B. P. & F. I. REMY.

MAGNETO ELECTRIC GENERATOR.

APPLICATION FILED FEB. 17, 1910.

1,081,696

Patented Dec. 16, 1913.

3 SHEETS—SHEET 1.

Fig. 2.

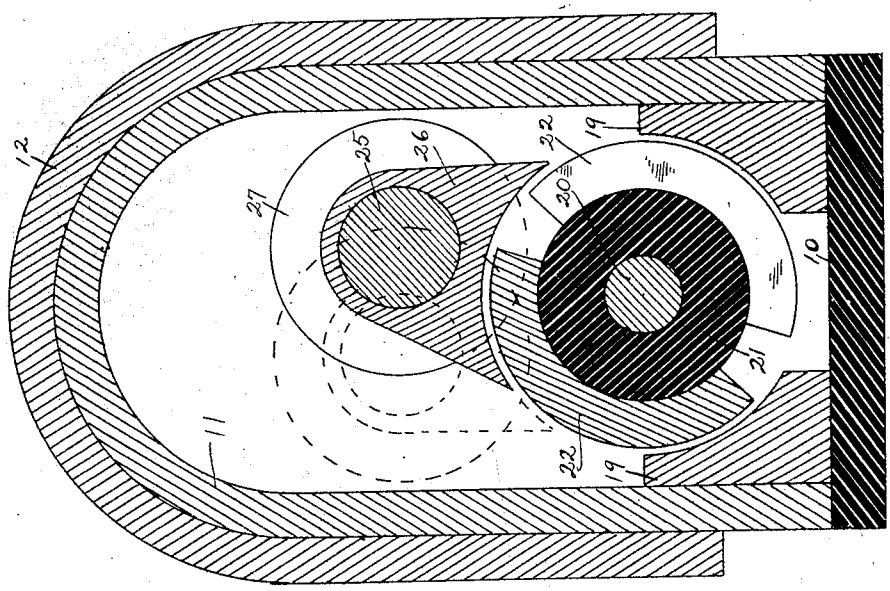
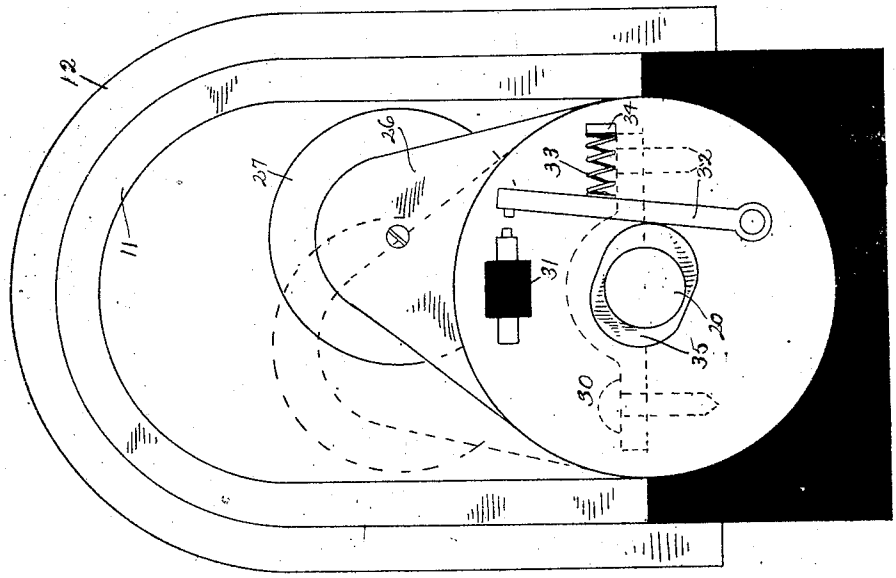


Fig. 1.



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3 SHEETS—SHEET 2.

Fig. 3.

