E. STUKE.

INTERNAL COMBUSTION ENGINE.

APPLICATION FILED MAY 3, 1918.

1,357,911. Patented Nov. 2, 1920.

Fig. 1.

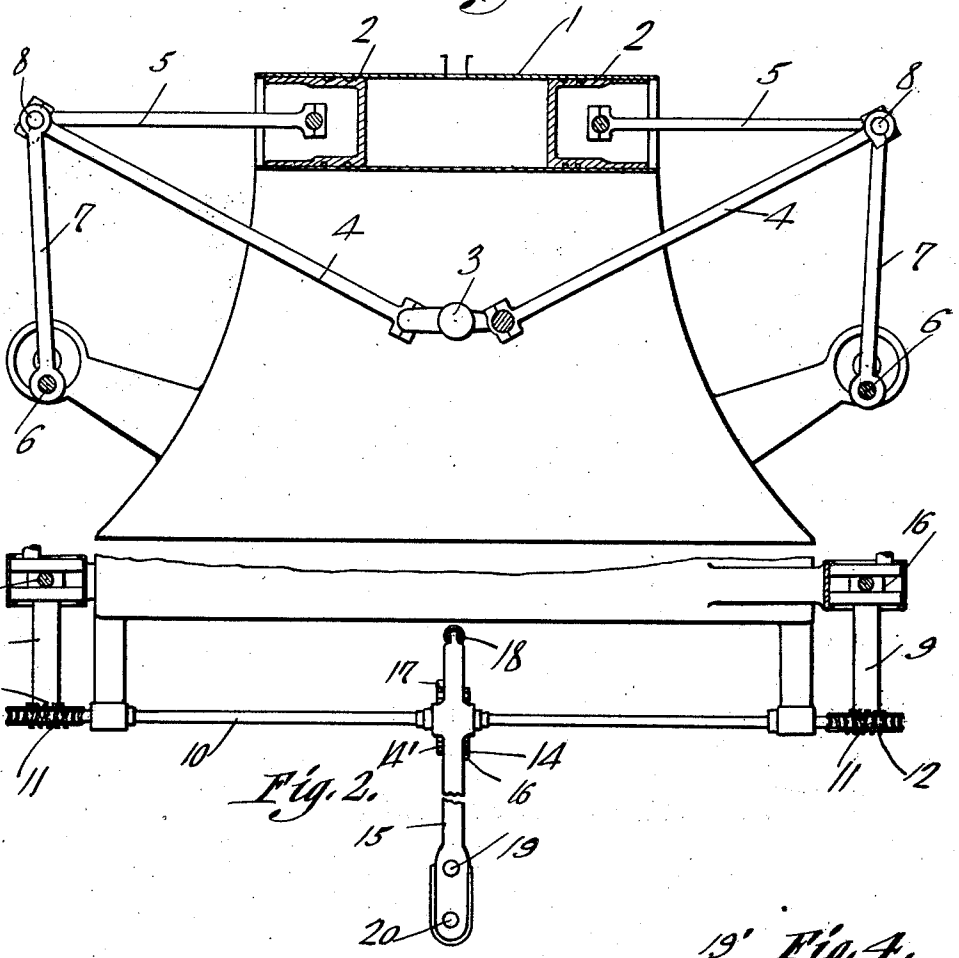


Fig. 2.

Fig. 3.

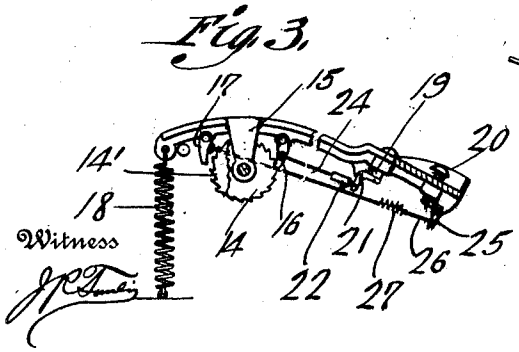
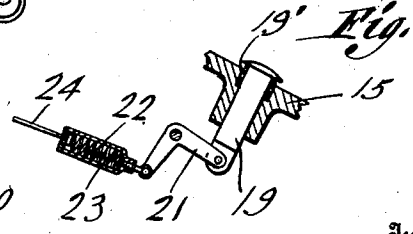


Fig. 4.



Witness

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UNITED STATES PATENT OFFICE.

ERNEST STUKE, OF MERIDIAN, MISSISSIPPI.

INTERNAL-COMBUSTION ENGINE.

1,357,911. Specification of Letters Patent. Patented Nov. 2, 1920.

Application filed May 3, 1918. Serial No. 232,328.

To all whom it may concern:

Be it known that I, ERNEST STUKE, a citizen of the United States, residing at Meridian, in the county of Lauderdale and State of Mississippi, have invented a new and useful Internal-Combustion Engine, of which the following is a specification.

This invention relates to internal combustion engines of that type shown, for example, in Patent Number 875,865 issued to me on January 7, 1908.

The primary object of the invention is to provide means constantly under the control of the operator whereby the compression of the explosive charge within the cylinder of the engine can be maintained substantially uniform if desired, irrespective of the changes in the atmosphere due to variations in altitude.

A further object is to provide simple and efficient mechanism whereby the variations in the relative positions of certain of the parts of the engine, necessary to maintain the desired compression, can be produced quickly and easily.

A still further object is to provide mechanism of this character especially adapted for use in connection with airships and whereby high altitudes can be attained readily.

With the foregoing and other objects in view the invention consists of certain novel details of construction and combinations of parts which will be hereinafter more fully described and pointed out in the claims, it being understood that various changes may be made in the construction and arrangement of the parts without departing from the spirit or sacrificing any of the advantages of the invention as set forth in the appended claims.

