Nov. 11, 1941. H. L. LYON 2,262,552

ENGINE

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Fig. 1.

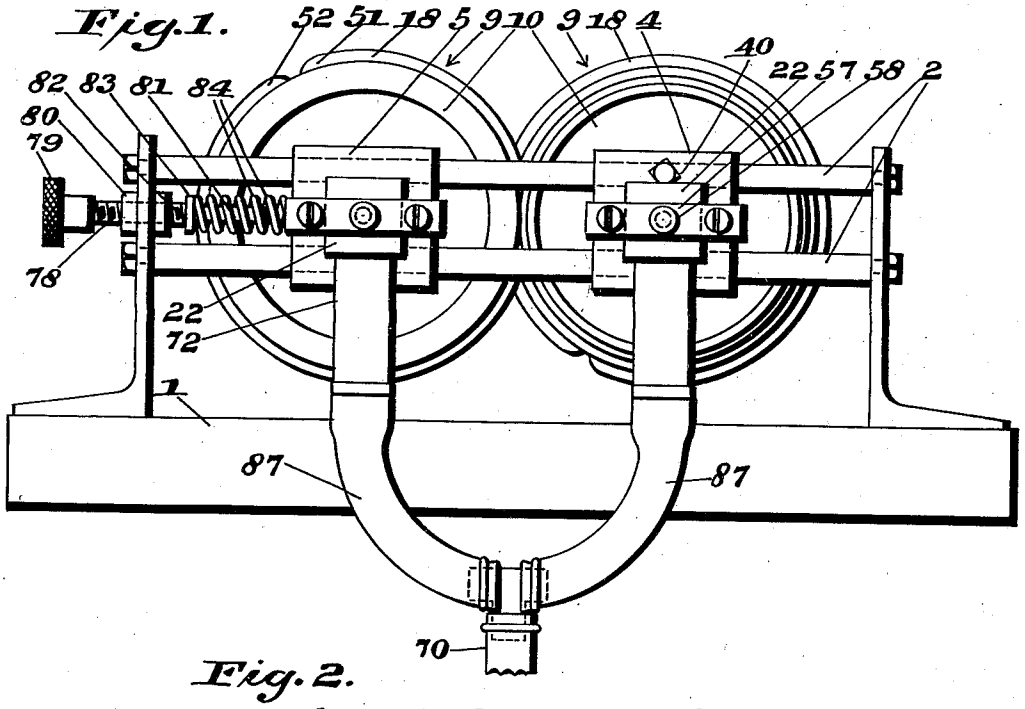
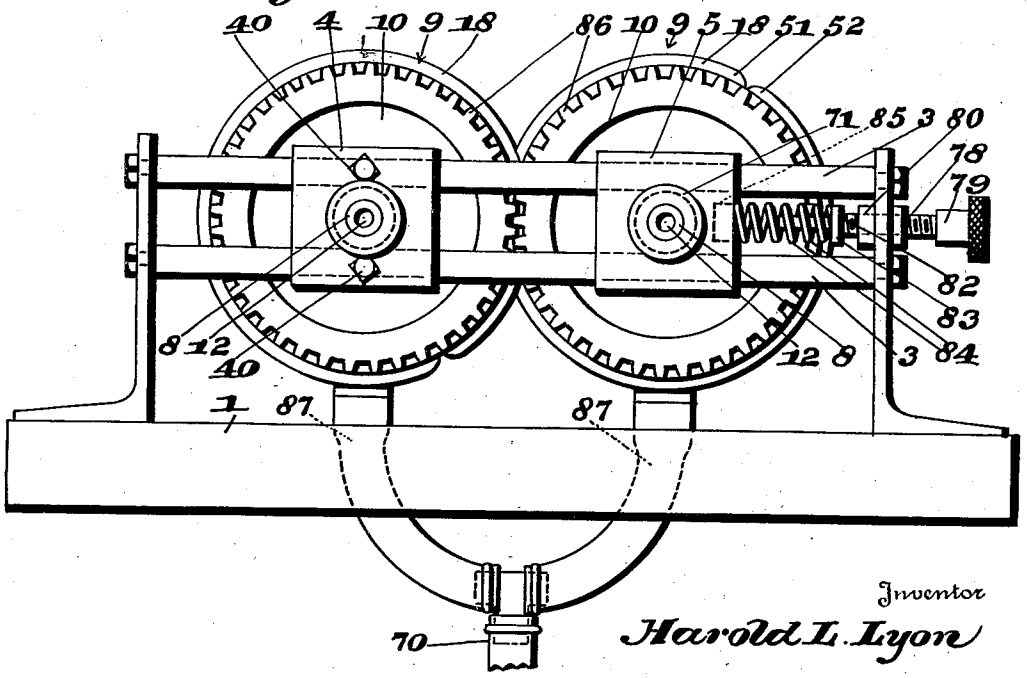


Fig. 2.



