

Oct. 9, 1934.

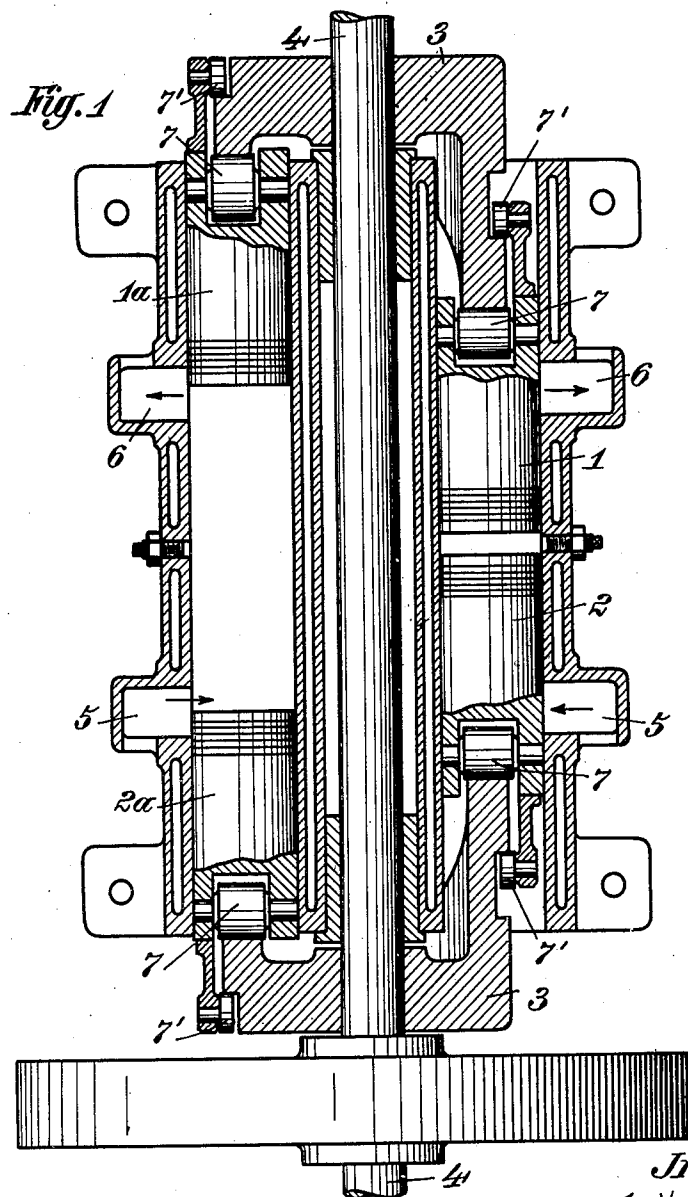
A. KREIDLER

1,976,286

CAM GEAR FOR INTERNAL COMBUSTION ENGINES

Filed March 22, 1932

2 Sheets-Sheet 1



Inventor:
A. Kreidler

By: *Marks & Clerk*
Attys.

Oct. 9, 1934.

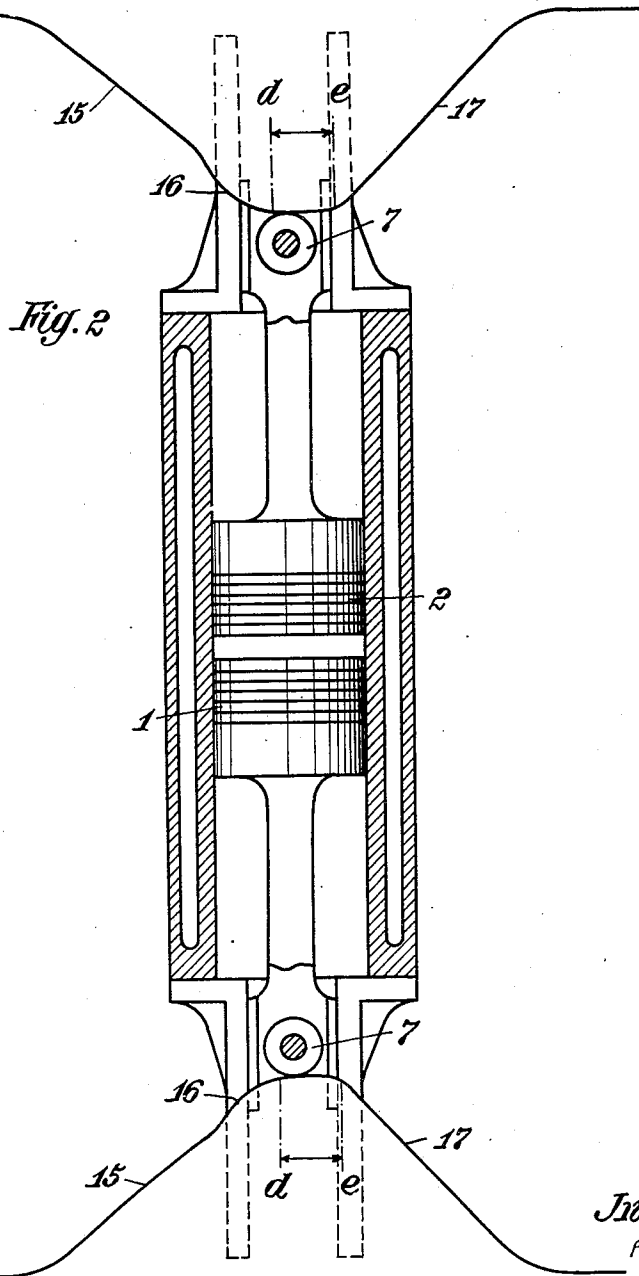
A. KREIDLER

1,976,286

CAM GEAR FOR INTERNAL COMBUSTION ENGINES

Filed March 22, 1932

2 Sheets-Sheet 2



Inventor:
A. Kreidler

By: Markes & Clerk
Attys.

