No. 752,692. PATENTED FEB. 23, 1904.

L. J. LE PONTOIS.

POLYPHASE MAGNETO ALTERNATOR.

APPLICATION FILED NOV. 7, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1

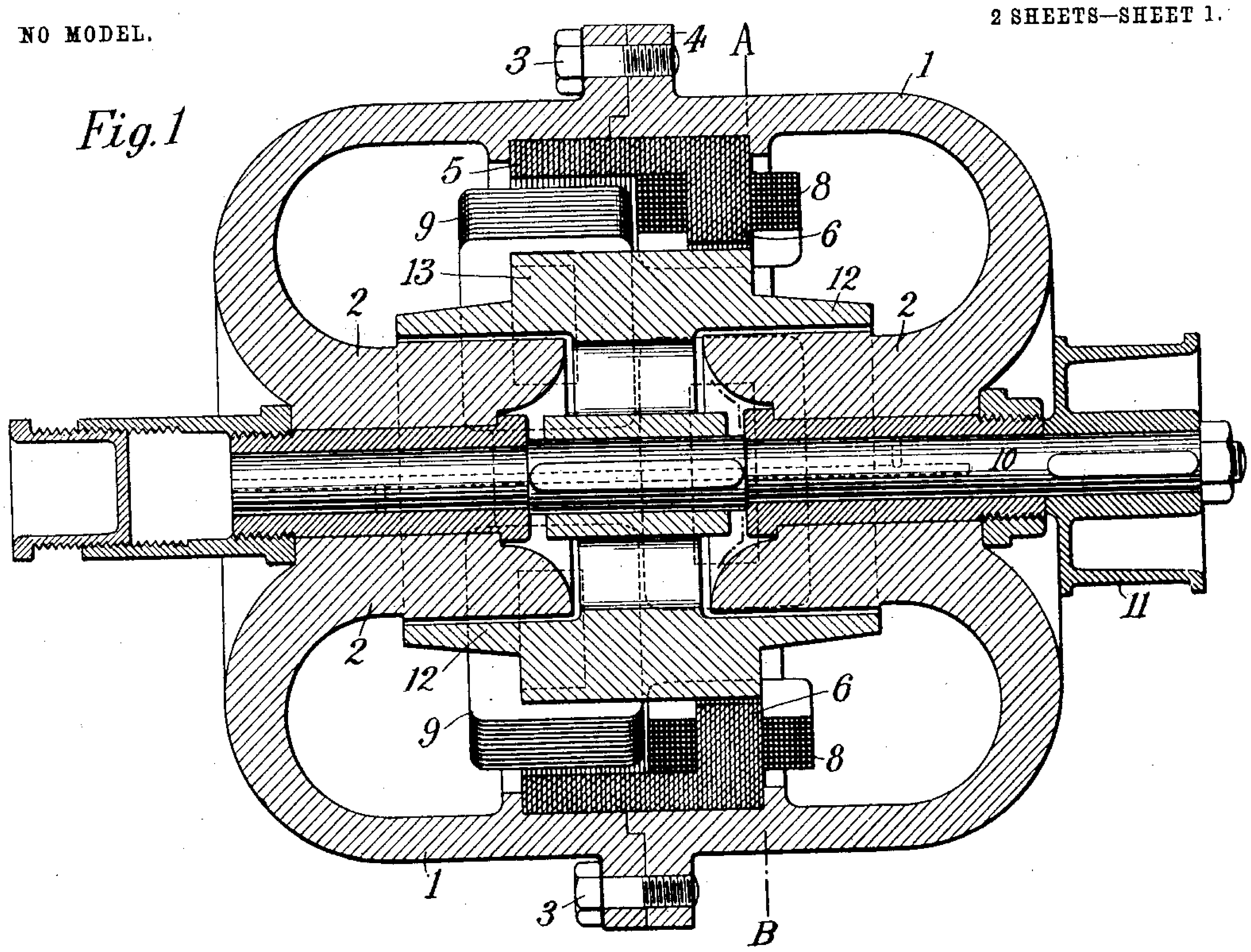
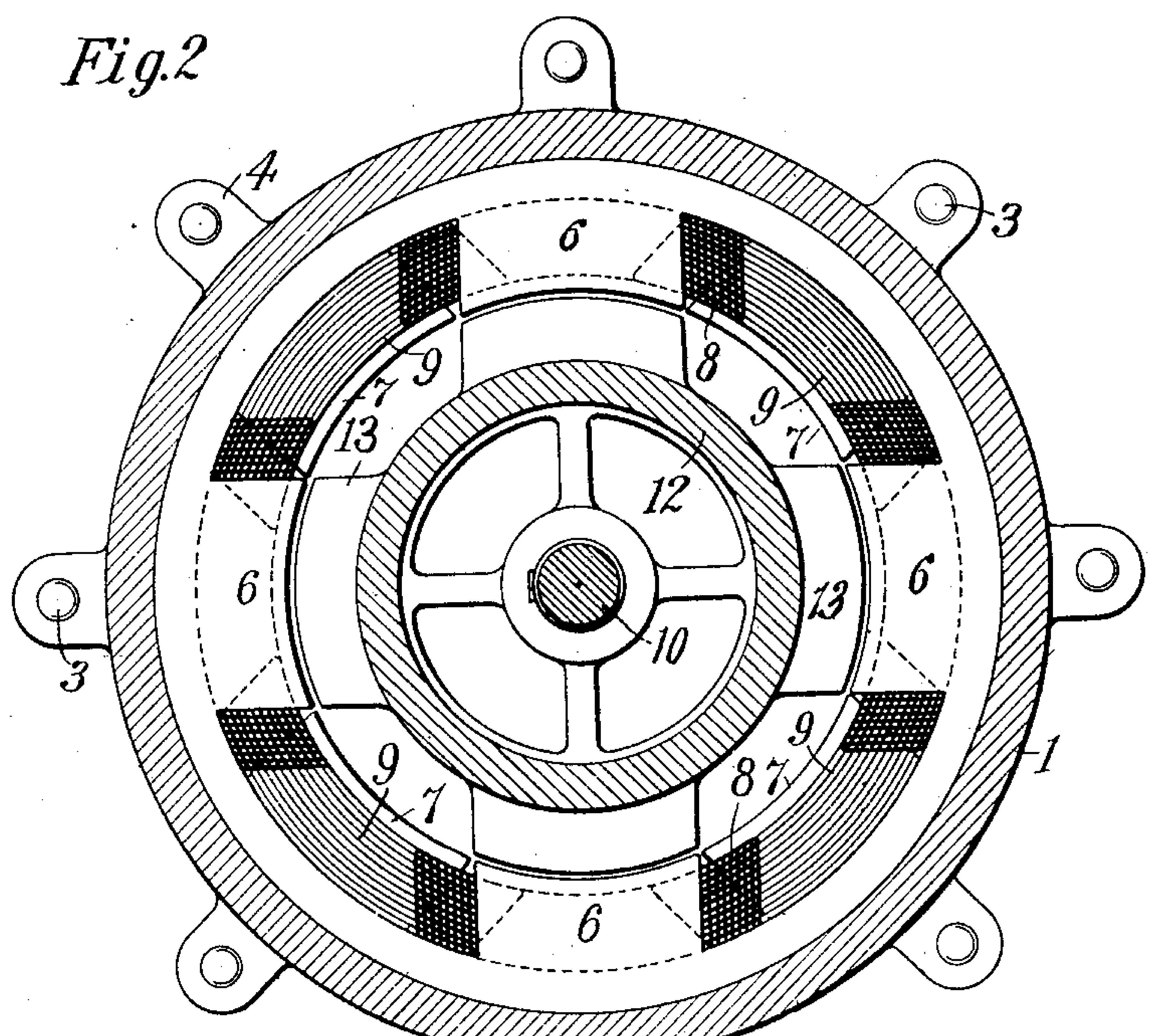


