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VARIABLE CONNECTION BETWEEN CRANK AND PISTON

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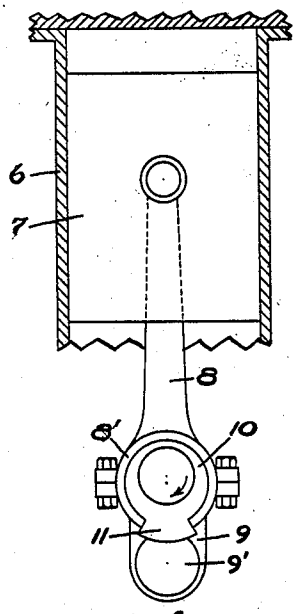


Fig. 1

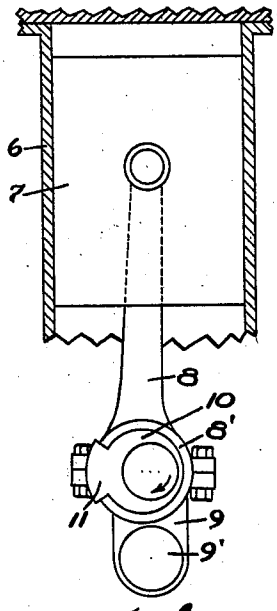


Fig. 2

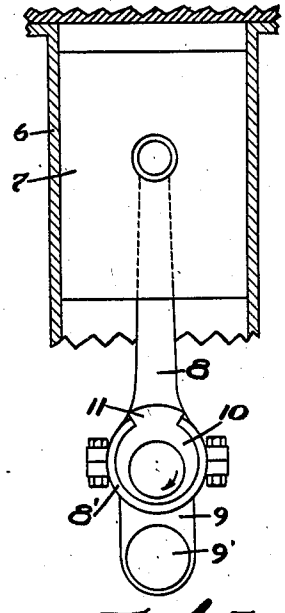


Fig. 3

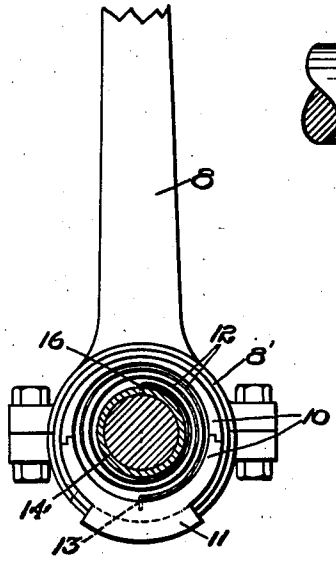


Fig. 5

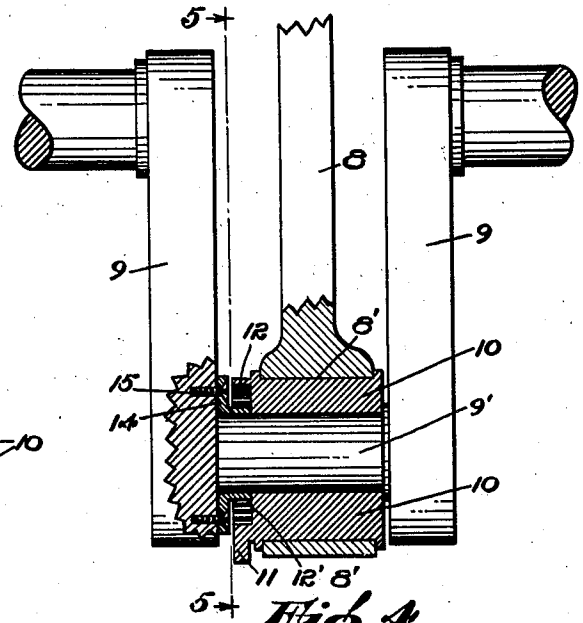


Fig. 4

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VARIABLE CONNECTION BETWEEN CRANK AND PISTON

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2 Claims. (Cl. 74—602)

Our invention relates more particularly to a new means for connecting the piston of an internal engine with a crank whereby the length of the piston stroke can be automatically varied with the increase and decrease of the speed of the motor.

It is known to provide means for varying the length of the stroke of a piston by adjustment of the connection but this adjustment remains the same at all times until again changed by mechanical means.

Our invention provides means for automatically changing the length of the stroke automatically and while the motor is running.

We accomplish this by using a weight connected to be moved by centrifugal force during the speed of the motor, the movement of which operates to change the length of the connection between the crank and the piston, with means for automatically returning the parts to their normal positions at low speed or when the motor is at rest.