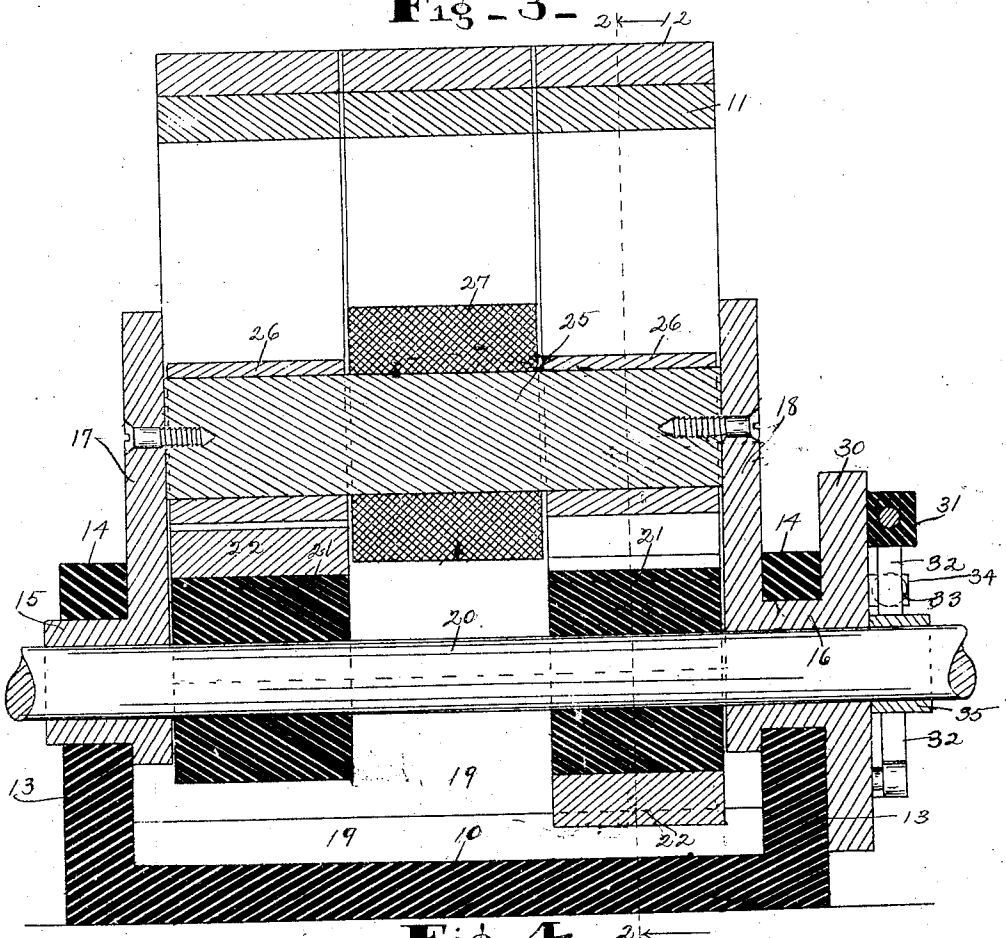
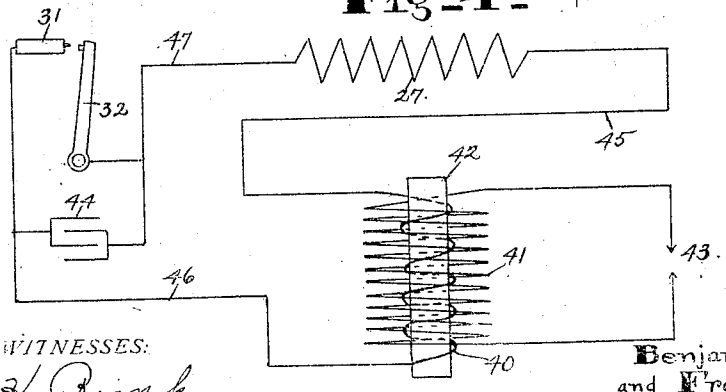


Fig. 4.



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3 SHEETS—SHEET 3.