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Fig. 3.

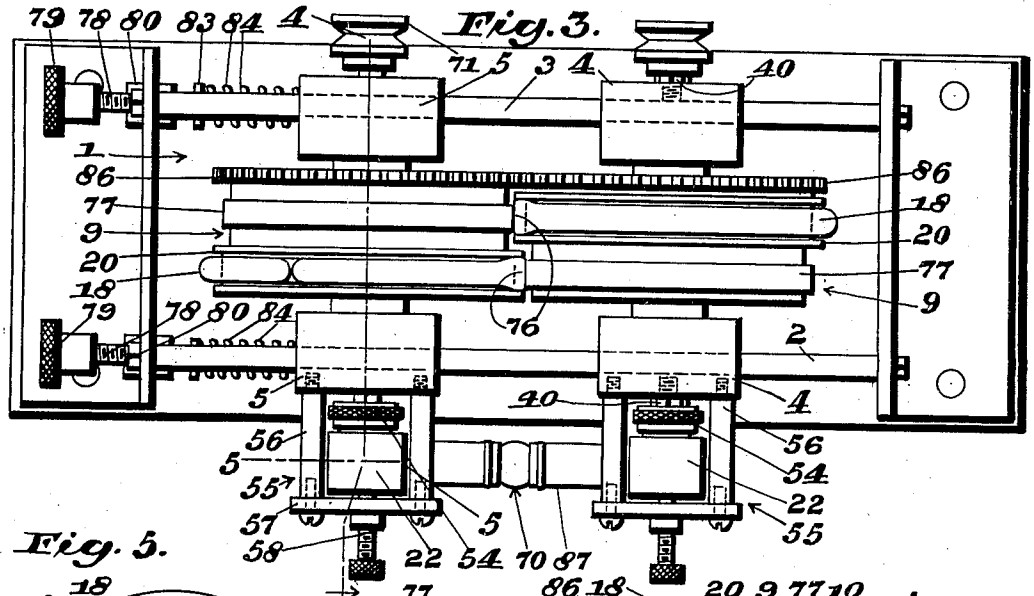


Fig. 5.

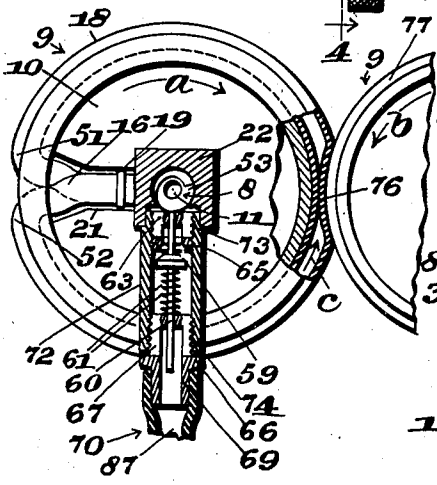


Fig. 4.

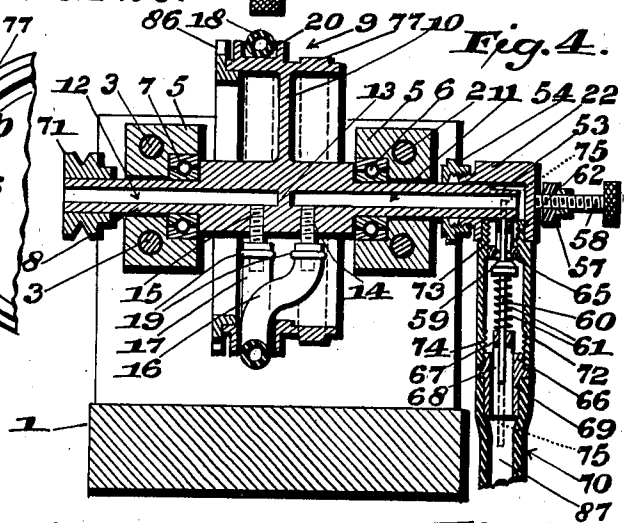


Fig. 6.

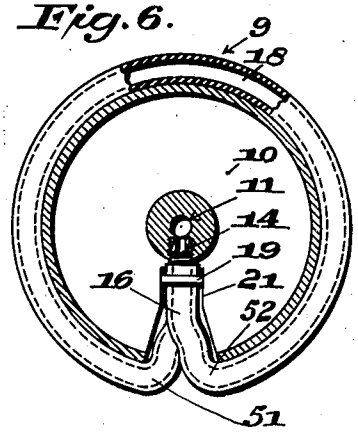


Fig. 7.

