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APPLIANCE FOR INTERNAL COMBUSTION ENGINES

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Fig. 1.

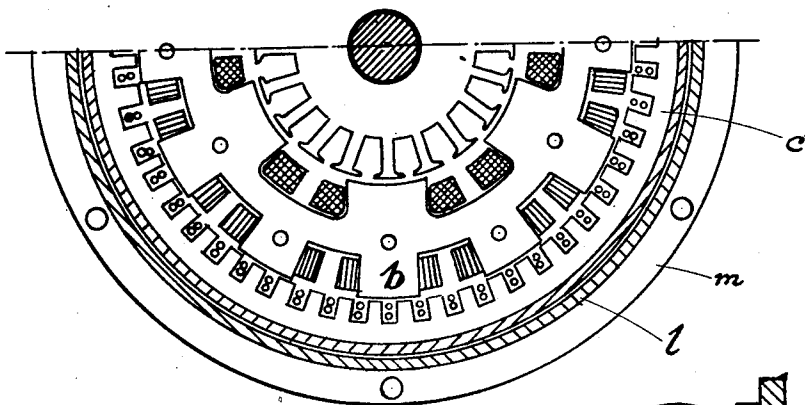


Fig. 2.

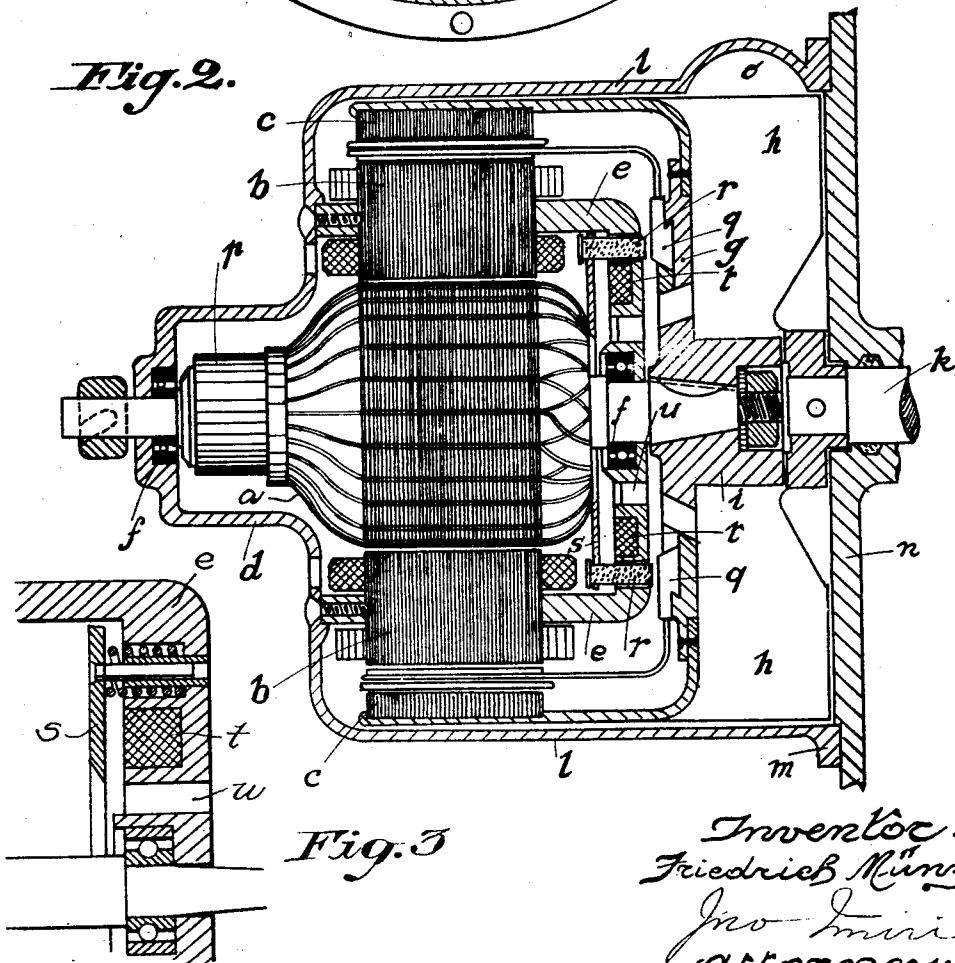


Fig. 3

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APPLIANCE FOR INTERNAL-COMBUSTION ENGINES

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My present invention relates to internal combustion engines and has for its object to provide an improved arrangement in motor-cars, whereby the construction thereof will be simplified in such a way that the manufacture and operation will be reduced to a minimum without affecting the modern accommodation and safety. This object will be attained by the fact that on one hand the heretofore usual generator and the electric starter will be united in a single machine and mounted directly on the crank-shaft of the internal combustion engine, so that special actuating means for the generator and starter will be omitted. Owing to the particular construction of this combined dynamo and starter it will be possible, if necessary, to assist the internal combustion engine, by the starter, that is to increase the rotary moment thereof. On the other hand the armature or rotor of the improved starter is constructed in the shape of a turbo or compartment blower, the purpose of which is to supply compressed air or a previously compressed gas mixture through the carburetor to the cylinders of the engine whereby the rotary motion of the crank shaft of the internal combustion engine will be increased to such an extent that the use of a changeable speed gear mechanism may be omitted. The purpose of my novel arrangement is therefore to provide an operating mechanism for motor-cars, comprising merely the internal combustion engine without combined dynamo-starter, the coupling and the differential devices. This purpose is obtained by mounting the starter concentrically around the generator, so that a common pole case for both mechanisms may be used, that the armature of the starter will therefore have the maximum diameter and thus produce the maximum rotary moment, at the same time utilizing the available space to the best advantage. As the armature or rotor of the starter is fast on the crank-shaft or coupled with the same, the fly-wheel of the internal combustion engine may be reduced by the weight of the armature of the starter. I am aware, that arrangements have been provided, in which a combined genera-

tor and starter are coupled directly with the crank-shaft.