Fig.-5-

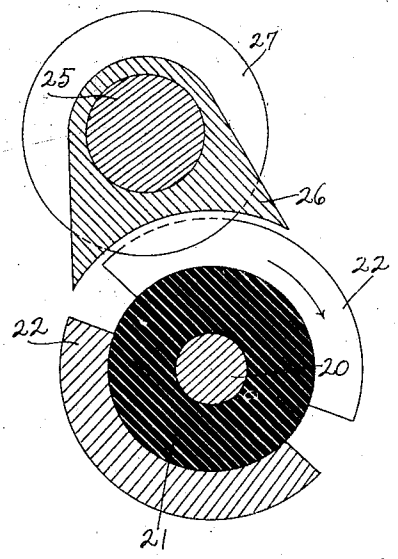


Fig.-6-

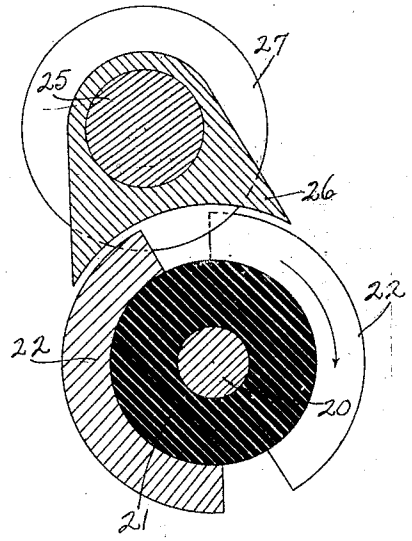


Fig.-7-

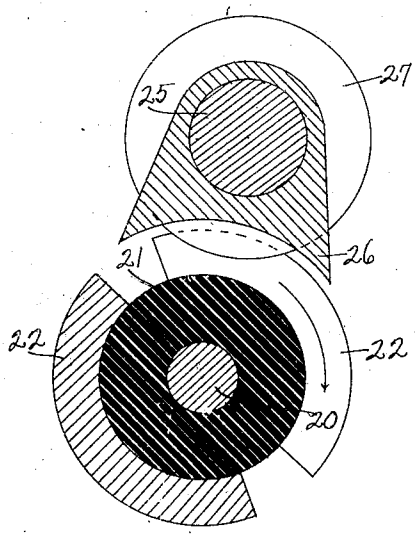
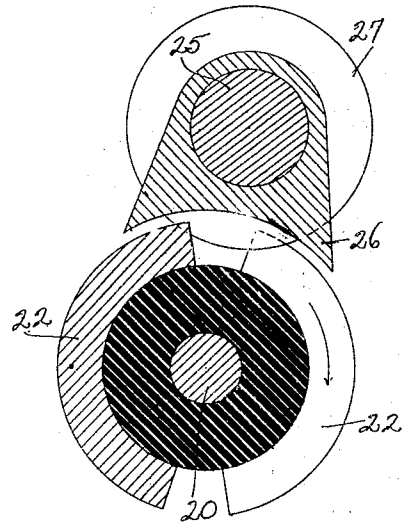


Fig.-8-



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UNITED STATES PATENT OFFICE.

BENJAMIN P. REMY AND FRANK I. REMY, OF ANDERSON, INDIANA, ASSIGNORS, BY MESNE ASSIGNMENTS, TO SUMTER ELECTRICAL COMPANY, A CORPORATION OF SOUTH CAROLINA.

MAGNETO-ELECTRIC GENERATOR.

1,051,696. Specification of Letters Patent. Patented Dec. 16, 1913.

Application filed February 17, 1910. Serial No. 544,402.

To all whom it may concern:

Be it known that we, BENJAMIN P. REMY and FRANK I. REMY, of Anderson, county of Madison, and State of Indiana, have invented a certain new and useful Magneto-Electric Generator; and we do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings.

This invention relates to the disposition of the parts of an electric generator in such manner as to produce an efficient and easily constructed apparatus, and has been made with particular reference to the construction of a magneto electric generator for ignition purposes.

The chief feature of the invention consists in mounting the armature in a non-revoluble position relative to the rotary inductors, said armature including pole pieces spaced apart, between which the winding is arranged, said armature being out of the field of rotation of the inductors.

Another feature consists in the mounting of said armature so as to permit of its position being changed, and providing an interrupter that is controlled by the change of position of the armature whereby the time of interruption may be varied.

The nature of the invention will be understood from the following description and claims and the accompanying drawings.

In the drawings Figure 1 is an elevation of one end of the generator with portions of the circuit breaker shown in vertical transverse section, altered positions of parts of the device being shown by dotted lines. Fig. 2 is a vertical transverse section through Fig. 1 on the dotted line 2—2 of Fig. 3. Fig. 3 is a central vertical longitudinal section through the device. Fig. 4 is a diagram of the circuits by which the ignition of an internal combustion engine may be produced by this generator, but the particular arrangement of circuits used is however not essential to the invention. Fig. 5 is a section through a part of the device showing the parts in one position. Fig. 6 is the same showing the inductor operated slightly farther than in Fig. 5. Fig. 7 is the same showing the parts in a different position from Fig. 5. Fig. 8 is the same as Fig. 7 with the inductor moved slightly farther than in Fig. 7.

