H. HESS.

STARTING DEVICE FOR EXPLOSIVE MOTORS.

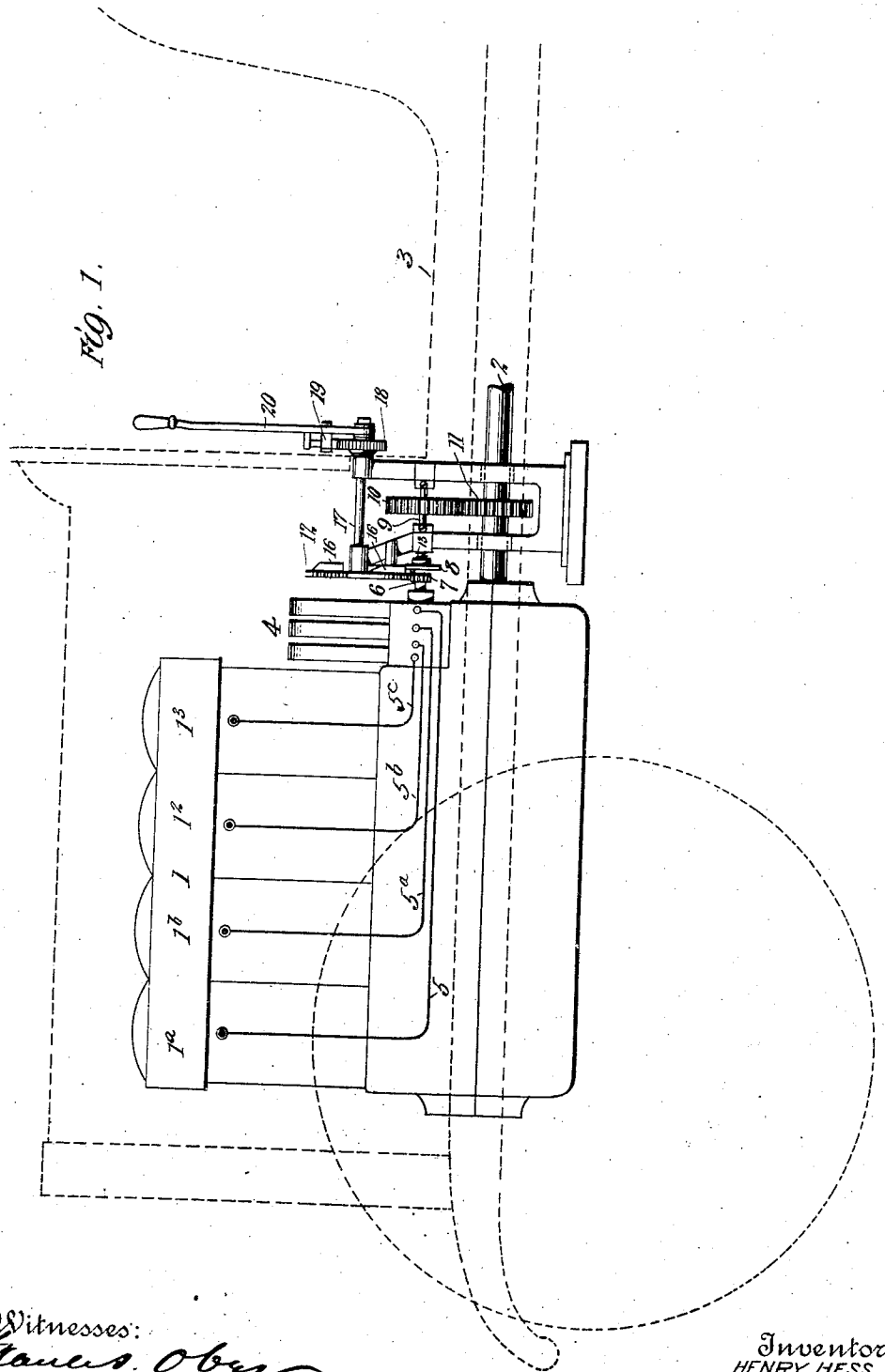
APPLICATION FILED JUNE 3, 1909.

1,068,129.

Patented July 22, 1913.

2 SHEETS—SHEET 1.

Fig. 1.



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2 SHEETS—SHEET 2.

Fig. 3.

