the lengths of the frame-tubes c^2 the curvature of the arc of movement would be so slight that there would be no appreciable movement of the crank-shaft toward or from the cylinders that would act to vary the strokes of the pistons in the latter.

The valve mechanism, which is the most sensitive part of an engine and the part most easily disarranged or thrown into error by any change of position or alinement, is in the present instance rendered practically unaffected by any adjustment of the crank-shaft by a suitable compensating arrangement that I will now describe. The center of the tumbler-shaft e^6 (see Fig. 2) is located so far to one side of the vertical pivotal line of the movable frame-tubes c^2 that any horizontal or swinging movement of the frame-tubes will cause the tumbler-shaft to have a pronounced up-and-down movement as well; but the reversing-rod e^8 holds the joint $e^\times$ stationary. Hence if the frame-tubes be swung to the left, Fig. 2, into the extreme dotted position shown the tumbler-shaft e^6 in addition to the slight movement to the left will also be lifted into this dotted position and will thereby cause the bell-crank e^5 to be swung in the direction of the arrow, about $e^\times$ as a fulcrum, causing the lower end of the bell-crank to be moved to the right into its dotted position, and this movement of the lower end of the bell-crank to the right exactly neutralizes the movement of the tumbler-shaft and frame-tubes to the left, so that the reach-rod e^4 receives no appreciable horizontal movement, leaving the links in substantially the same position as before the movement. If, on the other hand, the frame-tubes c^2 be moved to the right, Fig. 2, the tumbler-shaft not only will be moved slightly to the right, but will also be dropped and will thus swing the lower end of the bell-crank to the left, thereby neutralizing the two movements and leaving the links substantially unaffected, as before.

While the advantages of an engine constructed in accordance with my invention above disclosed are many when applied for various purposes, yet the advantages are particularly obvious when considered in connection with motor-vehicles. For example, my invention admits of the boiler being rigidly bolted or secured upon the spring-supported body of the vehicle instead of movably connected therewith, (as in my said patent of March 22, 1898,) and, furthermore, it permits the cylinders, whether or not within a lateral extension of the boiler, to be rigidly attached relative to the boiler, thus avoiding all joints or slip constructions in the steam pipes or passages that lead to or from the engine and that are absolutely necessary in constructions where the boiler is rigid and the engine as a whole swingingly or otherwise movable for the purpose of adjusting the drive chain or connections. Furthermore, by attaching the cylinders and guides so that they form one rigid structure with the boiler perfect alinement of the reciprocating parts is insured, and the entire weight of the boiler and its contained water and the carriage-body or other carrier when the latter and the boiler are rigidly secured together act like or as a foundation to prevent and take up any vibrations due to the rapid reciprocations of the parts of the engine. In

other words, the weight rigidly secured to the cylinder end of the engine is such as to steady it completely against any perceptible vibration, which is not true, nor can it be, of an engine not rigidly attached to the boiler, for in such case the engine is not itself of sufficient weight to hold itself against the tendency to vibrate due to the rapid reciprocation of its parts. While, therefore, the parts of the engine that tend most violently to vibrate an engine are thus carried by a rigid foundation or frame, (herein the boiler A,) the rotating crank-shaft is free to be adjusted at will to furnish the required tension or draft upon the drive-chain, and obviously this adjustment can be made more easily, expeditiously, and with greater certainty where only the crank-shaft end of the engine-frame is movable than could be possible where the entire engine must be moved, which would be necessary were the engine-frame rigid throughout, with no part movable separately from another. Furthermore, when the vehicle is in motion the distance means or rod f^3, by maintaining a substantially-fixed operative distance between the non-spring-supported driven member g and the spring-carried engine and its crank-shaft, causes the latter to have an almost constant vibrating or back-and-forth body movement relative to the cylinders due to the up-and-down movements of the body upon its springs, and as the crank-shaft end only of the engine is thus vibrated it has less modifying effect upon the spring-supported movements or easy riding of the vehicle and is otherwise less objectionable than would be possible in constructions wherein the whole engine is swung or moved.