In the drawings herein there is shown a base 10 for the generator which is made preferably of non-magnetic material, and there are no upwardly extending sides, as the inner set of magnets 11 rest upon the base. The outer set of magnets 12 do not extend as low as the base, as indicated in Figs. 1 and 2 but these features are immaterial. There are ends 13 extending up from and integral with the base, which together with removable portions 14 above, furnish bearings for outwardly extending tubular bearing portions 15 and 16 of the end plates 17 and 18, respectively, so that said plates can rock. There are field magnet pole pieces 19 secured stationary on the base and adjacent the lower end of the inner set of magnets 11, see Fig. 2. The inductor shaft 20 extends through and has bearings in the bearing portions 15 and 16, just referred to, see Fig. 3. This shaft carries two supports 21 for the inductors 22. Said supports 21 are made preferably of non-magnetic material, while the inductors are made of magnetic material, and the two sets of inductors and supports are spaced apart, one being located adjacent each end plate 17 and 18. The supports 21 are rigidly attached to the inductors 22 and also to the shaft 20, and together constitute the revolving member of the generator.

The armature consists of the core 25 that is secured to the end plates 17 and 18 so as to rock therewith concentrically with the shaft 20. It carries at each end adjacent said end plates, pole pieces 26, which extend down rather close to the inductors 22, and the adjacent surfaces of the pole pieces are curved concavely and concentrically to conform to the curvature of the inductors, see Fig. 2. The core 25 and pole pieces 26 are composed of magnetic material. The pole pieces have substantially the same length longitudinally of the core 25 as the inductors 22. A suitable winding 27 is mounted on the core 25 between the pole pieces and registering with the space between the inductors on the inductor shaft. The complete armature, including the core, winding, pole pieces and end plates 17 and 18 is relatively and normally stationary: that is, the armature is not revolved or moved by the revolution of the inductor shaft or any other revolving member. But the armature is not stationary altogether, as it is capable of being oscillated, rocked or moved as indicated

by the full and dotted lines in Figs. 1 and 2. This oscillatory or rocking movement of the armature is for the purpose of controlling the variation in time of the high value or peak.

Integral with the end plate 18 and bearing extension 16 therefrom there is a timer disk 30 which carries an insulated terminal 31 adapted to be touched by the contact lever 32, which lever is normally pressed toward said terminal by a spring 33 lying between said lever and a post 34 on the timer disk, see Fig. 1. The lever is actuated by the double cam 35, which is secured to the inductor shaft adjacent the disk 30. Therefore, at each revolution of the inductor shaft said cam actuates the lever 32 and makes and breaks the circuit twice. Since the switch portion of the circuit breaker, namely, the terminal 31 and lever 32 are mounted in connection with the oscillatory or rocking armature construction, when the armature is rocked or shifted, say from the position shown by full lines in Fig. 1 to that shown by dotted lines, the position of the lever 32 relative to the cam 35 will be modified, and thereby the time at which the circuit is made and broken is varied.

In Fig. 4 there is shown a diagram of circuits illustrating the arrangement of parts of the generator and electrical apparatus external thereto by which ignition may be produced. In that diagram 40 is the primary winding of an induction coil and 41 is the secondary winding, the latter having relatively many turns when compared with the former, and 42 is the core thereof.

43 represents the spark plug and 44 the condenser.

27 represents the armature winding and from that a wire 45 runs to the primary winding in the induction coil, and a wire 46 runs from the primary winding to the terminal 31, and a wire runs from the circuit breaking lever 32 to the winding 27 of the armature. The terminals of the secondary winding 41 are connected to the respective terminals of the spark plug.