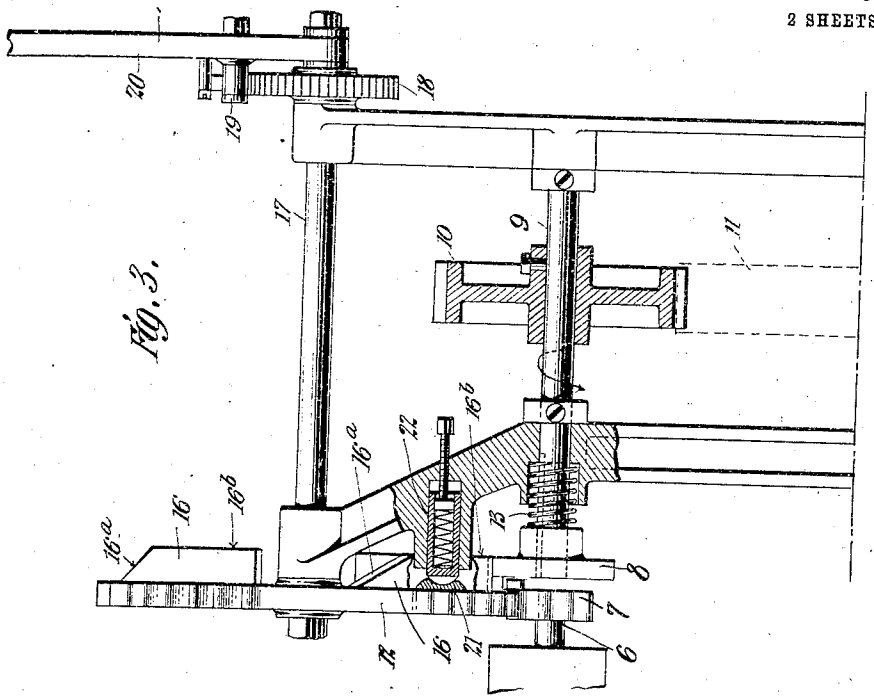


Fig. 4.

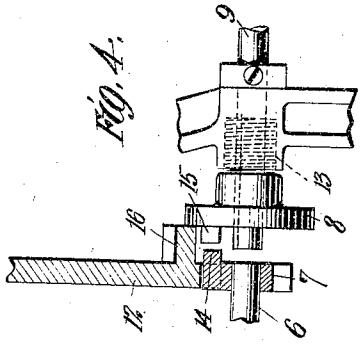
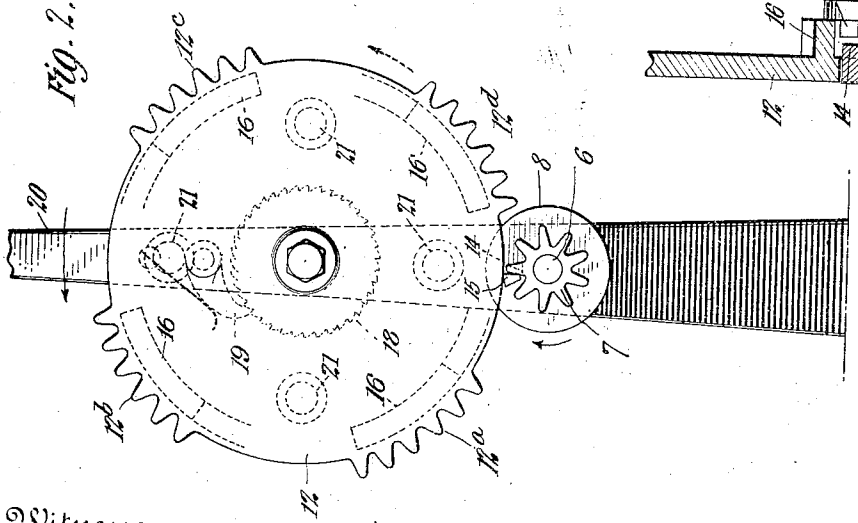


Fig. 2.



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UNITED STATES PATENT OFFICE.

HENRY HESS, OF WAWA, PENNSYLVANIA, ASSIGNOR TO THE HESS-BRIGHT MANUFACTURING COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF DELAWARE.

STARTING DEVICE FOR EXPLOSIVE-MOTORS.

1,068,129. Specification of Letters Patent. Patented July 22, 1913.

Application filed June 3, 1909. Serial No. 499,966.

To all whom it may concern:

Be it known that I, HENRY HESS, a citizen of the United States, residing at Wawa, in the county of Delaware and State of Pennsylvania, have invented certain new and useful Improvements in Starting Devices for Explosive-Motors, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to means for starting that type of motors for automobiles which are operated by explosive charges ignited by an electric spark generated by a dynamo or "sparker" driven by the motor, the aim of the invention being to start the motor without "cranking" or manually turning the motor shaft, or parts connected therewith.

With this end in view, my invention consists of improved means for actuating the dynamo independently of the motor, so that a spark may be formed in the motor cylinder to ignite the charge therein without the necessity of "cranking" the motor shaft, which would be necessary if the dynamo were incapable of independent operation. This result is accomplished by interposing between the dynamo and the motor, mechanism adapted to permit the continuous driving of the dynamo from the motor as usual, but adapted to permit the disconnection of the motor from the dynamo, so that the latter may be operated or "turned over" independently of the motor.