UNITED STATES PATENT OFFICE

1,976,286

CAM GEAR FOR INTERNAL COMBUSTION
ENGINES

Anton Kreidler, Stuttgart, Germany

Application March 22, 1932, Serial No. 600,517
In Austria April 15, 1931

2 Claims. (Cl. 74—57)

The invention relates to internal combustion engines (for example explosion-Diesel two-stroke cycle or multi-stroke cycle engines) in which the piston movement is converted into the rotary motion of the driving shaft not by crank gear but by cam gear.

It is a particular advantage of cam gear that the course of the piston movement is not confined to that determined by the crank gear, but that it is possible by suitable configuration of the cam tracks to move the piston as desired during one revolution of the engine shaft, for example, to accelerate the movement of the piston, to retard it or even temporarily to stop it entirely.

The invention utilizes this advantage, in such internal combustion engines, in which the fuel is supplied during or before the compression of the air for combustion for the purpose of securing spontaneous ignition of the fuel mixture at the correct instant instead of by electrical ignition or by the incandescent method of ignition. This is effected by appropriate configuration of the cam track (compression cam curve) provided on the cam, which cam track effects the compression of the mixture. This compression cam curve is so constructed according to the invention that the piston moved thereby first of all precompresses the fuel mixture to an extent such that spontaneous ignition does not yet occur, while the compression curve rises very steeply towards its end, thereby effecting such rapid and high compression of the fuel mixture that spontaneous ignition of the latter occurs.

The new type of compression process just described is also applicable in the case of a Diesel engine in which the fuel is only admitted at the end of the high compression of the fresh air. In this case, fresh air is precompressed first of all, but the rapid and high compression of the fresh air occurring towards the end of the compression curve then brings the said air intensively to a state of incandescence, hence considerably promoting the spontaneous ignition of the fuel which is now admitted.

Whereas in crank engines the piston only slowly increases compression towards the end of the compression stroke, and the resulting heat of compression is partly absorbed unused by the cylinder walls, the latter occurrence is considerably diminished according to the invention by the rapid high compression at the end of the compression stroke.

Since, in the case of the cam gear, the transition from the compression curve to the working

curve is very rapid, there is the disadvantage, particularly in the case of high speed engines, that this change of curve proceeds more rapidly than the time taken for combustion to develop. Consequently, the working piston and hence the working curve is not under the desired working pressure from the beginning of the said curve. This disadvantage is obviated according to the invention by providing between the end of the compression curve and the beginning of the working curve on the cam a substantially rectilinear transition portion which practically stops the working piston until the combustion initiated by the spontaneous ignition has been fully developed. This arrangement corresponds to the known pre-ignition in internal combustion engines.

One constructional example of a cam gear according to the invention as applied to an internal combustion engine is shown in the accompanying drawings, wherein:

Figure 1 shows in axial section the cam gear applied to a multi-cylinder two-stroke cycle internal combustion engine with pistons running counter to one another.

Figure 2 shows on a larger scale a compression and a working curve in development after and the position of the working piston spontaneous ignition of the fuel has occurred.

Referring to the drawings, 1 and 2 are the pistons, 3 is the cam mounted on the driving shaft 4. The pistons run on the tracks of the said cam by means of rollers 7 or slide shoes. The admission and exhaust ports are shown at 5 and 6 respectively.

In Figure 2, the compression curve is shown at 15, 16 being its steeply rising portion at the end, *d—e* the connection portion between compression and working curve and 17 the working curve.

In Figure 1, the pistons 1 and 2 are at the instant at which spontaneous ignition has occurred. (See also Figure 2.) The pistons in moving outwardly run along the connecting distance *d—e* and by their pressure upon the steep working curve 17 situated opposite them set the driving shaft 4 in rotation. The piston 1, now 1*a* passes the exhaust port 6 and uncovers it for the most part, and the combustion residues escape. Piston 2 at this instant still covers the inlet. Both pistons move further. Piston 1 passes the exhaust port and piston 2 uncovers the inlet port, so that the fresh gas mixture or the scavenging air can enter the cylinder. During the further course of the rotation of the cam, piston 1 closes the ex-

haust 6 and then piston 2 closes the inlet 5. Both pistons are now on the compression curves 15, Fig. 2, which move them towards the middle of the cylinder to compress the contents of the cylinder. On passing over the steep end portion 16 of the compression curve, a rapid compression of the fuel mixture takes place in cooperation with the piston 2, which is rapidly moved forward at the same time from the other end, thereby effecting spontaneous ignition of the fuel mixture, whereupon the working of the pistons is repeated in the manner described in the foregoing.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A piston operated cam gear for internal combustion engines of the Diesel two-stroke cycle and multi-stroke cycle type including a cam track having compression and working portions,

the part of the compression portion immediately adjacent the working portion having a steeper inclination than the remaining compression portion whereby to effect a sudden increase of pressure at a more rapid rate than at the beginning of the compression period. 80

2. A piston operated cam gear for internal combustion engines of the Diesel two-stroke cycle and multi-stroke cycle type including a cam track having compression and working portions, the part of the compression portion immediately adjacent the working portion having a steeper inclination than the remaining compression portion whereby to effect a sudden increase of pressure at a more rapid rate than at the beginning of the compression period, said track being provided with a substantially rectilinear transition portion between the compression and working portions. 85 90

ANTON KREIDLER. 95

25	100
30	105
35	110
40	115
45	120
50	125
55	130
60	135
65	140
70	145
75	150