The action of the generator is as follows: When an inductor 22 is in proximity to an armature pole piece 26 and the field magnet pole piece 19, as indicated in Fig. 2, it forms between said pole pieces a path for magnetic flux. The inductors 22 are so placed that when one armature pole piece 26 is thus connected with one field magnet pole piece 19, the other armature pole piece 26 is connected to the other field magnet pole piece 19 at the other end of the device. A path for magnetic flux is thus, formed starting from the field magnet, through a field magnet pole piece, an inductor, an armature pole piece, the armature core, the other armature pole piece, the other inductor, the other field magnet pole piece, to the field magnet. The inductors 22 are so disposed that when the inductor shaft and associated parts revolve through half a revolution, the direction of the flux through the armature core is reversed. The reversals of flux in the armature core occasioned by the revolution of the revolving parts serve to induce an electromotive force in the windings 27.

In order to produce ignition, the current from the winding is led through the primary of the induction coil and at a suitable instant interrupted by the separation of the contact lever 32 and the contact 31, occasioned by the action of the cam. This sudden stopping of the current in the primary of the induction coil induces in the secondary thereof an electromotive force sufficiently great to jump the gap in the spark plug. The condenser serves to diminish the spark formed between the insulated contact 31 and the contact lever at the instant of separation. To vary the time of interruption and consequently the time at which the spark occurs in the spark plug, the armature is shifted about the axis of the shaft, as indicated by full and dotted lines in Figs. 1 and 2, thereby moving the contact lever as hereinbefore described.

Although but two inductors 22 and two armature pole pieces 26 are shown in the drawings, the invention is not limited to this number. A greater number may be used together with windings located between various adjacent armature pole pieces, in order to produce electromotive forces of various characters in the various windings. Also it is immaterial whether the field magnet pole pieces 19 are separate from or integral with the magnets, as they act as one means. The same is true of the armature core and armature pole pieces 26.

In order to make the mode of operation clearer, reference may be had to Figs. 5, 6, 7 and 8, which show various positions of the inductor 22 and of the armature. As has been stated, as the inductors rotate they produce a variation in the magnetic flux through the armature core 25. At certain portions of the revolution of the inductors this variation of flux is rapid, resulting in the production of a high electromotive force in the armature winding 27, whereas at other times the variation of flux is slow, or zero, resulting in a low or zero value of the induced electromotive force. In order to obtain a satisfactory spark it is desirable that the circuit breaker open the circuit at the time when the induced electromotive force possesses a high value.

Referring to Fig. 5, the rear inductor 22, which is uppermost, forms a connection between the rear armature pole piece 26 and the right hand field magnet pole piece 19. The magnetic flux through the armature core is small, on account of the magnetic cir-

cuit being open between the front armature pole piece and the front inductor. By the time that the inductors have turned through a small angle, to the position shown in Fig. 6, the front inductor has closed the magnetic circuit between the front armature pole piece and the left hand field magnet pole piece, thereby closing the magnetic circuit and allowing the flux through the armature core to increase rapidly. This rapid increase in the flux results in a high value of the induced electromotive force. Thus, by shifting the armature, the most desirable point for the interruption of the circuit by the contact points is also shifted.

In use, the gearing between the magneto and the engine is such that the cam interrupts the circuit every time that a charge is to be ignited. If, for example, the engine be of the four cylinder, four cycle type, making two explosions per revolution of the crank shaft, the magneto should be driven at the same speed as the crank shaft. In order to vary the time of sparking, the disk 30 is turned about the axis of the shaft, thereby changing the position of the inductors at which the circuit is interrupted, but this movement of the disk 30 causes the armature to perform a similar movement, thereby changing the most favorable instant for the interruption of the circuit to correspond with the change of the instant of interruption.

Although the description here given assumes that the front inductor is on the left, and the rear one on the right, it is evident that similar conditions occur when the opposite is the case, one half of a revolution of the shaft later, but with the flux in the opposite direction through the armature core. There are therefore two points during the revolution of the inductors at which a good spark may be produced.

What we claim as our invention and desire to secure by Letters Patent is:

1. An electric generator including a rotary inductor, two sets of pole pieces, one set stationary and the other set angularly adjustable with relation to stationary pole pieces, and a winding in fixed relation to the adjustable pole pieces and adapted to be acted upon by the magnetic flux passing through said pole pieces.

2. A magneto electric generator including a rotary inductor, two sets of pole pieces, one set stationary and the other set angularly adjustable with relation to stationary pole pieces, a winding in fixed relation to the adjustable pole pieces and adapted to be acted upon by the magnetic flux passing through said pole pieces, and an interrupter controlled by the adjustable pole pieces whereby the time of interruption is varied when the position of the pole pieces is varied.

