Nov. 17, 1925. 1,562,392

J. G. VINCENT

HYDROCARBON MOTOR

Filed Sept. 7, 1917 3 Sheets-Sheet 1

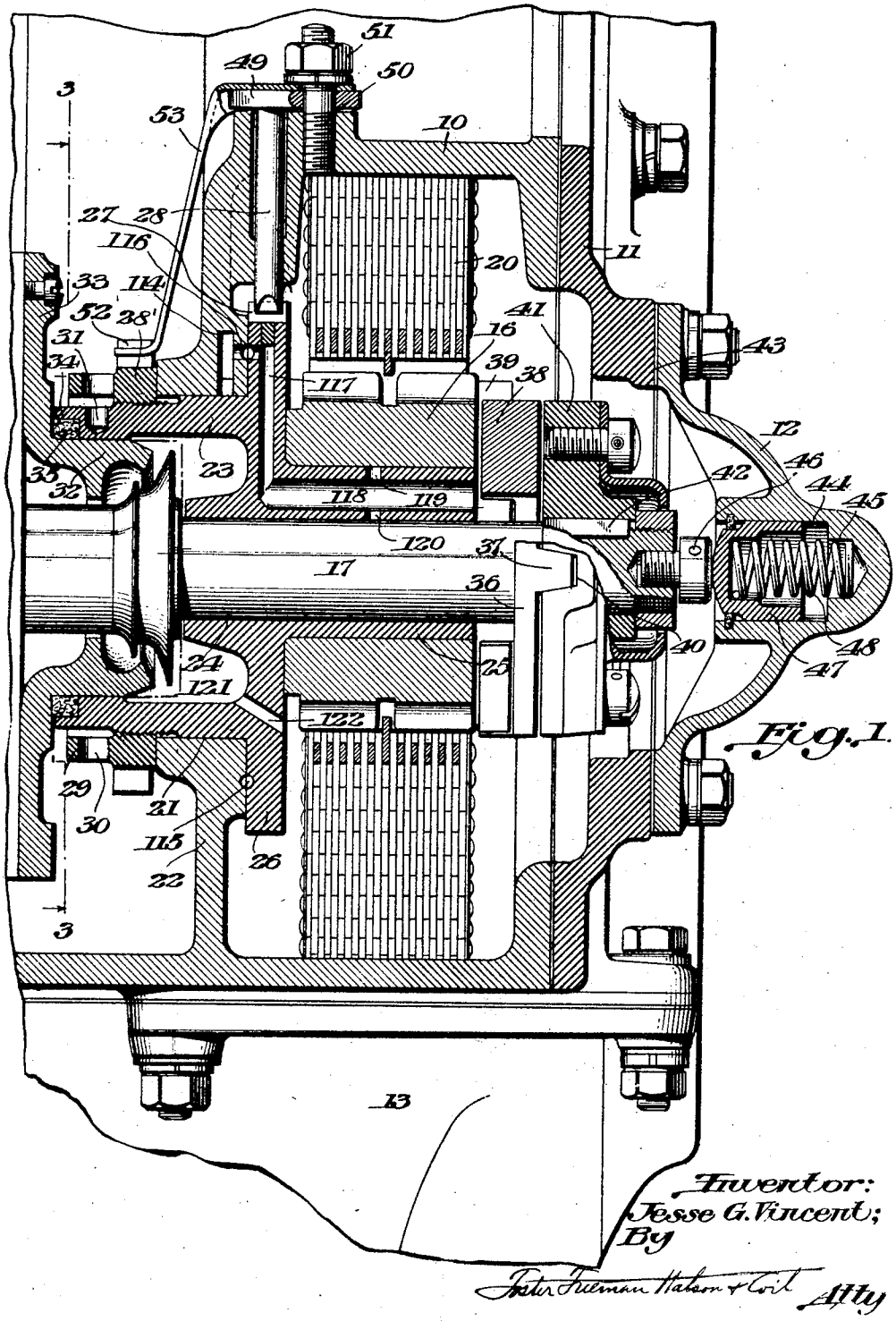


Fig. 1.

