J. W. JEPSON.

ENGINE GEARING.

APPLICATION FILED AUG. 21, 1913.

1,148,478. Patented July 27, 1915.

Fig. 1,

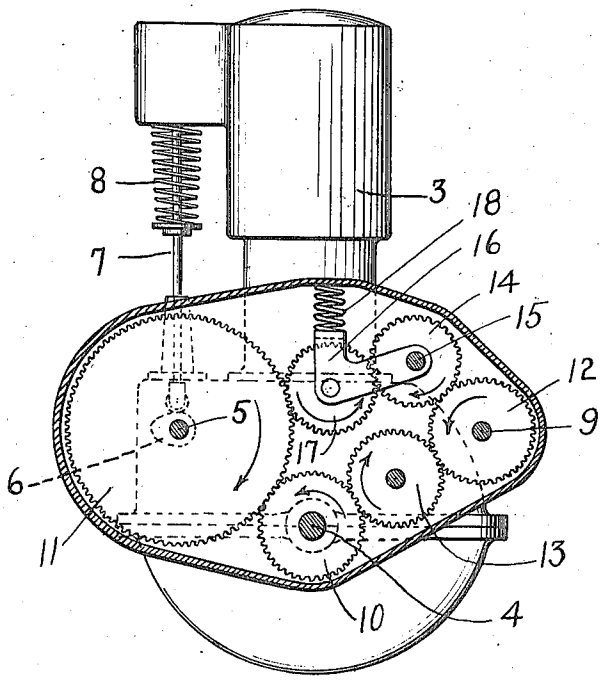
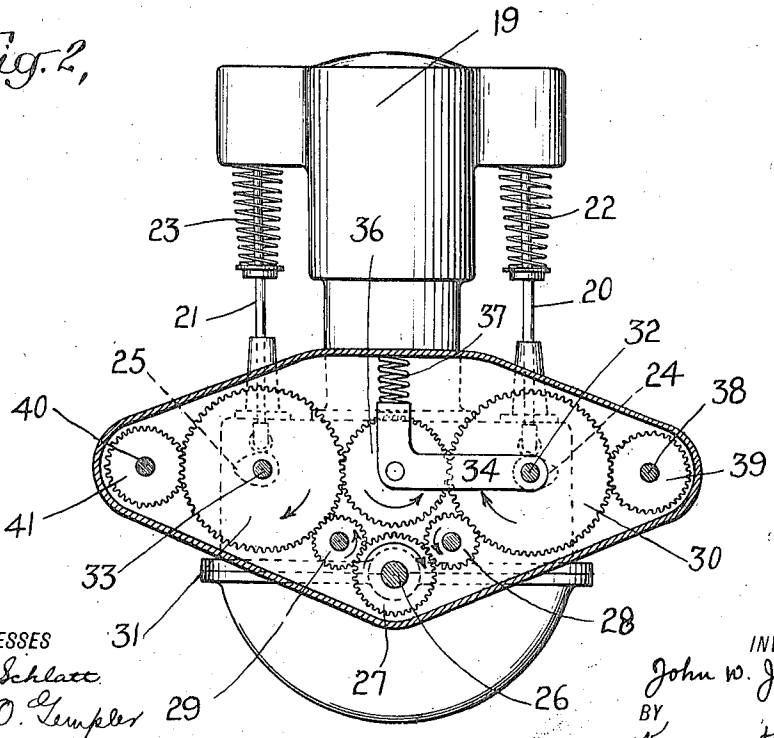


Fig. 2,



WITNESSES

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ENGINE-GEARING.

1,148,478. Specification of Letters Patent. Patented July 27, 1915.

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To all whom it may concern:

Be it known that I, JOHN W. JEPSON, a citizen of the United States, and a resident of Depew, Erie county, New York, have invented certain new and useful Improvements in Engine-Gearing, of which the following is a specification.

My invention relates more especially to gearing for explosive engines.

The main object of the invention is to provide an arrangement which will operate without backlash and the consequent noise or clicking.

