Dec. 16, 1930. G. B. COLEMAN 1,785,338

TORQUE IMPULSE MULTIPLIER

Filed April 1, 1930

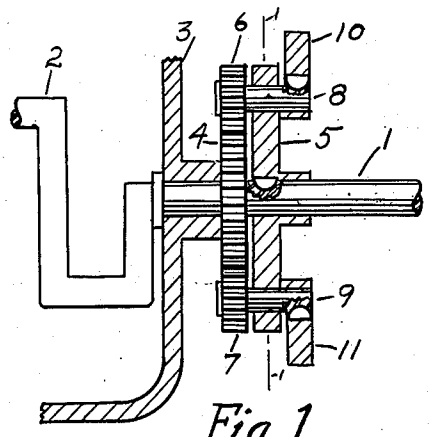


Fig. 1.

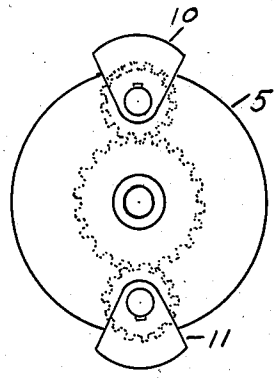


Fig. 2.

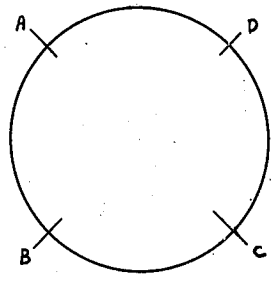


Fig. 3.

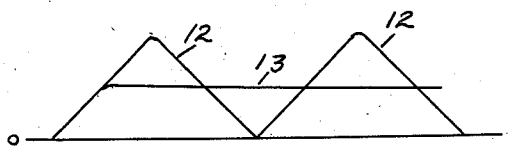


Fig. 4.

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UNITED STATES PATENT OFFICE

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TORQUE-IMPULSE MULTIPLIER

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This invention relates to a torque impulse multiplier for combustion engines, and it is particularly well adapted for automotive use.

An object of this invention is to provide a device of simple and efficient design, which when attached to a combustion engine, will multiply the number of torque impulses delivered by the engine, and which will produce torque impulses of uniform character.

A further object of this invention is to provide a device, which when used in combination with a four cylinder engine, will cause to be produced the same torque impulses as an eight cylinder engine, of standard design without the device.

One form of my invention is illustrated in the accompanying drawing, in which Figure 1 is a cross sectional assembly view, showing the device as viewed from one side.

Figure 2 is an end view taken along the line 1—1 of Fig. 1.

Figure 3 is a diagrammatic showing of impulses during a revolution.

Figure 4 shows torque impulses as delivered by a combustion engine, and the torque impulses as delivered by the same engine with the torque impulse multiplier in operation.

The drive shaft 1 is driven by engine crankshaft 2, and is rotatably mounted in engine frame 3. The central gear 4 is rigidly connected to frame 3. The carrier 5 is rigidly connected to shaft 1, and carries planetary gears 6 and 7, which gears are connected through shafts 8 and 9, to the eccentric weights 10 and 11.

If shaft 1 be rotated, gears 6 and 7 will be caused to rotate on their axes and also about the main axis of shaft 1. Since weights 10 and 11 must rotate with these gears, these weights will be caused to move inward toward the axis of shaft 1, and then outward again, and this inward and outward movement of weights 10 and 11 will continue during the rotation of shaft 1.

Since weights 10 and 11 are rotating about the main axis of shaft 1, at the same time they are rotating about their own axes, centrifugal force will tend to keep them in their outward position. This centrifugal force will retard their inward movement, but will impel their outward movement. Now assume that shaft 1 is driven by an engine that delivers two power impulses per revolution, and refer to Figure 3. The period from A to B is the time of maximum engine torque during one impulse, and assume this period averages 40 foot pounds torque. The weights 10 and 11 are so timed that during this period these weights will be drawn from outward to inward position, and assume it requires 20 foot pounds torque to pull these weights inward. This will leave a torque of 20 foot pounds effective to shaft 1. During the period from B to C the weights will swing outward with a 20 foot pound torque, and consequently the torque from B to C is substantially equal to that of A B. During the period from C to D the weights are again pulled in against centrifugal force, with a resulting torque of 20 foot pounds effective at shaft 1. During the period from D to A, the weights are again pulled outward by centrifugal force, with the resulting torque of 20 foot pounds during period D A. It will be seen that the torque is substantially 20 foot pounds at any period of a revolution, while without the torque impulse multiplier, the torque would be 40 pounds between A and B, and C and D and practically nil between B and C, and D and A. In Figure 4 curve 12 shows the torque curve of the engine alone, and straight line 13 shows the torque curve with this device.

In the past it has been necessary to use heavy fly wheels to smooth out the torque curve of combustion engines, but it has been found that if a sufficiently heavy flywheel were used the automobile would be sluggish.

Consequently the present tendency is toward 8 and even 16 cylinder engines, which employ lighter weight flywheels and more torque impulses.

With this invention a 4 cylinder engine of inexpensive design will produce the same results as an eight cylinder engine of more complicated and costly design.

It is obvious that a number of changes or modifications as to the details of my invention might be made without affecting the

spirit of the invention or the scope of the claims.

I claim:

1. A torque impulse multiplier comprising a planet carrier, planetary gears rotatably carried by said planet carrier, a mass member operatively secured to said planetary gears, and a non-rotatable gear meshing with said planetary gears.

2. In a torque impulse multiplier, a planet carrier, stub shafts rotatably mounted in said planet carrier, planetary gears secured to one end of each stub shaft, eccentrically disposed weights secured to the other ends of said stub shafts, and a non-rotatable gear in mesh with said planetary gears.

3. In a torque impulse multiplier, a drive shaft, a planet carrier secured to said drive shaft, stub shafts rotatably mounted in said planet carrier, planetary gears secured to one end of each stub shaft, eccentrically disposed weights secured to the other ends of each stub shaft, and a central gear rotatably mounted on said drive shaft and secured against rotation.

4. In a torque impulse multiplier, a source of power, a drive shaft secured thereto, a planetary gear train operatively mounted on said drive shaft, an inertia mass member movable synchronously with the planetary portion of said planetary gear train, and means for securing the remaining portion of said planetary gear train against rotation.

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