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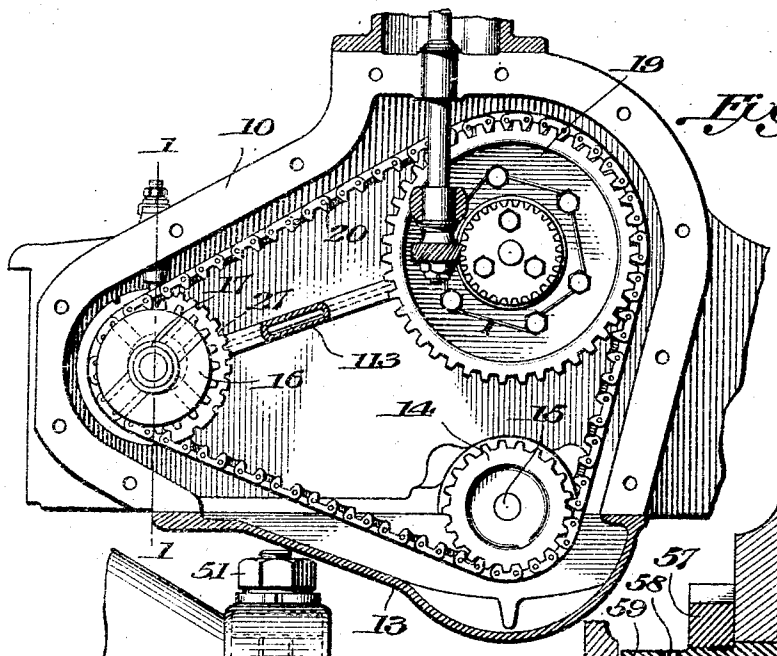


Fig. 2.

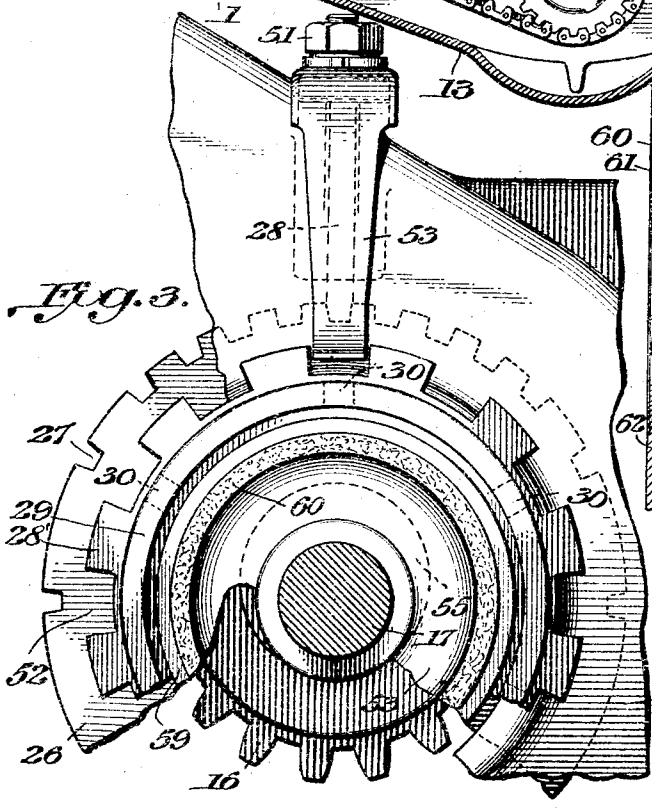


Fig. 3.

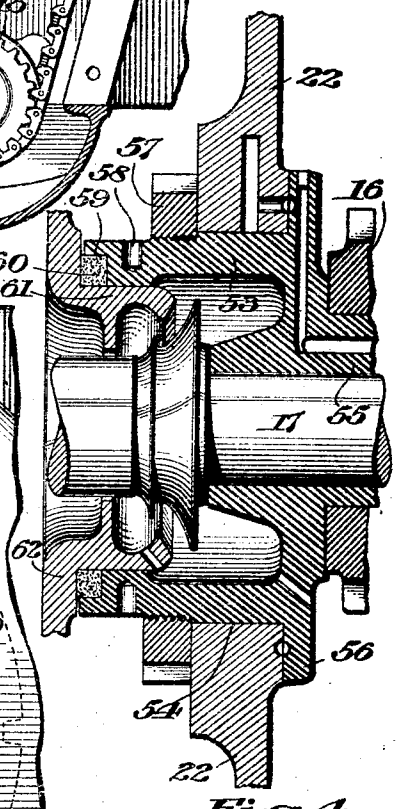


Fig. 4.