When the guides are attached to the engine-frame in accordance with the usual custom, the said frame must be of sufficient lateral rigidity and strength to withstand the side thrusts of the pistons upon the guides due to the angularity of the connecting-rods; but in my engine, as shown in Fig. 2, the guides are mounted upon the boiler. Hence the frame is relieved of all these side thrusts and withstands only the longitudinal thrusts of the pistons, and as these longitudinal thrusts are in the direction of the length of the frame I am enabled to make the latter of light tubes c^2, that possess great longitudinal strength and rigidity, but comparatively slight lateral rigidity, because the latter is not required. The lateral thrusts of the cranks are received by the distance-rod f^3 principally in the direction of the length of the latter. Thus it is that I have been enabled to make my engine several pounds lighter than an engine of corresponding power constructed as heretofore. My invention makes it possible and practicable to have the crank-shaft adjustable and still have the cylinders inclosed within a steam-jacket or portion of the boiler, whereby the engine and its vehicle may be started up at any time suddenly and quickly without fear of blowing out the cylinder-heads, which is always to be guarded against in engines where the cylinders are detached from the boiler or other heated space that acts to keep them always hot. The exhaust from the engine is here shown as through the pipe m.

My invention is not limited to the particular embodiment selected for illustration and here shown and described, for my said invention may be varied without departing from the spirit and scope of the same.

Having described my invention and without limiting myself to details, what I claim, and desire to secure by Letters Patent, is—

1. An engine provided with a frame jointed intermediate the cylinder and the crank-shaft to permit the latter to be moved bodily independently of the former.

2. An engine having a jointed frame with means for transversely supporting the movable portion thereof.

3. An engine provided with a frame having a movable portion carrying a crank-shaft, with means for adjusting the said movable portion to vary the position of said crank-shaft relatively to the immovable portion of said frame.

4. An engine the cylinder of which is rigidly held by a suitable support and a movable frame portion connected thereto and carrying the crank-shaft, with means for adjusting the movable frame portion with its crank-shaft relatively to said cylinder.

5. An engine the cylinder of which is rigidly held by a suitable support and a movable frame portion connected thereto and carrying a crank-shaft, valve mechanism intermediate said crank-shaft and cylinder, and compensating means operating in connection with said valve mechanism.

6. An engine the cylinder and crank-shaft of which are movable bodily, one relative to the other, a valve mechanism intermediate said crank-shaft and cylinder, and compensating means for said valve mechanism.

7. An engine the cylinder and crank-shaft of which are movable bodily, one relative to the other, and a multipart frame-support for said engine, one part of said frame being movable with reference to the other parts thereof for adjusting one portion of the engine with reference to another portion thereof.

8. An engine having a boiler-support for its cylinder end, a movable frame portion carrying a crank-shaft, and a support other than said boiler for said movable frame portion.

9. An engine having a boiler-support for its cylinder end, a relatively movable frame portion carrying a crank-shaft, a driven shaft operatively connected with said crank-shaft, and a support from said driven shaft for said movable frame portion.

10. An engine having a boiler to support its cylinder end, a guide or guides also carried by said boiler, a movable frame portion carrying a crank-shaft, a driven shaft opera-

tively connected with said crank-shaft, and a support from said driven shaft for said movable frame portion.

11. An engine having a boiler-support for its cylinder, guide, and cross-head, and a movable frame portion carrying the crank-shaft.

12. An engine having a boiler-support for its cylinder end, a movable frame portion carrying a crank-shaft, and a support independent of said boiler for said movable frame portion.

13. An engine having its cylinder carried by a pressure-generator, the latter in turn mounted in a vehicle, a movable frame portion connected with said cylinder and carrying a crank-shaft, a driven member for propelling said vehicle, and frame-supporting means between the said driven member and said movable frame portion.

14. An engine a part of which is immovably carried upon a vehicle-supported boiler and another part of which receives support from a driving member of said vehicle.

15. An engine a part of which is immovably carried by a spring-supported vehicle-body and another part of which receives support from a driving member of said vehicle.

16. An engine a part of which is immovably carried upon a spring-supported member and another part receiving support from a non-spring-supported member.

17. An engine a part of which is immovably carried upon a spring-supported vehicle member and another part of which is movable relative to said first-named part and receives support from a non-spring-supported vehicle member and movable frame connections between said engine parts.

18. An engine a part whereof is immovably carried upon a spring-supported vehicle member, and another part receiving support from a non-spring-supported vehicle member and movable supporting connections between said immovable and movable frame-connected parts.

19. An engine the cylinder whereof is inclosed within a steam-chamber on, and rigidly connected with a boiler, and a crank-shaft bodily movable relative to said cylinder, with movable frame connections between said crank-shaft and cylinder.

20. An engine the cylinder whereof is inclosed within a steam-chamber on, and rigidly connected with, a boiler, and a crank-shaft bodily movable relative to said cylinder, with movable frame connections between said crank-shaft and cylinder and means to adjust said bodily-movable crank-shaft.

21. An engine having its cylinder end supported immovably by a boiler, said cylinder being arranged within the steam-space or an extension thereof of said boiler, and a crank-shaft bodily movable relative to said cylinder, and means for adjusting said crank-shaft.