3. A magneto electric generator including stationary field magnets, a rotary inductor, a non-revoluble armature oscillatable concentrically of the inductor and having pole pieces, a winding in fixed relation to the pole pieces, and an interrupter controlled by the position of the armature whereby the time of the interruption may be varied.

4. A magneto electric generator including a field magnet, fixed field magnet pole pieces, a rotary inductor shaft, inductors mounted so as to rotate with the shaft, armature end plates oscillatably mounted on each end of the shaft, a core secured to and between said plates and parallel with the shaft, pole pieces on said core, the two sets of pole pieces being in position to be bridged by the inductors, windings on the core, and an interrupter controlled by the movement of said armature plates, whereby the armature may be rocked on the inductor shaft and the time of interruption varied.

5. A magneto electric generator including a field magnet, fixed field magnet pole pieces, a rotary inductor shaft, inductors mounted so as to rotate with the shaft, armature plates oscillatably mounted on each end of the shaft, a core secured to and between said plates and parallel with the shaft, pole pieces on said core the two sets of pole pieces being in position to be bridged by the inductors, windings on the core, a disk secured to one of said armature plates so as to oscillate therewith, a terminal mounted on said disk, a spring-controlled contact lever pivoted on said plate in position to engage said terminal, and cam-like means mounted on said shaft in position to actuate the lever thereby making and breaking the circuit.

6. A magneto electric generator including a rotary inductor, a fixed field magnet energizing the said rotary inductor, a set of pole pieces angularly adjustable about the axis of said inductor, and an armature winding in fixed relation to the said adjustable pole pieces and adapted to be acted upon by the magnetic flux passing through said pole pieces.

7. A magneto electric generator including a rotary inductor, a fixed field magnet energizing said rotary inductor, a set of pole pieces angularly adjustable about the axis of said inductor, an armature winding in fixed relation to the said adjustable pole pieces and adapted to be acted upon by the magnetic flux passing through said pole pieces, and an interrupter controlled for adjustment with the adjustable pole pieces whereby the time of interruption is varied when the position of the pole pieces is varied.

8. A magneto electric generator including a fixed field magnet, a rotary inductor shaft, inductors mounted so as to rotate with said shaft and energized by said fixed field magnet, and an armature structure compris-

ing end plates oscillatably mounted concentrically with each end of the shaft, armature pole pieces carried by and between said plates and therewith adjustable angularly about said inductor, armature windings in fixed relation to said pole pieces, and an interrupter controlled in the movement of said armature plates, whereby the armature structure may be rocked on the inductor shaft and the time of interruption varied.

9. An ignition dynamo having the following elements: a pair of fixed field poles, an armature structure carrying a generating coil, and a rotor adapted to carry flux from the field poles to said armature, a shaft for the rotor, journal bearings for said shaft, means connected to said journal bearings and securing the armature structure rigidly thereto, interrupter contacts and a support therefor also rigidly secured to the journal bearings, and means for turning said bearings with their connected parts concentrically with the rotor shaft, so as to vary the angular relation of the armature with the rotor and at the same time correspondingly adjust the position of the interrupter contacts for the purposes of timing.

10. An ignition dynamo having the following elements: a pair of fixed field poles, an armature structure carrying a generating coil, a rotor adapted to carry flux from the field poles to the armature, a shaft for said rotor, a pair of separated journal boxes or sleeve bearings for said shaft, rigid mountings connecting the armature structure therewith, so as to bridge across the same, a pair of interrupter contacts and a mounting therefor rigidly connected to one of the journal boxes with the contacts in proximity to the rotor shaft, and a cam rigidly secured on said shaft adapted to open and close said contacts as the rotor and shaft rotate, the arrangement being such that the armature structure may be adjusted with respect to the rotor so as to vary the time of production of the peak E. M. F. in the generating coil, and in such adjustment the contacts will be simultaneously and automatically adjusted with respect to the cam on the shaft so as to open and close said contacts at the desired instant.

In witness whereof, we have hereunto affixed our signatures in the presence of the witnesses herein named.

BENJAMIN P. REMY.
FRANK I. REMY.

Witnesses:
W. R. POLAND,
S. E. STURGIS.