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Fig. 5.

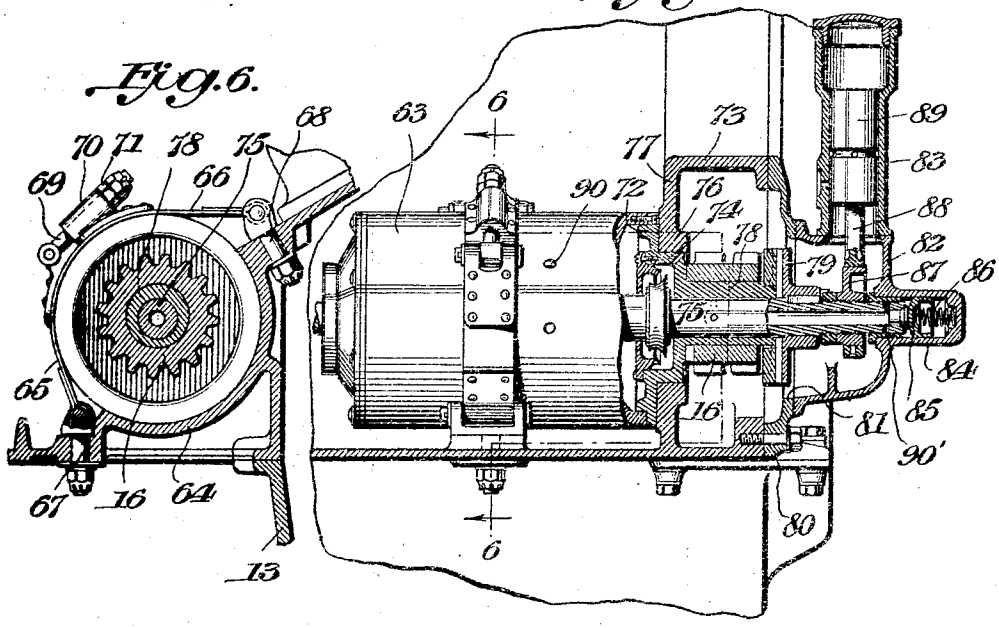
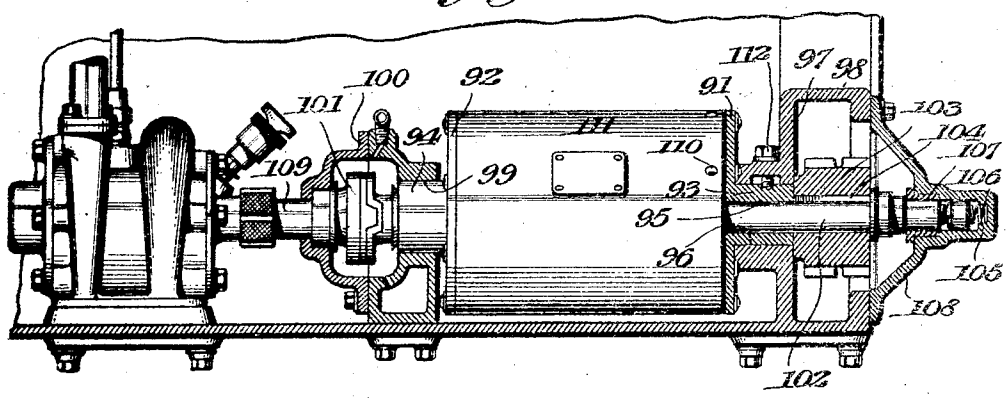


Fig. 6.

Fig. 7



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UNITED STATES PATENT OFFICE.

JESSE G. VINCENT, OF DETROIT, MICHIGAN, ASSIGNOR TO PACKARD MOTOR CAR COMPANY, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN.

HYDROCARBON MOTOR.

Application filed September 7, 1917. Serial No. 190,241.