In the operation of my improved mechanism, the independent actuation of the dynamo will ignite the charge in the cylinder and start the engine, and the latter in its continued operation will take up the motion of the dynamo and operate the same continuously and normally.

My invention consists also in an improved form of the driving connection between the motor and dynamo, adapted, after the independent operation of the dynamo and when the latter is again connected up with the motor, to preserve their phase relationship.

In the accompanying drawings: Figure 1 is a side elevation of a motor and dynamo, showing the same connected in accordance with my invention; Fig. 2 is a face view on an enlarged scale of the independent driving means for the dynamo, showing the latter connected for continuous operation by the motor; Fig. 3 is a side elevation of the same with parts in section; Fig. 4 is a sectional view on the line A—A of Fig. 2, showing the motor and dynamo disconnected for independent operation of the latter.

Referring now to the drawings: 1 represents a motor comprising power cylinders 1^a, 1^b, etc., provided with pistons, as usual, coupled to the driven power shaft 2, which shaft may be geared in any suitable manner to the wheels of the motor car 3. The pistons are given their power strokes by the explosion of compressed explosive charges in the cylinders, which charges are ignited by an electric spark produced by means of a dynamo or magneto-sparker 4, suitably sustained by the frame of the car and having its rotary armature driven from the motor, from which armature the current passes by means of conductors 5, 5^a, etc., to the interior of the respective cylinders, the rotary motion of the armature delivering a spark to the interior of the cylinders in succession and thereby igniting the explosive charges compressed therein. The foregoing parts may be of any appropriate and customary construction, and, except in so far as hereinafter indicated, they of themselves form no part of this invention.

In applying my invention, I so form the driving connection between the motor and dynamo that, while under ordinary and normal conditions the dynamo will be driven continuously by the motor, the two may be disconnected and the dynamo driven manually and independently of the motor, so that a spark may be produced in the cylinders by the manual operation of the dynamo without at the same time operating the motor shaft or parts connected therewith. This result and mode of operation is preferably effected by providing the armature shaft 6 with a driving pinion 7, adapted to be driven normally by means of a driving clutch disk 8, receiving its rotary motion from the motor shaft 2 through the medium of a counter-shaft 9, to which the driving clutch is connected, a pinion 10 on the counter-shaft and a pinion 11 on the motor shaft meshing with pinion 10. The clutch disk is adapted to be disengaged from driving connection with the armature shaft, and the latter driven independently by means of a gear wheel 12 adapted to be operated manually, preferably from the driver's seat, and in such manner that when operated

a partial rotation will be given to the armature shaft independently of the motor, and the necessary spark produced to ignite the charges in the cylinders. The driving clutch disk 8 is splined to the counter-shaft 9 so as to be movable longitudinally thereon, the disk being acted on by a spiral spring 13 encircling the shaft and bearing against the machine frame and disk respectively, and acting to normally hold the disk yieldingly in driving engagement with the armature pinion, the driving connection between these parts comprising a lug 14 on the face of the pinion adapted to be engaged by a driving lug 15 on the adjacent face of the clutch disk. With the parts in the position shown in Figs. 2 and 3, the clutch disk is held by the spring in driving engagement with the armature pinion, with the two lugs in the path of each other, so that the rotary motion of the motor shaft will through the medium of pinions 10 and 11, impart to the clutch disk a continuous motion, which by means of the lugs 14 and 15 will be imparted to the armature pinion, and the dynamo will be given its usual and normal continuous motion.

The form of the gear wheel 12 is such that when turned by hand it will first automatically disengage the driving clutch disk from the armature pinion, and then engage with the armature pinion and impart to the latter a partial revolution, after which it will automatically disengage from the armature pinion and permit the reëngagement therewith of the clutch disk. This is effected by providing at intervals on the gear wheel, a series of driving gear teeth 12^a, 12^b, 12^c and 12^d, thus forming a mutilated gear, which teeth are adapted to mesh with the teeth of the armature pinion and give the same a partial turn, in the present instance about half a revolution. Near the edge of the wheel 12, on its rear face, are a series of cams 16, corresponding in number and location to the series of gear teeth thereon, which cams are adapted, when the wheel is turned, to engage the face of the clutch disk and force the same back against its spring and out of driving connection with the armature pinion, as shown in Fig. 4, the disengagement of the clutch disk taking place co-incidently with the engagement of the gear teeth with the armature pinion, and the clutch disk being held out of engagement with the pinion while the gear wheel is in engagement therewith. To effect this the cams are each formed with an inclined forward face 16^a, and a rearwardly extending face 16^b, the former acting to engage the clutch disk and push it gradually out of engagement with the armature pinion, and the face 16^b acting to hold the same out of engagement, the form and relation of the parts being such that by the time the last tooth of the series of teeth on the wheel 12 leaves the armature pinion, the end of the cam face 16^b will pass beyond and disengage the clutch disk, and allow the latter to be pushed by its spring back into position where its lug 15 will be in the path of the lug 14 on the armature pinion.