It is customary in connection with explosive engines to provide a gear in the engine shaft, and a gear on the cam shaft driven thereby with or without the employment of an intervening idle gear. The cam shaft is customarily provided with cams which act to raise valve rods at proper intervals of time, against the action of springs, to open the engine valves. When a cam is raising a valve against the action of a spring the spring tends to rotate the cam shaft gear in the opposite direction from which it is driven, but as the valve is lowered under the action of the spring, the spring tends to rotate the cam shaft in the same direction in which it is driven so that if there is any backlash (and in practice there always is some) the force of the spring acts to cause the teeth of the cam shaft gear to jump forward and engage the teeth of the gear driving it on the opposite sides thereof, thus causing a clicking sound, which as the engine is rapidly operated results in a disagreeable noise. My invention is designed to overcome this disadvantageous feature and produce a gearing which will run quietly at all times even if the teeth of the gears become greatly worn.

Further objects, features and advantages will more clearly appear from the detailed description given below taken in connection with the accompanying drawing which forms a part of this specification.

In the drawing Figure 1 is a section illustrating an explosive engine gearing applied to an engine with a single cam shaft and embodying my invention in one form. Fig. 2 is a similar view illustrating my invention as applied to a T head engine or an engine with two cam shafts.

Referring to Fig. 1, 3 represents an engine of the internal combustion type such as commonly used on automobiles, etc. The main engine or driving shaft is indicated at 4. 5 represents a cam shaft having secured thereto cams 6 adapted to periodically raise valve rods 7 against the action of springs 8 to open the corresponding engine valves at the proper times. 9 represents a shaft which may be used for driving the magneto and pump in a well known manner. Secured to the engine shaft 4 is a gear 10 which meshes with a gear 11 secured to the cam shaft 5 so that the gear 11 is driven by the gear 10 for the purpose of driving the cam shaft. 12 represents a gear secured to the shaft 9 and driven from the gear 10 through an intermediate idle gear 13. 14 represents a gear meshing with the gear 12. The gear 14 is carried on a shaft 15 and pivotally mounted on the shaft 15 is a frame 16 having rotatably mounted therein a gear 17. The gear 17 meshes with the gear 14 on one side and with the gear 11 on the other side, and the axes of the gears 11, 17 and 14 lie substantially in a single plane. A spring 18 acts on the top of the frame 16 in order to resiliently but firmly force the teeth of gear 17 against the gears 14 and 11. It will be seen that as the gear 11 rotates in the direction shown by the arrow the spring 8 will tend to move the gear 11 backwardly because of its action on the cam 6 by means of the valve rod 7. However, after the apex of the cam 6 has passed the center of the valve rod 7, then the spring 8 tends to force the gear 11 in the same direction in which it is moving. In such gearing there is as a practical matter, always some blacklash between the gears which increases with wear. When the spring 8 then acts to tend to rotate the gear 11 in the opposite direction from what it did at first the gear teeth of the gear 11 jump forward and engage the opposite sides of the teeth of gear 10 causing a clicking sound which, if the motor is rapidly operated, results in a disagreeable noise. By the intervention of the spring pressed gear 17, however, which is forced downwardly by the spring 18 with a force which tends to move the gear 11 in the direction of the arrow with greater force than the spring 8 tends to move it in the opposite direction from the arrow, the teeth on the gear 11 will always engage the teeth

on the gear 10 on the same side thereof, and consequently when the apex of the cam 6 passes the center of the valve rod 7 there will be no jumping of the gear 11, and consequently no clicking noise, and the disagreeable noise due to backlash commonly experienced in such gears, is avoided.

In Fig. 2 I have shown my invention applied to a T-head motor 19 having valve rods 20 and 21, on each side thereof operated by springs 22 and 23 and cams 24 and 25, respectively.

The engine shaft is shown at 26 having connected therewith a gear 27 meshing with idlers 28 and 29 which in turn mesh with gears 30 and 31, respectively, secured to the cam shafts 32 and 33 respectively. A frame 34 is pivoted about the shaft 32 and has rotatably mounted therein a gear 36 so that the gear 36 is movably mounted. The gear 36 meshes on either side with the gears 30 and 31, and it is pressed downwardly by a spring 37, in order to tend to force or rotate all the cam shaft gears always in the same direction, to prevent backlash between the cam shaft gears and the engine shaft gear.

38 represents a shaft which may be used for driving the engine pump and has secured thereto a gear 39 meshing with the gear 30 for driving the same. The magneto may be driven by a shaft 40 having secured thereto a shaft 41 meshing with the gear 31 for driving the same. The operation of the arrangement shown in Fig. 2 will be clear from the description of the operation of the arrangement shown in Fig. 1.