To all whom it may concern:

Be it known that I, JESSE G. VINCENT, a citizen of the United States, and residing at Detroit, Wayne County, State of Michigan, have invented certain new and useful Improvements in Hydrocarbon Motors, of which the following is a specification.

This invention relates to hydrocarbon motors and more particularly to means for tightening a chain drive therein.

Most forms of hydrocarbon motors for motor vehicles are provided with a housing at the front end in which is located the gearing connecting the crank, cam and generator or other shafts. When chain gearing is employed, the chain stretches and wears with continued use, so that considerable back lash develops, thus disarranging the angular relation of the shafts. It is the principal object of this invention to provide an improved means for tightening the chain to compensate for stretch and wear. Other objects and features of novelty will appear from the description taken in connection with the drawings in which:—

Figure 1 is a sectional elevation taken substantially on the line 1—1 of Figure 2, showing a portion of a hydrocarbon motor having embodied therein one form of the present invention;

Figure 2 is a front elevation of a portion of a hydrocarbon motor, the front side being removed to show the arrangement of the chain drive between the crank, cam and generator shafts;

Figure 3 is a sectional elevation taken substantially on the line 3—3 of Figure 1, certain parts being broken away in order to illustrate a structure which would otherwise be hidden;

Figure 4 is a sectional elevation similar to Figure 1 illustrating another form of the invention;

Figure 5 is an elevation view partly in section illustrating another form of the invention in which the chain is tightened by rotatively adjusting the electric generator operated by the hydrocarbon motor;

Figure 6 is a transverse sectional elevation taken substantially on the broken line 6—6 of Figure 5;

Figure 7 is an elevation view with certain parts shown in section illustrating still another form of the invention.

Referring to the drawings, and more particularly to Figures 1 and 2 thereof, the reference numeral 10 indicates a housing arranged at the front of the motor and enclosing a chain drive which connects the crank, cam, and generator shafts. The front side 11 of this housing is removably secured to the housing in any desired manner and carries a cover 12 opposite the end of the generator shaft for a purpose presently to be described. A portion of the crank case of the motor is shown at 13. The chain drive within the housing 10 comprises a sprocket 14 on the crank shaft 15, a sprocket 16 on the end of the generator shaft 17, and a sprocket 19 secured to the cam shaft, these sprockets being connected for rotation by means of a chain 20 which may be of any desired type.

As is well recognized a chain drive soon develops back lash and loosens with continued use due to the stretch of the chain and the wear of the parts. Hence, in order to compensate for this back lash and keep the shafts connected by the chain drive in the proper angular relation, it is desirable to provide a means for tightening the chain. For his purpose a circular aperture 21 is formed in the rear wall 22 of the housing 10, and a sleeve having a cylindrical portion 23 is mounted in the said aperture for rotative adjustment. This sleeve is formed with a bore 24 concentric with the outer surface of the cylindrical portion 23 and with a second cylindrical portion 25, the axis of which is eccentric to the axis of the bore 24. The sprocket 16 is rotatively mounted on the portion 25 of the sleeve. Intermediate the two cylindrical portions 23 and 25 is a radial flange 26, which has one side thereof in contact with the inner surface of the wall 22 of the housing. The periphery of this flange is formed with a series of notches 27 which are adapted to receive the end of a pin 28 projecting through the wall 22 of the housing, the purpose of this pin being to positively lock the sleeve in adjusted position. The cylindrical portion 23 of the sleeve projects outside the housing and has threaded on the exterior thereof a nut 28′ which is adapted to be turned up against the outside of the wall 22 so that the wall 22 is clamped between the flange 26 of the sleeve and the nut 28′, thus holding the sleeve in any desired adjusted position. The nut 28′ is formed with an annular portion

29 having holes 30 for a spanner wrench, and the portion 23 of the sleeve which is radially within the nut 28′ is formed with a series of peripheral recesses 31 which may be aligned with the holes 30 on the nut so that the spanner may extend through the holes 30 and into the recesses 31 to turn the sleeve after the nut 28′ has been loosened. The end portion 23 of the sleeve is adapted to fit over the boss 32 formed on the end plate 33 of a generator housing, and in order to prevent any leakage of oil an annular recess 34 in the end of the portion 23 of the sleeve may be filled with a packing 35.