22. An engine the cylinder end of which is rigidly mounted upon a boiler, together with the cross-head and guide or guides, a relatively bodily-movable crank-shaft, longitudinally-rigid frame connections between said cylinder and the crank-shaft of the engine, and longitudinally-rigid means interposed between said crank-shaft and the member driven thereby.

23. That improvement in the construction of steam-engines which consists in mounting the cylinders, pistons and guides rigidly upon a boiler-support and supporting the crank-shaft in one direction at least, from a relatively bodily movable driven member.

24. An engine having its cylinder end rigidly carried by a boiler-support, a crank-shaft mounted in a movable frame portion connected with said cylinder, a driven member, and means between said driven member and crank-shaft constructed to maintain the same at a predetermined distance one from the other, said means also restraining said crank-shaft against axial vibration.

25. An engine having its cylinder end rigidly carried by a boiler-support, a crank-shaft and a bodily-movable frame portion carrying the same, with supporting means engaging the crank-shaft end of said movable frame portion to restrain said crank-shaft against axial vibration.

26. An engine having its cylinder end rigidly carried by a boiler-support, a bodily-movable crank-shaft, and a movable frame portion carrying the latter, a driven member and a distance-rod interposed between said driven member and crank-shaft and having forked ends to furnish rigid support against axial vibration.

27. An engine having its cylinder end rigidly carried by a boiler-support, a bodily-movable crank-shaft, a movable frame portion carrying the same, means to adjust said movable frame portion and its crank-shaft, and lateral guides for said movable frame portion.

28. An engine having its cylinder end rigidly carried by a boiler-support, a bodily-movable crank-shaft, a movable frame portion carrying the same, means to adjust said movable frame portion and its crank-shaft, and lateral guides on said boiler-support for said movable frame portion.

29. An engine having its cylinder end immovably supported and a crank-shaft bodily movable relative to said cylinder, a link-motion actuated by said crank-shaft, a tumbler-shaft, means connecting the same with and to control the links of said valve-motion, and means whereby adjustment of said crank-shaft relative to said cylinder causes movement of said tumbler-shaft in a direction substantially perpendicular to the line of the means controlling said links, whereby to reduce the tendency of movement of said tumbler-shaft to move said links.

30. An engine the cylinder end whereof is carried by a boiler-support, a movable frame portion, a crank-shaft carried thereby and bodily movable therewith, a link-valve mechanism the tumbler-shaft for which is carried by said movable frame portion, and revers-

ing means operating in connection with said tumbler-shaft and opposing the tendency of the tumbler-shaft to move the said links on adjustment of said movable frame portion, whereby said valve mechanism is substantially unaffected by adjustment of said crank-shaft.

31. An engine the cylinder whereof is rigidly attached to a boiler-support, a crank-shaft, and movable frame-tubes connecting said cylinder and crank-shaft and guides for the cylinder-pistons mounted upon the said boiler-support.

32. An engine the cylinder end of which is carried by a boiler-support, a bodily-movable crank-shaft, frame-tubes carrying the latter and jointed to the said cylinder for its support, means to adjust said crank-shaft and frame-tubes, a valve mechanism and reversing mechanism therefor mounted on said frame-tubes.

33. A motor-carriage provided with an engine having relatively fixed and movable frame portions or supports, and operating connections constructed to permit relative movement of said frame portions or supports, substantially as and for the purpose described.

34. A motor-carriage provided with a spring-supported body, a boiler mounted thereon, an engine having its cylinder rigidly mounted upon said boiler, a crank-shaft bodily movable relative to said cylinder and jointed connections between the same and said cylinder and between the same and the driven member operating the vehicle, with suitable driving connections to operate as described.

35. An engine the cylinder end of which is rigidly attached to, and steadied by, a steam-boiler, and the latter in turn attached to a vehicle-body, the crank end of said engine being freely movable independently of said boiler and vehicle-body and connected with, and supported by, the running-gear of said vehicle.

36. An engine the cylinder and crank-shaft of which are connected by a tube or tubes, the guide or guides of said engine being supported independently of said tubes, and of said crank-shaft, the latter being supported by the member driven therefrom.

37. An engine the cylinder and crank-shaft of which are connected by one or more frame-tubes and other supporting means independent of said frame-tubes and of the cylinder-support, for said crank-shaft.

38. An engine, its cylinder, a crank-shaft bodily movable relative to said cylinder, a driven member, and means to maintain a predetermined distance between said driven member and crank-shaft, while the distance between said driven member and cylinder is variable.