The present method of accomplishing this, as shown on the accompanying sheet of drawing, is to use an eccentric sleeve or bushing between the crank shaft and the coupling rod, said sleeve having at one side thereof a weight adapted to be moved by centrifugal force to turn the sleeve or bushing on the crank shaft and thus lengthen or shorten the stroke transmitted to the piston with which the other end of the coupling rod is connected.

In addition to the weight connected with the eccentric sleeve or bushing, we use a coiled spring to automatically return the parts to their normal positions, the centrifugal force operating not only to turn the eccentric bushing or sleeve, but also to put the spring under tension so that when centrifugal force ceases to operate, the spring will automatically return the eccentric sleeve to its normal position.

This eccentric sleeve can be turned on the crank through approximately 180° and this results in lengthening the stroke of the piston which in turn increases the displacement of the piston and also increases the compression ratio.

In order to further explain our invention, we have shown one practical embodiment thereof on the accompanying sheet of drawing which we will now describe. In the drawing

Figure 1 illustrates a cylinder with piston therein and a coupling rod with our invention interposed between the rod and the crank;

Figure 2 is a similar view showing the parts in a different position;

Figure 3 is a similar view showing the parts in another position, or 180° from the position shown in Fig. 1;

Figure 4 is a fragmentary view of a crank with the coupling rod and our invention applied thereto and shown in section; and

Figure 5 is a sectional view through the crank on the line 5—5 of Fig. 4.

Referring now in detail to the drawing, the cylinder is designated 6, in each instance, the piston is designated 7, and the coupling rod is designated 8. The crank is designated 9, the crank shaft being designated 9'. These parts are all standard parts and are understood and can be of any desired type or size.

Our invention as here shown for purposes of explanation and detailed description, and as one embodiment thereof, consists of an eccentric sleeve or bushing, designated 10, split so as to be applied to the crank shaft 9', the eccentric position thereof being best shown in the sectional view in Fig. 4, said sleeve being within the bearing 8' of the coupling rod, and provided at one end and on one side with a weight extension 11, of segmental form, as clearly shown.

The end of the sleeve on which the weight is shown is provided in this showing with a recess or chamber 12' within which is placed a coiled spring 12, one of which is anchored, as at 13, to the sleeve 10, and the other end of which is secured to the bearing collar 14, around the crank shaft 9' and secured to the crank, as at 15, and rigid therewith, as seen in Fig. 4. This end of said spring being attached thereto, as at 16, Fig. 5.

It will be understood from this showing that as the speed of the motor increases, the centrifugal force developed by the turning of the crank 9, on which the eccentric sleeve 10 turns, will cause the said sleeve to be turned on account of the weight 11, first to the position shown in Fig. 2, and then as the speed increases, to the position shown in Fig. 3, which results in changing the positions of the pistons 7, substantially as indicated in Figs. 1, 2 and 3, and thereby changing the displacement of the piston as well as to increase the compression ratio, as will be readily understood by those versed in the art. As the eccentric sleeve or bushing 10 is turned under the centrifugal force, in the direction indicated by the arrows in Figs. 1, 2 and 3, the coiled spring 12 is wound up or put under tension, and when the speed is reduced, said spring automatically returns the parts to normal positions as shown in Fig. 1.

Thus it will be seen that we have provided a construction in which an eccentric sleeve or member is automatically operated by the centrifugal force to change the stroke of the piston an amount equal to the throw of the eccentric, with means for returning the parts under slow movement or standing to normal positions, and while we have shown and described one practical embodiment of our invention, we are aware that changes in the details of construction and arrangement can be made therein without departing from the spirit of the invention and we do not, therefore, limit the invention to the showing made for explanatory purposes except as we may be limited by the hereto appended claims.

We claim:

1. In combination, a piston, a crank, a coupling rod therebetween, an eccentric sleeve interposed between said crank and said coupling rod adapted to vary the length of the stroke of the coupling rod and piston, a weight on said sleeve responsive to centrifugal force to turn said sleeve under high speed to change the length of the stroke of said coupling rod and said piston, and a coiled spring connected at one end with said sleeve and at its other end with said crank whereby the turning of said eccentric sleeve operates to increase the tension of said spring, said spring operating to return said eccentric sleeve to normal position under reduced speed.

2. In combination with a crank, coupling rod and piston, an eccentric sleeve on said crank within said coupling rod connection adapted to respond to centrifugal force to change the length of the stroke transmitted to said piston, a weight at one end and to one side of said sleeve, a coiled spring set in one end of said sleeve and attached to normally hold said eccentric sleeve in minimum stroke position, the tension of said spring being overcome by centrifugal force under great speed to increase the stroke of the piston, the spring under slow speed normally holding said sleeve in minimum stroke position, substantially as described.

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