In order to connect the sprocket 16 and the generator shaft 17 for rotation together an Oldham coupling is operatively interposed between these parts. This coupling comprises an intermediate plate 36 having a pair of wedge-shaped projections 37 on one side thereof and a similar pair 38 on the other side but disposed perpendicular to the first projections. The wedge-shaped projections 38 are received in correspondingly shaped recesses 39 in the end of the spocket 16, and wedge-shaped projections 37 fit in correspondingly shaped recesses 40 formed in a plate 41 rotatively connected to the shaft 17 as by the key 42. Because of the tongue and groove construction of the coupling, it is desirable to provide means to act on the coupling to keep the parts in operative position. For this purpose as shown in the drawings, a spring is provided which acts to move the generator shaft 17 in a direction to keep the coupling parts together. The cover 12 which closes an aperture 43 of such size that the coupling parts may be moved therethrough if desired, is formed with a recess 44 and a smaller recess 45 at the bottom of the first mentioned recess. A flat headed cap screw 46 is threaded in the end of the generator shaft 17, and a plunger cup 47 is forced into contact with the head of the screw by means of a coil spring 48 having one end seated in the recess 45 and the other end engaging the said plunger. Thus the spring 48 tends to move the shaft 17 towards the left, as viewed in Figure 1 to thereby hold the coupling parts in operative position. It will be apparent that the spring may be very easily and quickly replaced merely by removing the cover 12 and that the tension thereof may be adjusted by turning the screw 46 in the end of the shaft 17. In this manner the housing or support for the sleeve also carries the spring means for acting on the coupling. It will be observed that the locking pin 28 is provided with a flat head 49 which is held in position by means of a stud 50 and nut 51. The nut 28′ is formed with a series of peripheral notches 52 and a spring finger 53 mounted on the stud 50 and extending downward to the nut 28′ is adapted to engage in one of the recesses to lock the nut 28′ against rotation.

When it is desired to adjust the tension of the chain 20, the nut 51 on the stud 50 is loosened so that the pin 28 may be withdrawn from engagement with the flange 26 and the locking finger 53 may be disengaged from the nut 28′. Then the nut 28′ is loosened and the spanner wrench is inserted with a pin extending through a hole 30 into a recess 31 of the sleeve, so that the sleeve 23 may be turned in a direction to move the sprocket 16 laterally to thereby tighten the chain. When the desired degree of tension in the chain has been reached, the nut 28′ is screwed up, the pin 28 is inserted so that it engages in one of the notches 27 of the flange, the locking finger 53 is placed with its end in a notch 52 on the nut 28′, and finally, the nut 51 is screwed up thereby securing the pin 28 and locking finger 53 against displacement. As it is only necessary to move the sleeve through substantially 180° to shift the sprocket laterally from one extreme of its movement to the other, the notches 27 in the flange of the sleeve may be provided in only about one-half of the periphery of the flange, as shown in Figures 2 and 3.

In the form of the invention illustrated by Figure 4, the bearing sleeve is formed with a cylindrical portion 53 similar to the portion 23 in the other form, which is mounted for rotative adjustment in the circular aperture 54 of the wall 22 of the housing. The generator shaft 17 which is concentric with the portion 53 extends through the sleeve and is adapted to be connected with the sprocket 16 in the same manner as described in connection with Figure 1. This sprocket 16 is mounted on an eccentric portion 55 of the sleeve and between the two portions 53 and 55 of the sleeve is a radially extending flange 56 which has one side thereof in contact with the inner surface of the wall 22 of the housing. The portion 53 of the sleeve extends outside of the housing and has threaded thereon a nut 57 which is adapted to be screwed up against the wall 22 of the housing, thereby clamping the sleeve to the wall and frictionally holding it against rotation. The end of the portion 53 of the sleeve is formed with holes 58 to accommodate a spanner wrench for turning the sleeve. The end of the sleeve is formed with an annular recess 59, which is adapted to receive a packing 60 to prevent leakage of oil between the sleeve and the boss 61 on the end plate 62 of the generator.