39. An engine, its cylinder, a crank-shaft bodily movable relative to said cylinder, a driven member and adjustable means to maintain a predetermined distance between said driven member and crank-shaft, while the distance between said driven member and cylinder is variable.

40. An engine having a cylinder, a crank-shaft bodily movable relative thereto, a driven member, means to maintain a predetermined distance between said crank-shaft and driven member, and a valve mechanism for said cylinder operable from said crank-shaft in any position of the latter relative to its said cylinder.

41. An engine having a cylinder, a crank-shaft bodily movable relative to said cylinder, a driven member, power-transmitting means between said crank-shaft and said driven member and distance means between said driven member and crank-shaft and connected with both the latter at each side of said power-transmitting means.

42. In a motor-vehicle, an engine, its cylinder, a spring-supported carrier therefor, a crank-shaft bodily movable relative to said cylinder, a non-spring-supported driven member and means to maintain while the vehicle is in motion a predetermined distance between said driven member and crank-shaft.

43. In a motor-vehicle, a yieldingly-supported carrier, an engine-cylinder fixedly arranged thereon, the crank-shaft of said engine also carried by said carrier and movable bodily relative to said cylinder, and a non-yieldingly-supported driven member connected with, and driven by, said crank-shaft.

44. In a motor-vehicle, a yieldingly-supported carrier, an engine-cylinder fixedly arranged thereon, the crank-shaft of said engine also carried by said carrier and movable bodily relative to said cylinder, a non-yieldingly-supported driven member connected with, and driven by, said crank-shaft, and distance means to maintain a predetermined operative distance between said driven member and crank-shaft.

45. In a motor-vehicle, a yieldingly-supported carrier, an engine-cylinder fixedly arranged thereon, the crank-shaft of said engine also carried by said carrier and movable bodily relative to said cylinder, a non-yieldingly-supported driven member connected with, and driven by, said crank-shaft, and adjustable distance means to maintain a predetermined operative distance between said driven member and crank-shaft.

46. In a motor-vehicle, a yieldingly-supported body, an engine-cylinder fixedly carried by said body, the crank-shaft of said engine being also carried by said body and movable bodily thereon relative to said cylinder.

47. In a motor-vehicle, running-gear, a body yieldingly supported thereon, a generator fixedly carried by said body, an engine-cylinder rigidly fixed relative to said generator, and a crank-shaft bodily movable relative to said cylinder and stayed from said running-gear.

48. In a motor-vehicle, a spring-supported

engine connected with a non-spring-supported vehicle driving member, the engine crank-shaft having also a movement determined by said driven member and other than in the direction of said spring-supported movement.

49. In a motor-vehicle, a spring-supported engine connected with a non-spring-supported driven member, the engine-cylinder having a spring-supported movement only, the engine crank-shaft having additionally a movement transversely thereto.

50. A spring-supported engine, a part whereof has a spring-supported movement only, another part whereof having an additional movement in a direction intersecting the spring-supported movement.

51. A spring-supported but otherwise fixedly-positioned engine-cylinder, a crank-shaft and a fixedly-positioned non-spring-supported driven member, longitudinally-rigid distance means between said driven member and crank-shaft, and means to permit said engine-cylinder to have spring-supported movement while maintaining the longitudinally-rigid distance between the crank-shaft and said driven member.

52. In a motor-vehicle the combination with a steam-boiler provided with a lateral extension, of a plurality of cylinders arranged in said extension, a crank-shaft bodily movable with reference to said boiler and cylinders, and movable frame connections between said cylinders and said crank-shaft.

53. The combination in a motor-vehicle of a boiler provided with a lateral extension, a plurality of cylinders arranged in said extension, driving means connecting said cylinders with the propelling-wheels of the vehicle, and means to adjust said driving means for taking up wear therein, without moving said boiler or its cylinders.

54. The combination in a motor-vehicle of a boiler provided with a lateral extension, a plurality of cylinders arranged in said boiler extension, driving connections between said cylinders and the propelling-wheels of the vehicle, said driving means including a drive-chain and means to adjust said driving connections to regulate the slack in said chain, without moving said boiler and its cylinders.

55. The combination in a motor-vehicle of a boiler, one or more engine-cylinders rigidly positioned relative thereto, a movable crank-shaft for said engine cylinder or cylinders, and movable frame connections between the latter and said crank-shaft, permitting said crank-shaft to be bodily moved relative to said cylinder or cylinders.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGE E. WHITNEY.

Witnesses:
FREDERICK L. EMERY,
EVERETT S. EMERY.