Fig. 2



Witnesses:
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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 3

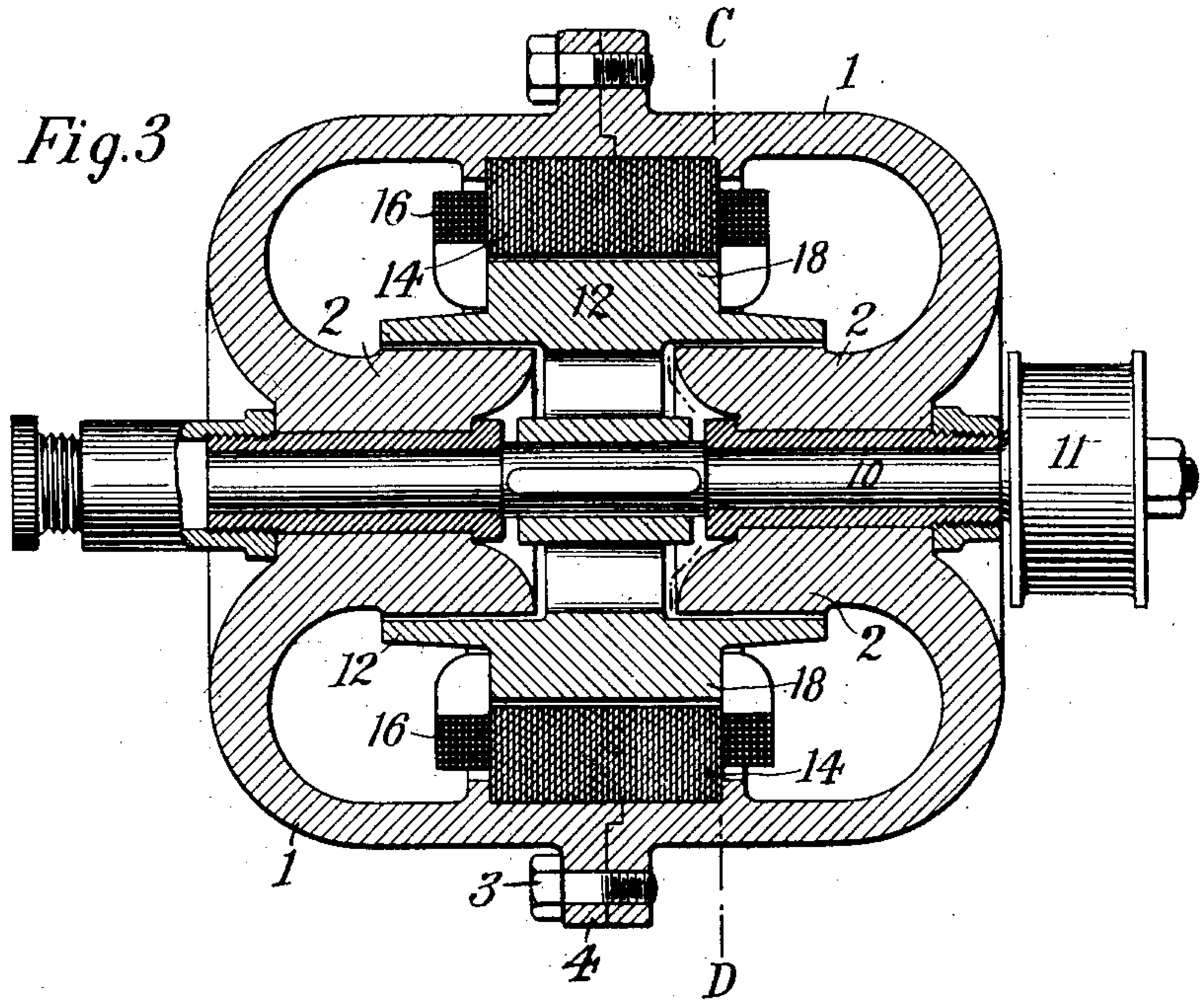
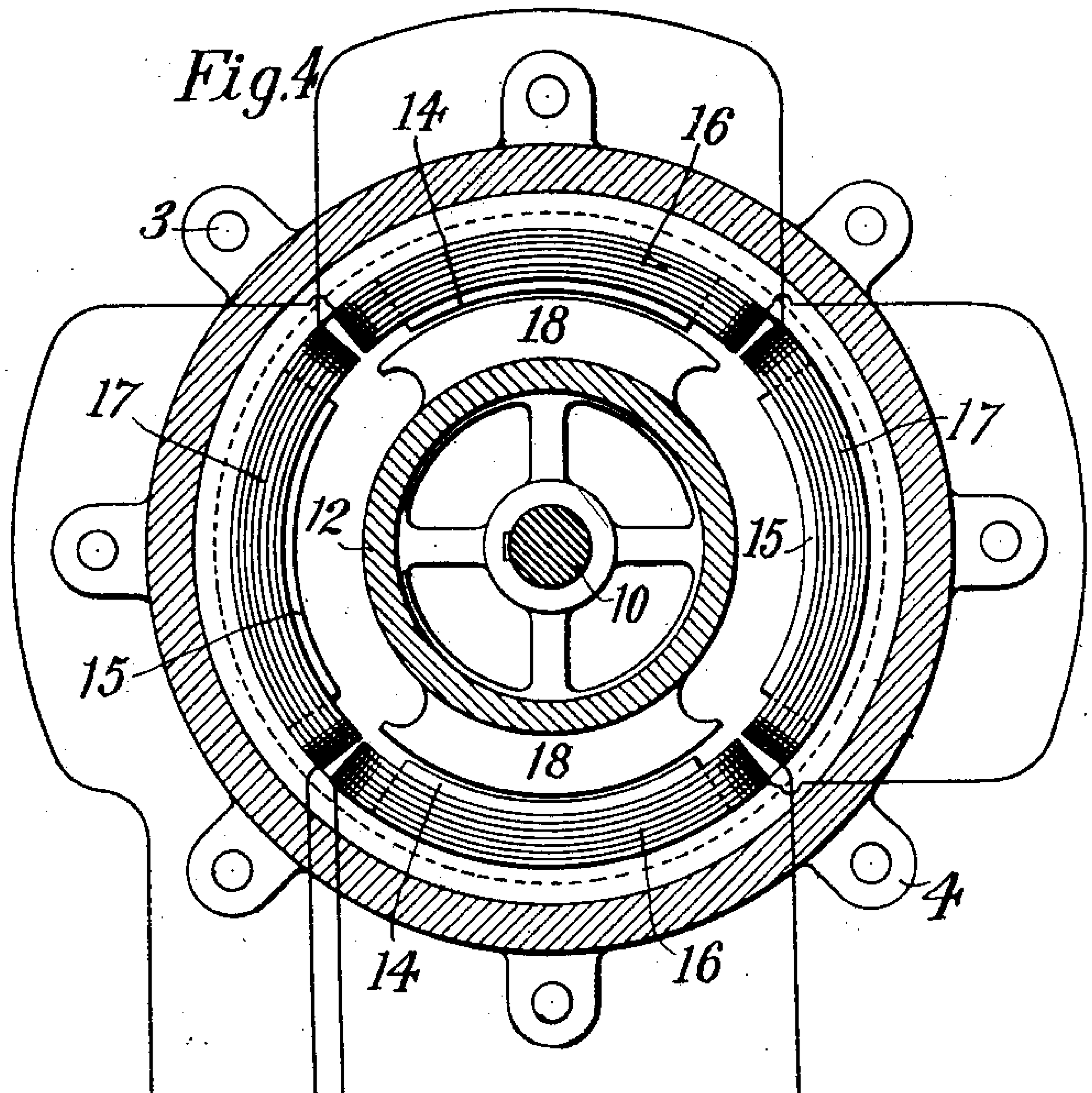