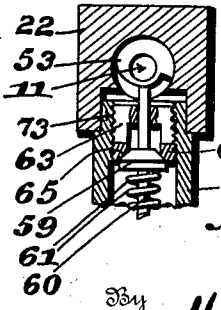


Fig. 8.

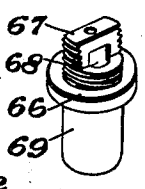
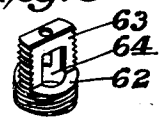


Fig. 9.



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Patented Nov. 11, 1941 2,262,552

UNITED STATES PATENT OFFICE

2,262,552

ENGINE

Harold L. Lyon, Honolulu, Territory of Hawaii

Application May 25, 1938, Serial No. 210,028

2 Claims. (Cl. 121—48)

This invention relates to improvements in engines, particularly of the type wherein the reaction of a pressure fluid against a constriction in a pliable pressure fluid conduit causes the rotation not only of the conduit carrier, but also of the abutment which produces the constriction. An engine of this type has the advantage of being easy to maintain. The parts are fairly simple and the inherent nature of the engine makes it possible to maintain its operation almost indefinitely with little or no noise because of the absence of heavy reciprocating parts.

One outstanding accomplishment of the engine is its capability of furnishing power for the operation of light machinery in isolated localities. The main requirement is that of a pressure fluid of sufficient force to drive the engine as intended. This pressure fluid can and in many instances will consist of a sufficiently high head of water, the impingement of which upon the previously mentioned constriction provides the reaction that does the driving. With this preamble in mind the objects of the invention are as follows:

First, to provide an engine of the type wherein a revoluble conduit, filled with and in communication with a source of pressure fluid, coacts with an abutment which pinches the conduit at one place to the extent of closure, the reaction of the fluid pressure upon both the constriction and abutment causing mutually reverse rotation which can be converted into usable power.

Second, to arrange a plurality of pressure fluid-conduits and abutments in tandem upon a single carrier, and to provide the carrier in multiple so as to confront the conduits and abutments with each other in working relationship, thereby producing an economical set-up and augmenting the power delivered by any selected carrier shaft.

Third, to inter-gear the carrier shafts of the foregoing multiple engine arrangement so as to synchronize the rotation of the carrier wheels and prevent slippage therebetween thus insuring uniform sequential pulls and avoiding the damage that would otherwise be inflicted upon the pliable conduits.

Fourth, to provide an automatically controlled valve for each revoluble carrier to momentarily shut off the pressure fluid source during the period of passage of the intake and exhaust bends in the conduit across the face of the abutment, thereby to prevent a loss of pressure fluid.

Fifth, to provide a novel combination of each carrier shaft with an independently held pressure fluid chamber, the latter also constituting a housing for the cam that automatically actuates the respective valve.

Sixth, to provide a simple yet effective contact adjustment with which to press the conduits and abutments together with a degree of pressure best suited to the force of the pressure fluid in use at a given time.

Other objects and advantages will appear in the following specification, reference being had to the accompanying drawings, in which:

Figure 1 is a side elevation of the intake side of the engine.

Figure 2 is a side elevation of the exhaust side of the engine.

Figure 3 is a plan view.

Figure 4 is a cross section taken on the line 4—4 of Fig. 3.

Figure 5 is a diagrammatic sectional view taken on the line 5—5 of Fig. 3.

Figure 6 is a sectional view of one of the conduit carriers.

Figure 7 is a detail sectional view of one of the pressure chambers and its allied structure, the position of the cam being that of the cam of the partially shown conduit carrier in Fig. 5.

Figure 8 is a perspective view of the lower valve stem bearing.

Figure 9 is a perspective view of the upper valve stem bearing.

This engine is an improvement on an engine of a similar type disclosed in Patent 2,135,520 granted to Harold L. Lyon Nov. 8, 1938. The engine of that application comprises a relatively simple structure, and although the instant engine is capable of a far greater range of work than the former, yet it is not complex in its nature. Attention is directed to the drawings. A base 1 is provided with end supports (Figs. 1 and 2), to which pairs of standards 2, 3 are secured. Although the latter comprise parallel horizontal rods, they are regarded as standards inasmuch as they provide the main supports for most of the mechanism of the engine.

