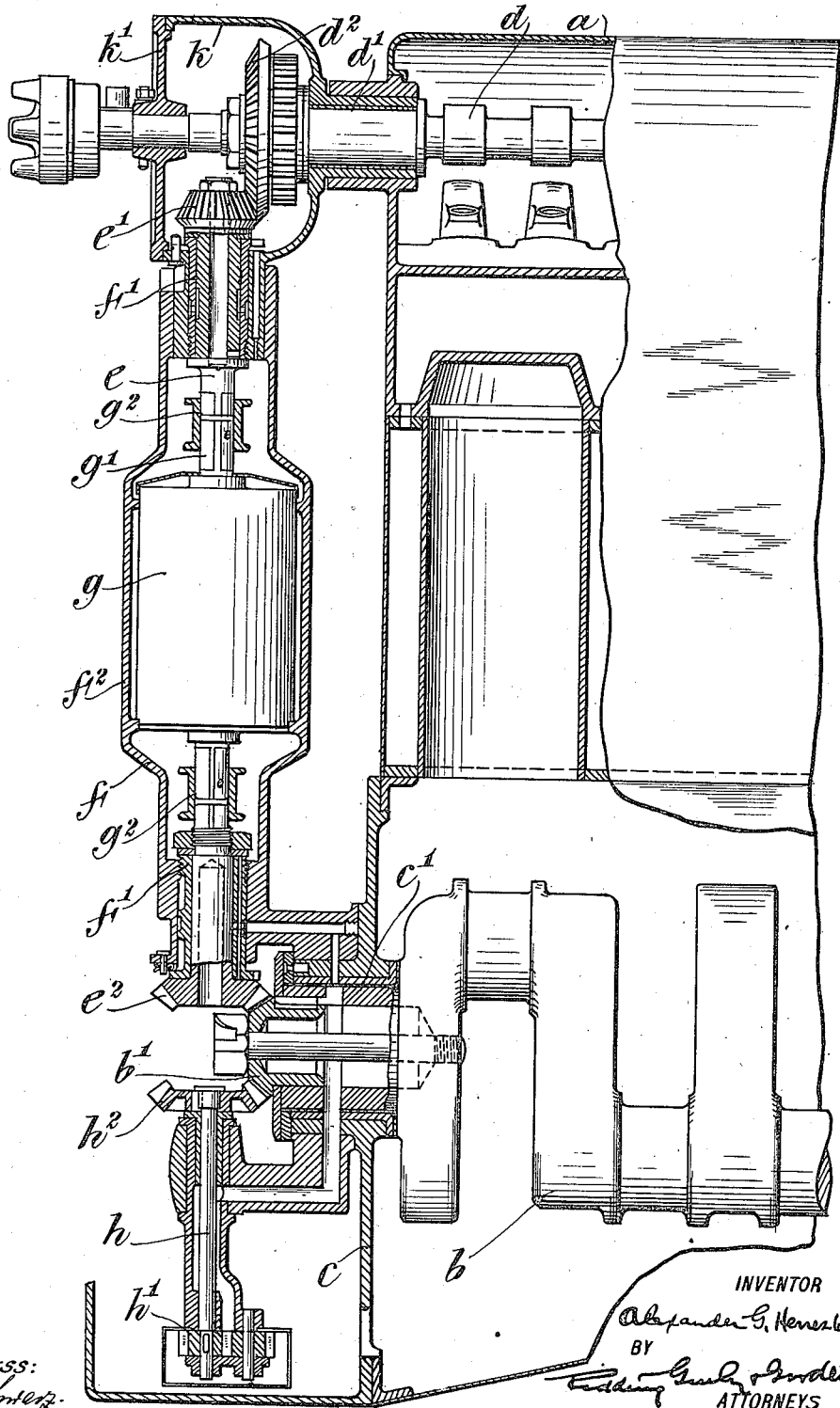


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GENERATOR DRIVE MECHANISM.
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WITNESS:
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GENERATOR DRIVE MECHANISM.

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To all whom it may concern:

Be it known that I, ALEXANDER GRISWOLD HERRESHOFF, a citizen of the United States, residing in the borough of Manhattan of the city of New York, in the State of New York, have invented certain new and useful Improvements in Generator Drive Mechanism, of which the following is a specification, reference being had to the accompanying drawing, forming a part hereof.

This invention relates to generator drives for internal combustion engines and is concerned particularly with such drives in engines having overhead cam shafts. It has for its principal object to simplify such constructions by the elimination of some of the elements heretofore employed, to make the construction more compact and accessible than heretofore and to include the generator by direct connection in the driving mechanism for the overhead cam. Further details of construction and other advantages will appear at greater length hereinafter in connection with the detailed description of the illustrated embodiment in the drawing, in which drawing—

The figure is a view showing a fragment of an internal combustion engine, partly in side elevation and partly in vertical section to which the improved generator drive is applied.