Fig. 4



Witnesses:
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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 752,692. Patented February 23, 1904.

UNITED STATES PATENT OFFICE.

LEON JULES LE PONTOIS, OF NEW ROCHELLE, NEW YORK.

POLYPHASE MAGNETO-ALTERNATOR.

SPECIFICATION forming part of Letters Patent No. 752,692, dated February 23, 1904.

Application filed November 7, 1903. Serial No. 180,175. (No model.)

To all whom it may concern:

Be it known that I, LEON JULES LE PONTOIS, a citizen of the Republic of France, and a resident of the city of New Rochelle, Westchester county, New York, have invented a certain new and useful Improvement in Polyphase Magneto-Alternators, of which the following is a specification.

My invention relates to a polyphase magneto-alternator which is capable of general application, but which I have designed more particularly for use in connection with a sparking device to produce sparks in the cylinders of internal-combustion engines. Heretofore two kinds of electric generators have been used for this purpose—namely, the continuous-current dynamo self-exciting or excited by permanent magnets, and the alternating-current magneto constructed with a permanent magnetic field and a shuttle-wound armature, the latter of the two generators being the more simple and more widely adopted. In order to do effective work, it is absolutely necessary that the magneto should run at such a speed in relation to the speed of the engine that the current generated reaches its maximum intensity when the circuit is opened by the circuit-breaker in the engine-cylinder. The magneto must therefore either be driven at the same angular speed as the engine or by gears at a multiplied speed, so that the current will always reach its maximum when a spark is desired; but as the time of sparking should be regulated according to the speed of the engine or under control of the operator it has been proved very difficult to secure a sufficient range of sparking by means of the magneto.

The generator which I have devised for the above purpose delivers two or more alternating currents differing in phase from each other, and I employ such generator in connection with a multiple-circuit breaker so constructed that the different currents delivered by the generator may be interrupted simultaneously in the combustion-chamber, it resulting therefrom that the total heat energy of the spark or sparks is at any given time almost constant. It is obvious that as the currents are differing in phase one or more of them will reach sufficient intensity at the time of opening the circuit, and therefore the simultaneous opening of all the circuits will result in one or more sparks having sufficient heat value to ignite the mixture in the chamber.

I have devised a particular form of multiple-circuit breaker for the above purpose and have filed an application therefor of even date herewith.

In the following I have described, with reference to the accompanying drawings, a structure illustrating one means of carrying out my invention, the features thereof being more fully pointed out in the claim.