Pairs of blocks 4, 5 are mounted upon each pair of standards in spaced relationship to the base 1 and to each other. The blocks 4 are fixed to the standards by set screws 40 (Figs. 1, 2 and 3). The blocks 5 are slidable on the standards. All of the blocks, as illustrated in the instance of the blocks 5 (Fig. 4) contain ball bearings 6, 7. It will be observed in Fig. 3 that the carriers are provided in multiple and that each carrier unit is of a construction identical with that of the

other, excepting for the reversal in relationship of the conduits and their abutments.

Because of the foregoing identity of construction, it is deemed necessary to describe one carrier unit only. The one at the left of Fig. 3 is herein adopted for description, it being understood that the structure of the one at the right is the same, corresponding numerals being used for corresponding parts, with only a few exceptions.

The previously mentioned ball bearings 6, 7 (Fig. 4) support a hollow shaft 8 of a carrier wheel 9. The shaft 8 comprises the axle of the wheel and the web 10 of the latter is made integral with the axle. Said axle is bored in from each end to make it hollow as already stated, the intake and exhaust bores 11 and 12 stopping short of the center where a dividing wall 13 is left, as shown.

At places closely adjacent to the wall 13 the hollow shaft has communicating nipples 14, 15 to the respective ones of which the ends 16, 17 of a pliable conduit 18 are secured by clamps 19 or their equivalents. This conduit is applied to and extends around the grooved rim 20 of the carrier wheel. The major part of the pliable conduit lies in said grooved rim (Fig. 4) the only break in its continuity occurring at the place where the ends 16, 17 emerge (Fig. 1) at a hole 21 (Fig. 5) in the web 10, in order to reach the nipples 14, 15 through which the conduit is placed in pressure fluid communication with the bores 11, 12.

A chamber 22 (Fig. 4) provides for the inflow of pressure fluid into the bore 11 of the shaft. One end of the shaft projects into the chamber, the latter housing a cam that is formed on the extremity of the shaft. The chamber is held independently of the shaft so that the latter is free to rotate, the chamber being provided with a packing gland 54 around the shaft to prevent the leakage of pressure fluid.

A yoke 55 (Fig. 3) holds the pressure chamber 22 in place. This yoke comprises studs 56 fixed in the nearest slidable block 5 and projected forwardly beyond the pressure chamber where the distance between them is spanned by a bar 57. The bar is secured to the studs, and it carries a screw 58, the point of which engages the pressure chamber (Fig. 4) to hold the latter in place.

In holding the pressure chamber in place the screw 58 has a range of adjustment equal to the depth of the cam 53. The latter is provided for the actuation of a valve 59. The valve is situated medially of its stem 60, the upper end of which is held in engagement with the cam 53 by a spring 61 on the lower end of the valve. A member 62 (Fig. 9) has a guide portion 63 in which the upper end of the stem slides. This portion is narrowed so as to expose the bore 64. This bore has communication with a seat 65. Thus the member 62 is a combined valve seat and stem guide.

A somewhat similar member 66 (Fig. 8) has a guide portion 67 which is narrowed to expose a bore 68. The lower end of the valve stem has bearing in the portion 67 and the latter provides a rest for the spring 61. The tubular terminal 69 of the member 66 provides a nipple onto which a pressure fluid pipe 70 is suitably attached. It is this pipe which leads off to the source of pressure fluid.

After the fluid has traversed conduit 18 it is exhausted through the bore 12 (Fig. 4) when the exhaust is discharged in any desired manner.

Ordinarily only one of the shafts 8 is utilized as a power shaft. But it is conceivable that both the shafts may thus be employed, and when they are the power can be taken off in each of the two directions of rotation. To the latter end each shaft is shown as equipped with a pulley 71, but it is perfectly obvious that one of these will be left off in the event of using the left carrier unit (Fig. 3) only as the power source.

Reverting to the valve 59, it is to be observed that this and its related parts are housed in a tube 72. This is internally threaded at 73 to take the threads of the member 62. In practice the threads will be coated with solder prior to screwing together and when the member is properly emplaced it will be sweated so as to render it immovable. The same practice is adopted with respect to the member 66, it being noted that the portion 67 is also threaded to match the internal threads 74 in the tube, but in practice it is permissible to substitute the members 62, 66 with any equivalent construction that will have the same result.

A further important feature is to be observed with respect to the valve stem 60. In its initial state this stem is made longer than shown. The approximate original length may be taken as indicated by the dotted line 75 (Fig. 4). The purpose of the excess length is this; the member 62 is first fixed in position by sweating (or it may be integral with the tube 72) whereupon the valve 59 is emplaced and the stem is followed by the member 66 which provides the bottom guide. The lower protruding end of the stem 60 then affords a means which is adapted to be grasped by a suitable instrument which is manipulated for grinding the valve 59 into its seat. The spring 61 does not need to be emplaced in this operation.

