E. MATTMAN.

INDUCTION MOTOR.

APPLICATION FILED MAR. 17, 1906.

917,471. Patented Apr. 6, 1909.

Fig. 1.

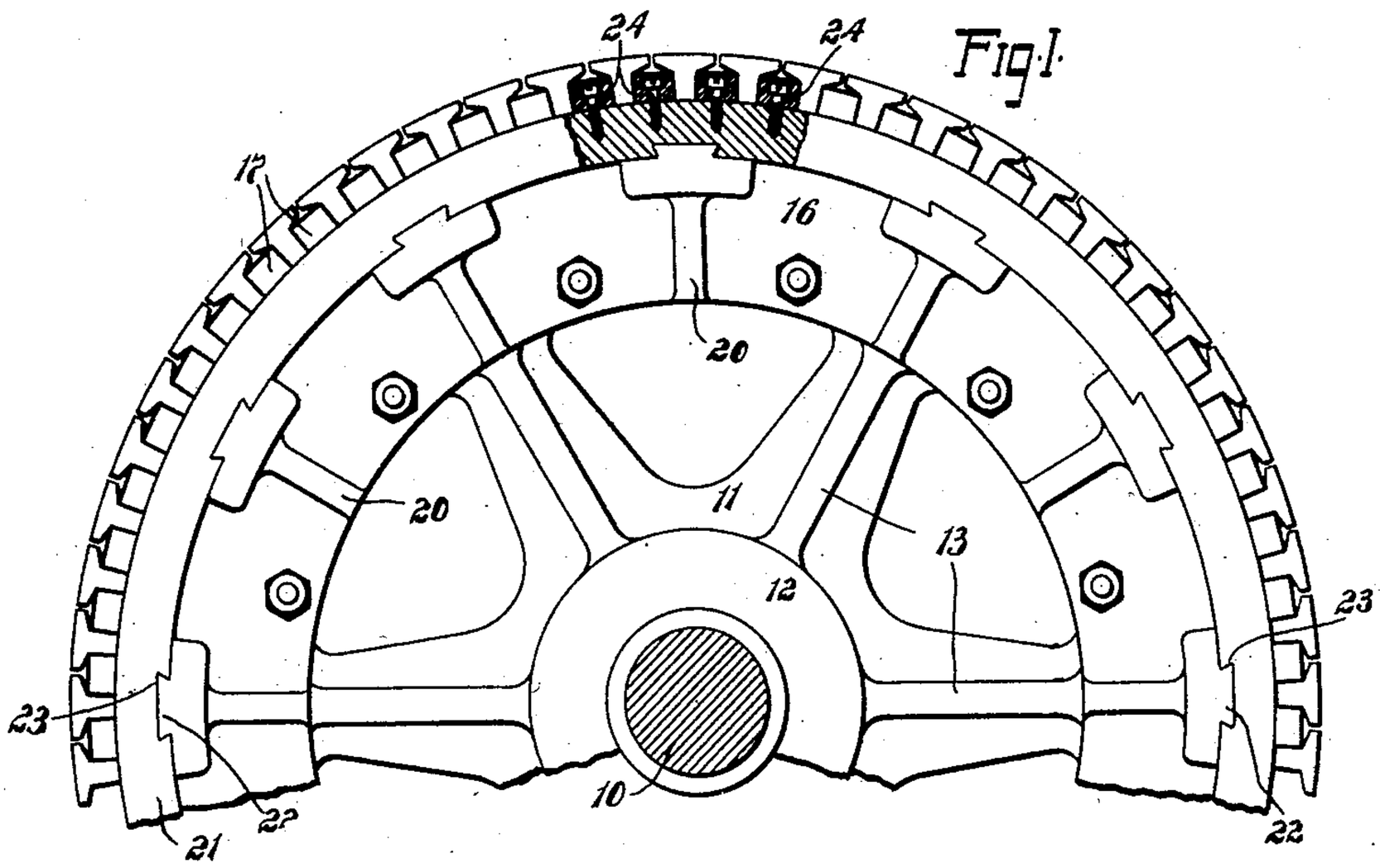


Fig. 2.