In the operation of this form of the invention, in order to tighten the chain the nut 57 is loosened and then the spanner wrench is used to rotatively adjust the sleeve to thereby shift the sprocket 16 lat-

ened the nut 57 is screwed up thereby frictionally securing the sleeve in adjusted position.

In the form of the invention illustrated by Figures 5 and 6, the generator 63 has its casing or frame rotatively supported by a cradle 64 carried by the crank case 13 of the engine. This cradle is located substantially mid-way of the length of the casing and extends around about 180° thereof. Two straps 65 and 66 have their opposite ends pivotally connected to the cradle as by means of the bolts 67 and 68. The adjacent ends of the strap 65 and 66 are connected for adjustment by means of a bolt 69 pivoted to the end of the strap 65 and extending through a lug 70 on the adjacent end of the strap 66. These adjacent ends of the straps are adapted to be drawn towards each other and to thereby bind the straps on the generator casing by means of the nut 71 on the end of the bolt 69. The end plate 72 of the generator is formed with a sleeve which projects into the housing 73 at the front end of the motor. This sleeve consists of a cylindrical portion 74 which is concentric with the generator shaft 75 and is mounted for rotative adjustment in the circular aperture 76 of the wall 77 of the housing. The sleeve also has a cylindrical portion 78 within the housing connected to the portion 74 and the axis of which is eccentric to the axis of the shaft 75. Mounted on the eccentric portion 78 of the sleeve is the chain sprocket 16 and this sprocket is rotatively connected to the shaft 75 by an Oldham coupling 79. The front side 80 of the housing 73 is formed with an aperture 81, which is closed by a cover 82 carrying a pump cylinder 83, and a hollow boss 84, the latter being aligned with the shaft 75. A plunger 85 is arranged within the boss 84 and is forced against the end of the shaft 75 by means of a spring 86 arranged within the hollow boss. Intermediate the Oldham coupling 79 and the end of the shaft, the latter carries an eccentric 87, which, by means of the eccentric rod 88 operates the piston 89 in the pump cylinder 83.

In order to tighten the chain in this form of the invention, the nut 71 is loosened so that the generator casing may be slightly rotated by means of a spanner wrench engaging in the holes 90 of the casing. As the eccentric portion 78 of the sleeve is directly connected with the generator casing, this eccentric portion will be slightly rotated thereby shifting the axis of the chain sprocket 16 laterally and tightening the chain. When the chain has been tightened to the desired degree the generator may be clamped so as to hold the sleeve in this adjusted position by tightening up the nut 71. As in the first form of the invention acts to hold the parts of the coupling in operative position in a very simple manner.

It will be observed that the end of the generator shaft has a bearing in the bushing 90′ carried by the cover 82. Thus the shaft is securely held in alignment against any deflection which would be caused by the load coming on the same, due to the operation of the pump.

In the form of the invention illustrated in Figure 7 the end plates 91 and 92 of the generator have eccentric sleeves 93 and 94 respectively projecting therefrom. The sleeve 93 is formed with a bore 95 and has a cylindrical exterior surface, the axis of which is eccentric to the axis of the bore 95. This sleeve is mounted for rotative adjustment in a circular aperture 96 formed in the wall 97 of the housing 98. The sleeve 94 at the other end of the generator is similar to the sleeve 93 and is mounted for rotative adjustment in a circular aperture 99 formed in one wall of a housing 100, which encloses an Oldham coupling 101. The armature shaft 102 at one end is connected with the Oldham coupling and at the other end extends into the housing 98 and carries the sprocket 103 which is secured to the shaft for rotation therewith by suitable means, such as a key 104. Spring means similar to that described in connection with Figure 1, acts on the end of the shaft to force it towards the left, as viewed in the said Figure 7. This spring means comprises a spring 105 having one end seated in a recess 106 and the other end acting on a plunger 107 which plunger acts on the end of the shaft. These parts are arranged in a removable cover 108. The other end of the shaft drives a pump shaft 109 through the Oldham coupling. It will be observed that when the generator is turned by means of a spanner wrench engaging in one of the apertures 110 formed in the generator casing 111 that the eccentric sleeves will also be turned thereby shifting the generator shaft together with the sprocket laterally and tightening the chain. The generator may be locked in adjusted position by means of the set screw 112 which is carried by the housing 98 and engages the sleeve 93. With the parts arranged as described in this form of the invention, the generator shaft is rotated through a positive connection between the sprocket and said shaft and only the power for driving the pump is transmitted by the Oldham coupling. Obviously, this relieves the coupling of the torque which is required to drive the generator and would have to pass through the coupling if it were located between the sprocket and generator shaft.