When the valve is properly ground in the member 66 is removed, the valve 59 extracted and its stem 60 cut off at each end to the proper lengths. Any burr is then removed from the cut ends whereupon a reassemblage is made, the member 66 preferably being secured by sweating, so that there will be no chance of a loosening of the parts.

As previously indicated, the purpose of the cam 53 is to automatically control the valve 59 so as to open and close the bore 11 to the pressure fluid at critical moments. It will be understood from Fig. 5 that the principle of operation of the engine is the constriction and closure of the conduit at the place 76 by the action of the companion rotary abutment or rider wheel 77 and the impingement upon the constriction by the pressure fluid, the direction of flow of which is denoted by the arrow *c*, the resulting directions of turning of the left and right units being according to the respective arrows *a* and *b*. The conduit 18 has bends 51, 52 which form a break in the continuity of the conduit. When the space between the breaks reaches the crest of the abutment 77 there would be a loss of pressure because the fluid would momentarily be permitted to flow through.

However, the cam 53 prevents this contingency, the former being so oriented that when the break between the bends reaches the crest of the abutment 77, the low part of the cam will take a position over the valve stem 60, permitting the spring 61 to momentarily shut off the pressure fluid.

Figure 7 illustrates the closed position of the valve 59. The conduits and abutments are so arranged that when one of the valves is closed the other will be open. From this it will be under-

stood that Fig. 7 illustrates the position of the valve for the right carrier unit (Fig. 3) while the valve of the left carrier unit is open (Fig. 5).

The conduit 18 and rotary abutment 77 are arranged in tandem on each of the two carriers. In principle each carrier may be fitted out with more than the single pairs of conduits and abutments. Further, it is conceivable that the multiplicity of the carriers may comprise more than the two shown. In any event it is necessary for every conduit to be confronted by an abutment on the companion carrier in order to produce the constriction 76 (Fig. 5). Means is provided for maintaining the constriction 76 under any possible variation of pressure fluid impacts.

This means comprises a pair of pressure screws 78 (Fig. 3). Each has a knurled head 79 which makes hand adjustment easy. Each screw is threaded in a boss 80 in the adjacent base support. The screw is reduced in diameter at 81 so as to provide a pin extension beyond a certain point. This reduction forms a shoulder 82. A washer 83 is slid onto the pin and rested against the shoulder. One end of a heavy spring 84 abuts the washer, the other end of the spring being seated in a socket 85 in the adjacent block 5. It will be understood that this structure is duplicated in each of the pressure screws 78 and that by manipulating the heads 79 the degree of contact between the driver members can be regulated.

Each of the latter carries a gear 86 (Fig. 3). The teeth of the gears are in constant mesh and the purpose of the gears is this; it was previously pointed out that power is taken off from one axle or shaft only at a time. However, the fluid pipe 70 (Fig. 4) is of a divided nature, as shown at 87 (Fig. 1), so that pressure fluid is furnished to the intake chambers of each carrier unit. Thus it is proposed to transmit the power generated by the right unit (for example) to the left unit, and in order to forestall the possibility of any slippage, the provision of the intermeshed gears 86 is made so as to always keep the two units in true relationship.

If any slippage were permitted there would be serious wear and tear upon the pliable conduits 16. Even in the event of the power being taken off of both axles or shafts at the same time, there is the possibility of slippage resulting from the variation in the loads, which slippage however is prevented by the intermeshed gears.

I claim:

1. In an engine, a hollow shaft having a pressure fluid opening at one end to supply a pliable conduit on a carrier affixed to said shaft, an inlet tube to conduct the fluid to said shaft, a chamber constituting one terminal of said tube, being slipped over said end of the shaft to comprise an enclosure for the open end, and because of its slip-contact being subject to displacement from the shaft by internal fluid pressure, a valve in the inlet tube having a stem extending into the chamber, a cam on said end of the shaft to actuate the stem and valve, a yoke disposed partly around the chamber and in fixed relationship thereto, and means carried by the yoke, being abutted by the chamber because of internal fluid pressure to maintain a set position wherein the cam is substantially centered on the valve stem.

2. In an engine, a hollow revoluble shaft having a pressure fluid opening at one end, means to supply the hollow shaft with said fluid and simultaneously to control its introduction into said opening, said means comprising a fluid inlet tube having a valve with a stem, a chamber in which said tube terminates, being slipped on and over said end of the shaft to provide communication with said opening, a cam on the shaft to control the valve and thus the intake of fluid, said cam having the stem in contact therewith, and means resisting the effort of the pressure fluid to slip the chamber off the shaft and thus in a position to keep the stem in operative relationship with the cam.

HAROLD L. LYON.