The mutilated gear 12 may be operated manually by any appropriate means, but I prefer to adopt the construction shown in Fig. 3, where it will be seen that the wheel is mounted on the end of a shaft 17, which in turn is mounted in suitable bearings, and has fixed to it a ratchet wheel 18 engaged by a driving pawl 19, pivoted to an operating lever 20 mounted to fulcrum on the end of the shaft, the movement of the lever in the direction of the arrow (Fig. 2) serving to impart a turning motion to the shaft and acting to cause the wheel 12 to be moved in the direction of the dotted arrow in said figure. These connections for the manual operation of the wheel may be extended to the driver's seat, and the operating lever formed to be actuated either by the hand or foot, it being but necessary to give the lever a forcible push to cause the proper impulse to be given to the mutilated gear to effect such a movement of the armature as to produce the igniting spark.

In order to prevent the mutilated gear wheel from being given a greater motion than necessary by reason of the suddenness of the impulse given to it by the operating lever, and in order to maintain the wheel in proper relationship after starting, with reference to the armature pinion, I provide on the face of the wheel a series of sockets or depressions 21, corresponding in number to the series of gear teeth, which sockets are adapted to receive a spring actuated plunger 22, sustained by the frame, the parts being so positioned relatively to the series of gear teeth on the wheel 12, that when the plunger engages with one of the sockets, the wheel will be held with its gear teeth disengaged from the armature pinion, ready for the engagement of the next series of teeth with said pinion on the succeeding motion of the wheel.

By reason of the fact that there is but a single point in the rotation of the clutch disk and armature pinion, where the disk can engage and drive the pinion, it follows that these parts when engaged will always preserve the same relation to each other, so that the phase relationship of the dynamo and motor is not disturbed in the operation of disengaging the parts for manual action and again connecting them for normal action.

While in the accompanying drawings I have illustrated the particular embodiment of the invention which I prefer to adopt, and which in practice has been found to an-

swer satisfactorily the end in view, I desire it to be understood that my invention is not limited to any specific form or arrangement of parts, except in so far as such limitations are specified in the claims.

Having thus described my invention, its construction and mode of operation, what I claim and desire to secure by Letters Patent of the United States is as follows:

1. In combination with a motor, a magneto normally in driving connection therewith, and manually operable means for interrupting said driving connection to permit the independent operation of the magneto, said means acting thereafter to automatically reëstablish such driving connection to provide for the continued operation of the magneto by the motor.

2. In combination with a motor, a magneto normally in driving relation to the motor and adapted to be disconnected therefrom, and manually operable means adapted to engage the magneto so as to operate the same independently of the motor when the latter is disconnected, and thereafter operating to automatically disengage itself from the magneto to permit the operation of the magneto by the motor when the latter is again connected.

3. In combination with a motor, a driven member receiving motion therefrom, a magneto, operated by said driven member, a manually operated member adapted when actuated to first disengage the driven member from the magneto and then effect driving connection therewith.

4. In combination with a motor, a rotary driven member receiving motion therefrom, a magneto, a pinion in operative connection with the magneto and adapted to be driven by the said driven member, a manually operated member adapted to disengage the driven member from the pinion, and teeth on the manually operated member adapted to engage the magneto pinion.

5. In combination with a motor, a rotary member driven thereby, a magneto, a member operatively connected with the magneto, driving connections between said rotary member and the magneto member joining said parts in phase relationship and adapted to be disengaged to free the magneto from the motor, and a manually operated device acting when operated to first disengage the motor and magneto and then operate the latter independently of the motor.

6. In combination with a motor, a rotary disk operatively connected therewith, a driving tooth on the disk, a magneto, a pinion on the magneto, a driven tooth on the pinion adapted to be engaged by that on the disk, means for moving one of said parts relatively to the other to disengage the driving and driven teeth, and means for operating the pinion when disengaged.

7. In combination with a motor, a rotary member driven thereby, a driving tooth on said member, a magneto, a driving pinion operatively connected therewith, a tooth thereon adapted to be engaged by the said driving tooth, on the motor member, a mutilated gear adapted to engage and drive the magneto pinion, and means for disengaging the teeth on the motor member and magneto pinion from driving connection with each other.

In testimony whereof I have affixed my signature in presence of two witnesses.

HENRY HESS.

Witnesses:
HENRY MCCALLA,
NETTIE L. HAHN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."