Having fully and clearly described my improvements, what I claim as new and desire to secure by Letters Patent, is:

1. Internal combustion engine gearing comprising in combination with an engine shaft and cam shaft, a gear on the engine shaft, a gear on the cam shaft driven thereby, a chain of gears connecting said first mentioned gears to form a closed cycle of gears, one of said last mentioned gears being movable as a whole, and means for resiliently forcing said last mentioned gear firmly against the teeth of the gears in mesh therewith to prevent backlash between the engine shaft gear and the cam shaft gear.

2. Gearing of the class described, comprising in combination with an engine shaft and cam shaft, a driving gear connected with the engine shaft, a gear driving the cam shaft, a chain of gears connecting said first mentioned gears to form a closed cycle of gears, one of said last mentioned gears being movable as a whole, and means for resiliently forcing said last mentioned gear firmly against the teeth of the gears in mesh therewith to prevent backlash between the driving and driven gears.

3. Internal combustion engine gearing comprising in combination with an engine shaft and cam shaft, a driving gear connected with the engine shaft, a gear driving the cam shaft upon which a force acts to tend to rotate the gear first in one direction and then in the other direction, said cam shaft gear being driven from the engine shaft gear, a chain of gears connecting said two gears to form a closed cycle of gears, one of said last mentioned gears having its axis movably mounted, and means for resiliently forcing the teeth of said last mentioned gear firmly against the teeth of gears in mesh therewith to prevent backlash between the driving and driven gears.

4. Internal combustion gearing comprising in combination with an engine shaft and cam shaft, a driving gear connected with the engine shaft, a gear driving the cam shaft upon which a force acts to tend to rotate the gear first in one direction and then in the other direction, said cam shaft gear being driven from the engine shaft gear, and means acting with a force greater than said first mentioned force tending to force or rotate said cam shaft gear always in the same direction to prevent backlash between the cam shaft gear and the engine shaft gear.

5. The combination of a driving gear, a gear driven thereby and subject to backlash therewith, a chain of gears connecting said two gears to form a closed cycle of gears, one of said last mentioned gears having its axis movably mounted, and means for resiliently forcing the teeth of said last mentioned gear firmly against the teeth of gears in mesh therewith to prevent backlash between the driving and driven gears.

6. Internal combustion engine gearing comprising in combination with an engine shaft and cam shaft, a gear on the engine shaft, a gear on the cam shaft driven by the engine shaft gear, a chain of gears connecting said first two gears to form a closed cycle of gears, a pivotally mounted frame having its axis coincident with one of the gears and another of the gears being rotatably mounted in said frame, and a spring acting on said frame to resiliently force the teeth of said last mentioned gear firmly against the teeth of the gears with which it is in mesh to prevent backlash between the engine shaft gear and cam shaft gear.

7. The combination of a driving gear, a gear driven thereby upon which a force acts tending to rotate the driven gear first in one direction and then in the other direction, and means acting with a force greater than said first mentioned force tending to rotate the driven gear always in the same direction.

8. Internal combustion engine gearing comprising in combination with an engine

shaft and cam shaft, a gear connected with the engine shaft, two cam shaft gears driven thereby, a gear between the two cam shaft gears to form a closed cycle of gears, said last mentioned gear being movable as a whole, and means for resiliently forcing said last mentioned gear firmly against the teeth of the gears in mesh therewith to prevent backlash between the engine shaft gear and the cam shaft gears.

9. Internal combustion engine gearing comprising in combination with an engine shaft and cam shaft, a gear on the engine shaft, a gear on the cam shaft driven by the engine shaft gear, a chain of gears connecting said first two gears to form a closed cycle of gears, a pivotally mounted frame having its axis coincident with one of the gears and another of the gears being rotatably mounted in said frame, and a spring acting on said frame to resiliently force the teeth of said last mentioned gear firmly against the teeth of the gears with which it is in mesh to prevent backlash, the axes of said last mentioned gear and the gears with which it is in mesh lying substantially in the same plane.

10. Gearing of the class described, comprising in combination with an engine shaft and cam shaft, a driving gear connected with the engine shaft, a gear driving the cam shaft, a chain of gears connecting said first mentioned gears to form a closed cycle of gears, one of said last mentioned gears being movable as a whole, and means for resiliently forcing said last mentioned gear firmly against the teeth of the gears in mesh therewith to prevent backlash between the driving and driven gears, the axes of said movable gear and the gears with which it is in mesh lying substantially within a single plane.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

JOHN W. JEPSON.

Witnesses:
GORHAM CROSBY,
EDWIN SEGER.