However in such arrangements the armature of the generator is provided with two kinds of windings, and used at the same time as armature for the starter. Now in order to produce the required rotary moment in the operation of starting, transmission mechanism is generally employed, which will be automatically released at the end of the starting operation. Such a starter of course cannot be used while the car is running for assisting the internal combustion engine; furthermore the transmission mechanism and automatic engaging and disengaging gear are very complicated and subject to early destruction.

My invention is illustrated in the accompanying drawings, wherein:

Fig. 1 is a cross section of the combined dynamo and starter, and

Fig. 2 is a longitudinal section of same with combined blower.

Fig. 3 is a broken sectional view illustrating the means for holding the flange apart from the flat ring collector.

a is the armature of the generator and b is the pole case which has on the inside six magnet-poles for the generator and on the outside twelve magnet-poles for the starter. c is the armature for the starting motor. Preferably the armatures a and c as well as the pole-case b are made of dynamo sheets, which are dimensioned in such a way that the armature sheets and the pole case sheets may be punched from one sheet blank. Secured to the pole-case b are the two bearing covers d and e and the armature a of the generator is journaled in the two ball bearings f, f . Preferably the shaft of the armature on the side of the commutator will project beyond the bearing cover d for the reception of a gear for a starting handle. The opposite end of the armature shaft is extended rearwardly and has a cone for the reception of the armature plate g , which on one side carries the armature c of the starting motor, while the opposite side is constructed in the form of a turbo or compartment blower h . As shown the hub i serves as a coupling between my improved

apparatus and the crank-shaft *k* of the internal combustion engine. The entire apparatus is inclosed by a protecting casing *l*, adapted to be rigidly fastened to the cover *e* and pole case *b* by means of screws. The casing *l* is provided with a flange *m* which abuts against the engine case *n*. This arrangement affords means for securing the casing to the engine. The casing *l* forms an annular channel *o* through which the compressed air from the blower *h* passes, and from which air is forced to the carburetor. Preferably the air to be compressed will be sucked through the case of the generator, whereby effective cooling of the mechanism is obtained. For the dynamo armature *a* I use an ordinary cylindrical commutator *p*, and for the starter armature *c* I preferably use a flat ring commutator *q*. The collecting brushes rest permanently on the commutator *p* of the dynamo armature, and metal-carbon brushes *r* for the starter armature *c* only engage the flat ring commutator *q* during the starting period and when it is desired to augment the power of the internal combustion engine by the starter. This will be effected preferably by arranging all twelve metal-carbon brushes *r* (six positive and six negative brushes, the latter being in this case grounded) on an iron annular flange *s* which will be held apart from the flat ring collector *q*. By the action of the electro-magnet *u* provided with an annular winding *t* the iron annular flange *s* with the twelve metal carbon brushes *r* will be attracted if required (during the starting period and the time of assistance to the engine) against the flat ring commutator *q* whereby the starting motor will be operated. As soon as the current in the annular winding *t* will be cut off, the metal-carbon brushes *r* with the annular flange *s* will again be moved apart from the flat ring commutator *q* by the springs, whereby no current will be supplied to the starting motor. Owing to the comparatively large diameter of the turbo-blower *h* it will not be necessary to have a transmission gear for increasing the number of revolutions thereof.

Having now fully described my said invention, what I claim and desire to secure by Letters Patent, is:

1. The combination with the crank shaft of an internal combustion engine, of a generator, a starting motor mounted around said generator, and means whereby said starting motor and generator are directly and rigidly connected to the crank shaft of the engine.

2. The combination with the crank shaft of an internal combustion engine, of a generator, a starting motor mounted around said generator, a pole-case common to the generator and starting motor, and means whereby said starting motor and generator are directly and rigidly connected to the crank shaft of the engine.

3. The combination with the crank shaft of an internal combustion engine, of a generator, a starting motor mounted around said generator, a pole-case common to the generator and starting motor, an armature for the starting motor, a flat ring commutator for the armature, brushes cooperating with said commutator, means for selectively engaging and disengaging said brushes and commutator, and means whereby said starting motor and generator are directly and rigidly connected to the crank shaft of the engine.

4. The combination with the crank shaft of an internal combustion engine, of a generator, a starting motor mounted around said generator, a pole-case common to the generator and starting motor, an armature for the starting motor, a flat ring commutator for said armature, brushes cooperating with said commutator, electro-magnetic means for moving the brushes into engagement with the commutator, springs for disengaging the brushes from the commutator on the decenergization of the electro-magnetic means, and means whereby said starting motor and generator are directly and rigidly connected to the crank shaft of the engine.

In testimony whereof I have hereunto set my hand.

FRIEDRICH MÜNZ.