In the accompanying drawings the preferred form of the invention has been shown.

In said drawings—

Figure 1 is a side elevation of the engine, the same being shown partly in diagram and certain of the parts being broken away.

Fig. 2 is a plan view of that portion of the mechanism constituting the present invention.

Fig. 3 is a detail view of the pedal mechanism.

Fig. 4 is an enlarged view through a portion of the pedal.

Referring to the figures by characters of reference, 1 designates, in diagram, the cylinder of an internal combustion engine and which cylinder is open at its ends and is provided with any suitable means for directing gas thereinto at the center thereof. Opposed pistons 2 are mounted for reciprocation in the respective end portions of the cylinder and arranged below the center of the cylinder is a crank shaft 3 to the cranks of which are connected links 4. These links diverge upwardly and are connected, at their upper ends, to the outer ends of piston rods 5, the inner ends of the rods being pivotally connected to the respective pistons 2. A crank 6 is mounted for rotation under each of the rods 5 and these cranks 6 are connected to the outer ends of the rods 5 by bars 7, the rods, bars and links at each side of the engine being mounted preferably upon a single pivot or connection, shown at 8.

Any suitable means may be provided for rotating the cranks 6 simultaneously or otherwise and one form of mechanism for this purpose has been illustrated in Figs. 2, 3 and 4. Shafts 9 are connected to the cranks 6 and are provided with worm wheels which, in turn, are engaged and operated by worms secured to a shaft 10, the worm wheels being indicated at 11 and the worms at 12. Ratchet wheels 14 are secured to the shaft 10 and tiltably mounted on the shaft and extending over the ratchet wheels is a pedal 15 having opposed pawls 16 and 17 depending therefrom and adapted to engage opposed portions of the ratchet wheels. A spring 18 is connected to the pedal for holding it normally in an intermediate position. Spaced pins 19 and 20 are slidably mounted in the pedal and are provided at their upper ends with knobs for engagement by the toe and heel respectively of the foot engaging the pedal. A bell crank lever 21 is connected to the pin 19 and is connected to a sleeve 22 in which is housed a spring 23. This spring bears against a plunger housed in the sleeve and which is attached to a rod 24 connected to the pawl 16. A coiled spring 25 may be arranged around the pin 19 to hold it normally elevated and with the pawl 16 pulled out of engagement with the ratchet wheel. Pin 20 is connected to a bell crank lever 25 adapted to pull through rods 26 and a spring 27 upon the pawl 17, thus to throw the pawl into engagement with the ratchet wheel.

It is to be understood that under normal

conditions the worms 12 and wheels 11 will hold the shafts 9 and cranks 6 against rotation in either direction and the bars 7 are thus anchored at their lower ends. Thus when the pistons are reciprocated by the successive explosions of gas in the cylinder, the connections 8 will work in arcs concentric with the lower ends of the bars 7 and motion will be transmitted through the links 4 to the cranks on shaft 3. The operation of the engine will thus be the same as that of the engine described in my patent hereinbefore mentioned.

As the density of the atmosphere diminishes in proportion to the altitude, it is necessary, in order to drive aeroplanes, etc. at high altitudes, to have some means whereby the compression of the charge can be increased as the density of the atmosphere diminishes. The pedal operated mechanism is provided for this purpose. By pressing with the toe on the pin 19 and lifting the heel from the pin 20, the pawl 16 will be thrown into engagement with one ratchet wheel 14 while the pawl 17 will shift out of engagement with the other wheel. Thus by oscillating the pedal, at the same time holding pin 19 depressed, the shaft 10 can be rotated intermittently in one direction, thereby transmitting motion through the worm gearing to the shafts 9 and causing the cranks 6 to gradually rotate and lift the bars 7. The arcs described by the connections 8 during the reciprocation of the pistons will thus be moved upwardly and inwardly toward the cylinder 1 with the result that the pistons will move closer together during the compression strokes thereof and increase the compression as desired. By lifting the toe from the pin 19 and pressing with the heel upon the pin 20 pawl 16 will become disengaged and pawl 17 will be moved into active position so that oscillation of the pedal 15 will result in the rotation of the shaft 10 in the opposite direction and the lowering of the connections 8. Obviously this adjustment of the engine can be effected during the operation of the engine by a simple movement of the foot engaging the pedal 15, the worm gearing locking the parts efficiently during the operation of the engine.

What is claimed is:—

1. In an internal combustion engine a cylinder, oppositely arranged pistons therein, a crank shaft opposite the space between the pistons, oppositely extending piston rods pivotally connected to the pistons, supports pivotally connected to and extending at an angle from the outer ends of the piston rods, means for simultaneously shifting the supports to correspondingly shift the outer ends of the piston rods, and link connections between the crank shaft and the respective joints between the piston rods and their supports.

2. In an internal combustion engine the combination with a cylinder, oppositely arranged pistons therein, a crank shaft opposite the space between the pistons, and oppositely extending piston rods pivotally connected to the respective pistons, of supporting links pivotally connected to the outer ends of the piston rods, a shaft, means operated by the rotation of said shaft for simultaneously shifting said supports to raise or lower the outer ends of the piston rods, links connecting the crank shaft to the joints between the piston rods, links connecting the crank shaft to the joints between the piston rods and their supporting links and constituting means for transmitting motion from the pistons to the crank shaft, and foot operated means for rotating the support shifting shaft in either direction to raise or lower said support.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

ERNEST STUKE.

Witnesses:
IVY E. SIMPSON,
PHILOMENA A. ROCKELLI.