In the drawings, Figure 1 is a longitudinal sectional view of a polyphase magneto-alternator. Fig. 2 is a cross-sectional view along the line A B of Fig. 1, certain parts being removed for clearness of illustration. Fig. 3 is a longitudinal sectional view of a modified form of the structure, and Fig. 4 is a cross-sectional view along the line C D of Fig. 3.

Similar numerals of reference indicate similar parts throughout the several views.

The magnetic field of the magneto illustrated in Figs. 1 and 2 comprises a pair of circular steel shells 1 1, permanently magnetized and each having an inward polar projection 2, also circular in shape. For convenience of construction the shells are shown as being in two parts, fastened together by bolts 3 3 in lugs 4 4. On the interior of the shells and within the air-gap between the shells 1 1 and the polar projections 2 2 are mounted two sets of discoid laminæ 5, each having four polar projections 6 6 6 6 and 7 7 7 7, respectively, the polar projections of said two sets being displaced with relation to each other, so that the center of the polar projections of one set are approximately opposite one of the ends of the polar projections of the other set, the object being to obtain two alternating currents differing in phase a quarter-wave length from each other. Each one of the polar projections 6 and 7 supports a coil 8 and 9, respectively, the coils for each set being electrically connected one with the other.

Mounted in the magneto shell in suitable bearings is a shaft 10, having at one end a pulley 11, operated in any convenient manner, by which said shaft is adapted to be driven. Keyed on this shaft between the polar projections 2 2 is a soft-iron shell 12, cylindrical in shape, fitting closely around the polar projections 2 2 and having four projections 13, the face of each being approximately equal in width to the length of the polar projections 6 and 7 and long enough to extend over said projections.

It is obvious that the lines of magnetic flux pass from shell 1 to pole 2 through the polar projections 6 and 7 and the soft-iron shell 12. As the shell 12 is rotated the projections 13 pass successively across the faces of the polar projections 6 and 7, the magnetic flux passing through each of the polar projections 6 and 7 successively, beginning to pass through one before it has left the other. The number of lines of magnetic flux threading through the coils changing rapidly, the coils become the seat of electromotive forces varying according to a sinusoidal function. The polar projections 6 and 7 being displaced, so that the angular distance separating the center lines of any two adjacent poles belonging to the two different sets of laminations is equal to one-half the angular distance separating any two poles belonging to the same set and the coils also being correspondingly arranged, the electromotive force induced in the two series of coils will follow sinusoid curves ninety degrees apart from each other. It is evident that at whatever speed the soft-iron shell is rotated the magneto will give forth two currents differing in phase by ninety degrees, the number of alternations differing according to the speed, and that if the circuits of two series of coils are opened simultaneously a spark or sparks will be produced.

In Figs. 3 and 4 I have shown a modified form of arrangement. The permanently-magnetized circular steel shells 1 1 and the inward polar projections 2 are substantially the same as in Figs. 1 and 2. Instead, however, of two sets of discoid laminæ, each set having four polar projections and each polar projection supporting a coil, as in Figs. 1 and 2, I mount on the interior of the shells and between the polar projections 2 2 four pole-pieces 14 14 15 15 of discoid laminæ. The polar projections 14 support coils 16, and the polar projections 15 support coils 17, the diametrically opposite coils being electrically connected, as shown in Fig. 4. Keyed on the shaft 10, between the polar projections 2 2, is a soft-iron shell 12, cylindrical in shape, fitting closely around the polar projections 2 2 and having two projections 18. The face of each projection 18 is approximately equal in width to the length of the polar projections 14 and 15 and long enough to extend over said projections. The revolution of the shaft 10 and projections 18 obviously produces in the coils 16 and 17 alternating currents the intensity and direction of which depend upon well-known laws. Owing to the angular positions respectively occupied by coils 16 and 17, it is obvious that the revolution of the inductor-armature will cause two alternating currents differing between each other by ninety degrees to take place in coils 16 and 17. Although this structure of polyphase magneto-generator is more simple than that previously described, I prefer the first form, as the reluctance of the magnetic circuit never varies in the first type, and this tends to maintain the magnetic field fully saturated.

Both generators described may be employed in connection with either a jump-spark system or a contact-sparker.

What I claim, and desire to secure by Letters Patent of the United States, is—

A polyphase alternating-current generator consisting of permanently-magnetized circular steel shells each shell having inner polar projections, a plurality of pole-pieces displaced with respect to each other and mounted on said shells, coils on said pole-pieces and a rotating inductor in the air-gap between said polar projections and said pole-pieces.

In testimony whereof I have hereunto signed my name in the presence of two subscribing witnesses.

LEON JULES LE PONTOIS.

Witnesses:
GRACE L. HEASLEY,
OTTO P. OSMERS.