Referring to Figures 1 and 2, the means for lubricating the rotative parts will now be described. This lubricating means is

adapted for use in connection with a motor which has a force feed oiling system. This is the well-known system of oiling, and as it forms no part of this invention, is thought to require no illustration. The parts which are involved in this invention include an oil conduit 113 which takes lubricant which is supplied to the cam shaft by the ordinary force feed system and conducts it to an oil lead 114 formed in the wall 22 of the housing (see Figure 1). The inner face of the wall and the contacting face of the flange 26 are formed with registering annular recesses which together constitute an oil groove 115. This groove is connected with the lead 114 by a duct 116. It will be seen that with this construction the sleeve with its flange 26 may be rotatively adjusted without in any way disturbing the flow of oil to the parts. The flange is formed with a radial oil duct 117, which at its upper end is connected to the oil groove 115 and at its inner end leads to an oil passage 118 formed in the portion 25 of the sleeve and extending to the end thereof. Two oil holes 119 and 120 distribute the oil to the bearing surfaces on the exterior and interior of the sleeve. The interior of the portion 23 of the sleeve is constructed to form an oil collecting chamber 121 and drain holes 122 formed in the sleeve are arranged to conduct any oil which collects in the chamber back into the housing 10.

As shown in the drawings the manner of lubricating the rotative parts of the form of the invention illustrated by Figure 4 is the same as that just described and is thought to require no specific mention.

Having thus described the invention what is claimed as new and desired to be secured by Letters Patent is:—

1. In combination, a housing, a chain drive within said housing including a sprocket, means for adjustably supporting said sprocket comprising a sleeve on which the sprocket is rotatively mounted, said sleeve being rotatively adjustable about an axis eccentric to the sprocket axis, means without the housing for adjusting said sleeve, and means operable from the outside of the housing, extending through the wall of the housing and engaging the sleeve within the housing for securing the sleeve in adjusted position.

2. In combination, a housing, a chain drive within said housing including a sprocket, means for adjustably supporting said sprocket, comprising a sleeve on which the sprocket is rotatively mounted, said sleeve being rotatively adjustable about an axis eccentric to the sprocket axis, said sleeve within the housing having a series of recesses, and a pin extending from the outside through the wall of the housing adapted to engage in any one of said recesses to hold the sleeve in adjusted position.

3. In combination, a housing, a chain drive within said housing including a sprocket, means for adjustably supporting said sprocket comprising a sleeve on which the sprocket is rotatively mounted, said sleeve being rotatively adjustable about an axis eccentric to the sprocket axis, a radially extending flange on said sleeve inside the housing, and means extending through the wall of the housing operable from the outside thereof, adapted to engage said flange to hold the sleeve in adjusted position.

4. In combination, a housing, a chain drive within said housing, including a sprocket, means for adjustably supporting said sprocket comprising a sleeve on which the sprocket is rotatively mounted, said sleeve being adjustable about an axis eccentric to the sprocket axis, a radially extending flange on said sleeve inside the housing, and having a series of recesses, and a pin extending through the wall of the housing operable from the outside thereof adapted to engage one of said recesses in said flange to hold the sleeve in adjusted position.

5. In combination, a housing, a chain drive within said housing including a sprocket, means for adjustably supporting said sprocket comprising a sleeve having a cylindrical portion mounted for rotative adjustment in a wall of the housing and extending therethrough and also having a cylindrical bearing portion for the sprocket the axis of which is eccentric to the first mentioned cylindrical portion, a radial flange on the sleeve in contact with the inside surface of the housing wall and means outside of the housing for frictionally clamping said flange against said wall, and means to lock the sleeve in adjusted position.