In accordance with known practice, particularly where overhead cam shafts are employed separate shafts and gearings have been used for driving the generator of an internal combustion engine although separate vertically disposed shafting and gearing have been necessary to drive the overhead cam shafts from the crank shaft. The principal object of the present invention is to improve such construction by eliminating some of the shafting and gearing employed, thereby not only reducing the initial expense and mechanical difficulties involved in the correlation and installation of such greater number of parts, but also making the improved construction much more compact, certain and accessible than before. As shown in the drawing, the engine *a* includes in its construction the usual crank shaft *b* which is journaled in the end wall *c* of the crank case and also includes a cam shaft *d* which, in the overhead drive, is journaled in the cylinder head and is extended beyond the bearings *d'* provided in the end wall

thereof. The end of the crank shaft *d* also extends beyond the bearings *c'* provided in the end wall *c* of the crank case. The invention is not concerned with the details of construction of any of the elements thus far described. Since the cam shaft *d* must be driven in time with the crank shaft *b*, it is the usual practice to interconnect these two shafts by an independent vertically disposed shaft extending therebetween and geared therewith. It is also required, however, that the generator in such engines be driven from the crank shaft and usually this drive has been obtained through a separate generator shaft geared operatively to the crank shaft. In accordance with the present invention, there is provided outside of the engine casing a vertically disposed shaft *e* on the ends of which are carried bevel pinions *e'*, *e''* meshing, respectively with bevel gears *d''*, *b'* carried on the projecting ends of the cam shaft *d* and the crank shaft *b*. By this shaft *e* the cam shaft is driven from the crank shaft in proper time relation thereto. The shaft *e* in the illustrated embodiment is disposed within a casing *f* and this casing is supported on the crank case *c* and carries in its ends bearings *f'* in which the shaft *e* is supported. By the present invention it is proposed to employ the auxiliary drive shaft *e* for the cam shaft *d* for the driving of the generator *g* without providing the usual independent shafting and gearing heretofore required for driving the generator from the crank shaft. In accordance with the improvement the auxiliary drive shaft *e* is split or made in sections and has its end sections connected directly to the ends of the armature shaft *g'* of the generator *g* through couplings *g''*, these connections insuring the direct drive of the generator by the auxiliary shaft *e* at the same speed. To permit the intercoupling of the generator in the manner described, the casing *f* for the shaft *e* is suitably enlarged, as at *f''*, to receive the generator and support it. By placing the generator in the position shown it is much more accessible than heretofore, the entire construction is much more compact and the number of parts is greatly reduced, thereby improving the engine from a mechanical viewpoint.

In the improved construction, further simplicity and compactness are realized by connecting the shaft *h* of the oil pump *h'* to

the crank shaft through a bevel pinion k^2 on the end of the oil shaft which is meshed with the gear b' on the end of the crank shaft.

The gears e' , d^2 are inclosed by a casing k which is supported on the walls of the engine and receives all of the shafts which pass into it with a substantially oil-tight engagement, thereby insuring proper lubrication of the parts and yet permitting ready accessibility through the provision of an end cap k' thereon.

The scope of the invention will appear from the appended claims.

I claim as my invention:

1. In an internal combustion engine, a crank shaft, a cam shaft, a separate shaft connecting the first two shafts and a generator coupled directly to said separate shaft.

2. In an internal combustion engine, a crank shaft, a cam shaft, gears on the ends thereof, a separate sectional shaft extending therebetween and having gears at its ends to mesh with the respective gears on the first two shafts whereby the cam shaft is driven in time from the crank shaft and a generator interposed between the sections of said separate shaft and coupled directly thereto.

3. In an internal combustion engine, a crank shaft, an overhead cam shaft, a vertically disposed separate sectional shaft geared to said first two shafts and a genera-

tor interposed between the sections of said separate shaft and coupled directly thereto.

4. In an internal combustion engine, a crank shaft, an overhead cam shaft, a vertically disposed separate sectional shaft geared to said first two shafts, a generator interposed between the sections of said separate shaft and coupled directly thereto, and a casing inclosing the separate shaft and generator.

5. In an internal combustion engine, a crank shaft, an overhead cam shaft, a sectional separate shaft having its ends geared to the ends of the two first named shafts and a generator interposed in said sectional shaft and having the ends of its armature coupled directly to the proximate ends of the sectional shaft.

6. In an internal combustion engine, a crank shaft, an overhead cam shaft, a sectional separate shaft having its ends geared to the ends of the two first named shafts, a generator interposed in said sectional shaft and having the ends of its armature coupled directly in the proximate ends of the sectional shaft, a casing inclosing the generator and sectional shaft and bearings carried in the casing for supporting said generator and separate sectional shaft.

This specification signed this 21 day of June, A. D. 1917.

ALEXANDER GRISWOLD HERRESHOFF.