6. In combination, a housing, a chain drive within said housing including a sprocket, means for adjustably supporting said sprocket comprising a sleeve having a cylindrical portion mounted for rotative adjustment in a wall of the housing and extending therethrough and also having a cylindrical bearing portion for the sprocket the axis of which is eccentric to the first mentioned cylindrical portion, a radial flange on the sleeve within the housing, means for clamping the sleeve to the wall of the housing and means extending through said wall for engaging the said flange to lock the sleeve against rotation.

7. In combination, a housing, a chain drive within said housing including a sprocket, means for adjustably supporting said sprocket comprising a sleeve having a cylindrical portion mounted for rotative

adjustment in a wall of the housing and extending therethrough and also having a cylindrical bearing portion for the sprocket the axis of which is eccentric to the first mentioned cylindrical portion, a radial flange on the sleeve within the housing, means for clamping the sleeve to the wall of the housing, and means for locking said clamping means and securing said flange engaging means against removal.

8. In combination, a housing, a chain drive therein including a sprocket, means for adjustably supporting the sprocket comprising a sleeve having a cylindrical portion mounted for rotative adjustment in a wall of the housing and extending therethrough, said sleeve having a radial flange within the housing and a nut threaded on the portion of the sleeve outside the housing for clamping the wall between the flange and nut, and a pin extending through the wall adapted to engage any one of a series of recesses in said flange to lock the sleeve against rotation.

9. In combination, a housing, a chain drive therein including a sprocket, means for adjustably supporting the sprocket comprising a sleeve having a cylindrical portion mounted for rotative adjustment in a wall of the housing and extending therethrough, said sleeve having a radial flange within the housing and a nut threaded on the portion of the sleeve outside the housing for clamping the wall between the flange and nut, a pin extending through the wall adapted to engage in one of a series of recesses in said flange and means for locking the nut and securing the pin against removal.

10. In combination, a housing, a chain drive therein including a sprocket, a sleeve mounted in a wall of the housing constructed and arranged to adjustably support said sprocket, a shaft extending through said sleeve, coupling means including transversely tongued and grooved parts for rotatively connecting the sprocket and shaft, and spring means mounted in a wall of the housing for holding said parts in operative position.

11. In combination, a housing, a chain drive therein including a sprocket, a sleeve mounted in a wall of the housing constructed and arranged to adjustably support said sprocket, a shaft extending through said sleeve, coupling means for rotatively connecting said sprocket and shaft including a part secured to the shaft and means coacting with another wall of the housing for forcing said shaft in a direction to hold the coupling parts in operative position.

12. In combination, a housing, a chain drive therein including a sprocket, a sleeve mounted in a wall of the housing constructed and arranged to adjustably support said sprocket, a shaft extending through said sleeve, coupling means for rotatively connecting said sprocket and shaft, a removable cover for the housing and spring means carried by said cover for holding the coupling in operative position.

13. In combination, a chain drive, including a sprocket, a support, a sleeve mounted in said support constructed and arranged to adjustably support said sprocket, a shaft extending through said sleeve, driving connections between said sprocket and shaft, and spring means interposed between the end of the shaft and the support for holding the said connections in operative position.

14. In combination, a housing, a chain drive therein includng a sprocket, a sleeve mounted in a wall of the housing, constructed and arranged to adjustably support said sprocket, a shaft extending through said sleeve, coupling means for rotatively connecting said sprocket and shaft, a removable cover for the housing, a screw member, a spring member coacting with the screw member, one of said members carried by the said cover, and the other by the shaft.

15. In combination, a housing, a chain drive in said housing including a sprocket, a shaft extending through said sprocket, means for adjusting the sprocket transversely to tighten the chain, an Oldham coupling having one member thereof secured to said shaft, and means for forcing the members of the coupling together including a spring carried by the housing and coacting with the shaft.

16. In combination, a housing, a chain drive in said housing, including a sprocket, a rotatively adjustable member arranged to project outside the housing having a sleeve extending into the housing, said sleeve having a bearing surface for the said sprocket eccentric to the axis of the member, a shaft coaxial with the member extending through the member and sprocket, an Oldham coupling connecting the shaft and sprocket, a spring coacting with the shaft to hold the coupling parts in operative position, and means for securing the member in adjusted position.

In testimony whereof I affix my signature.

JESSE G. VINCENT.