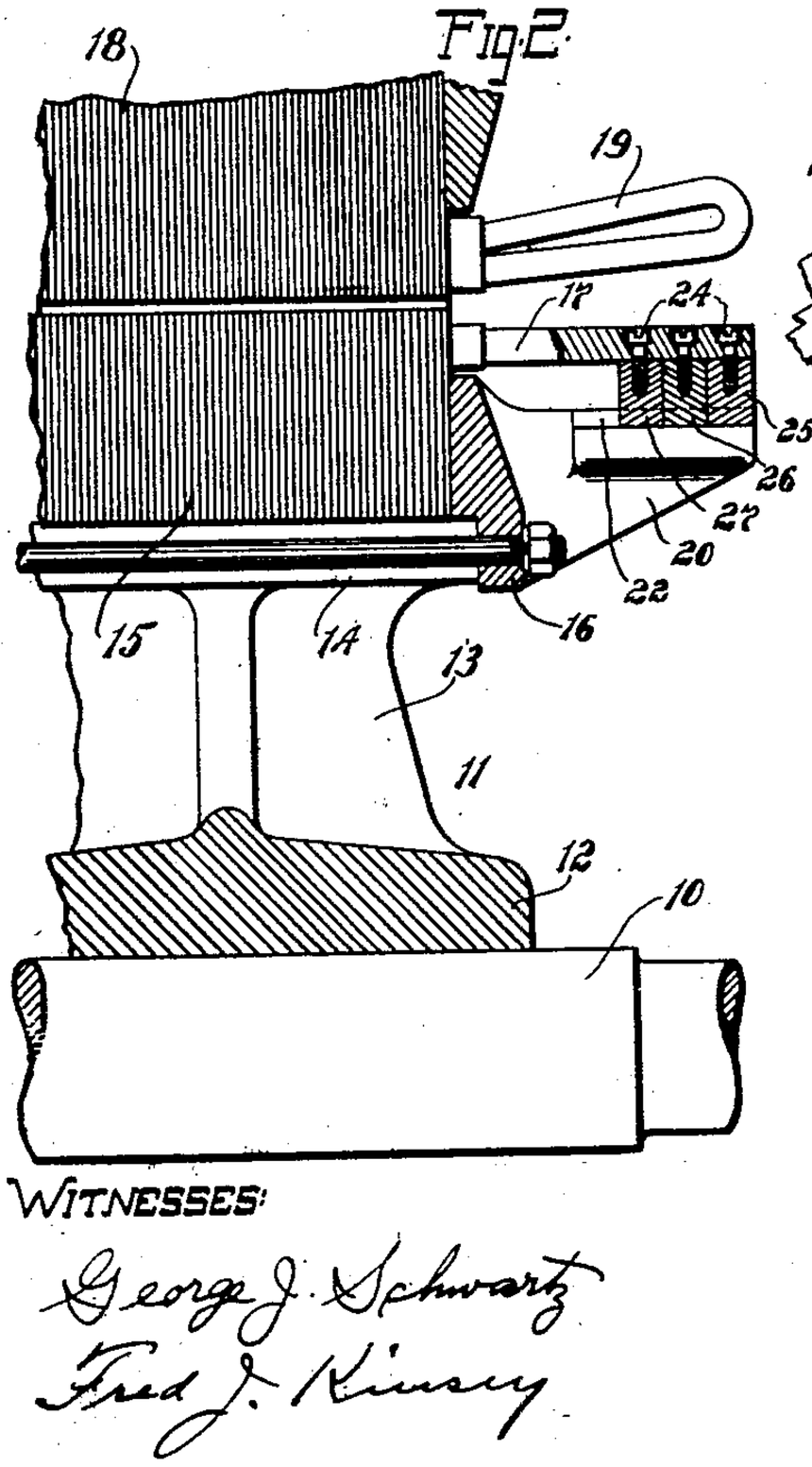
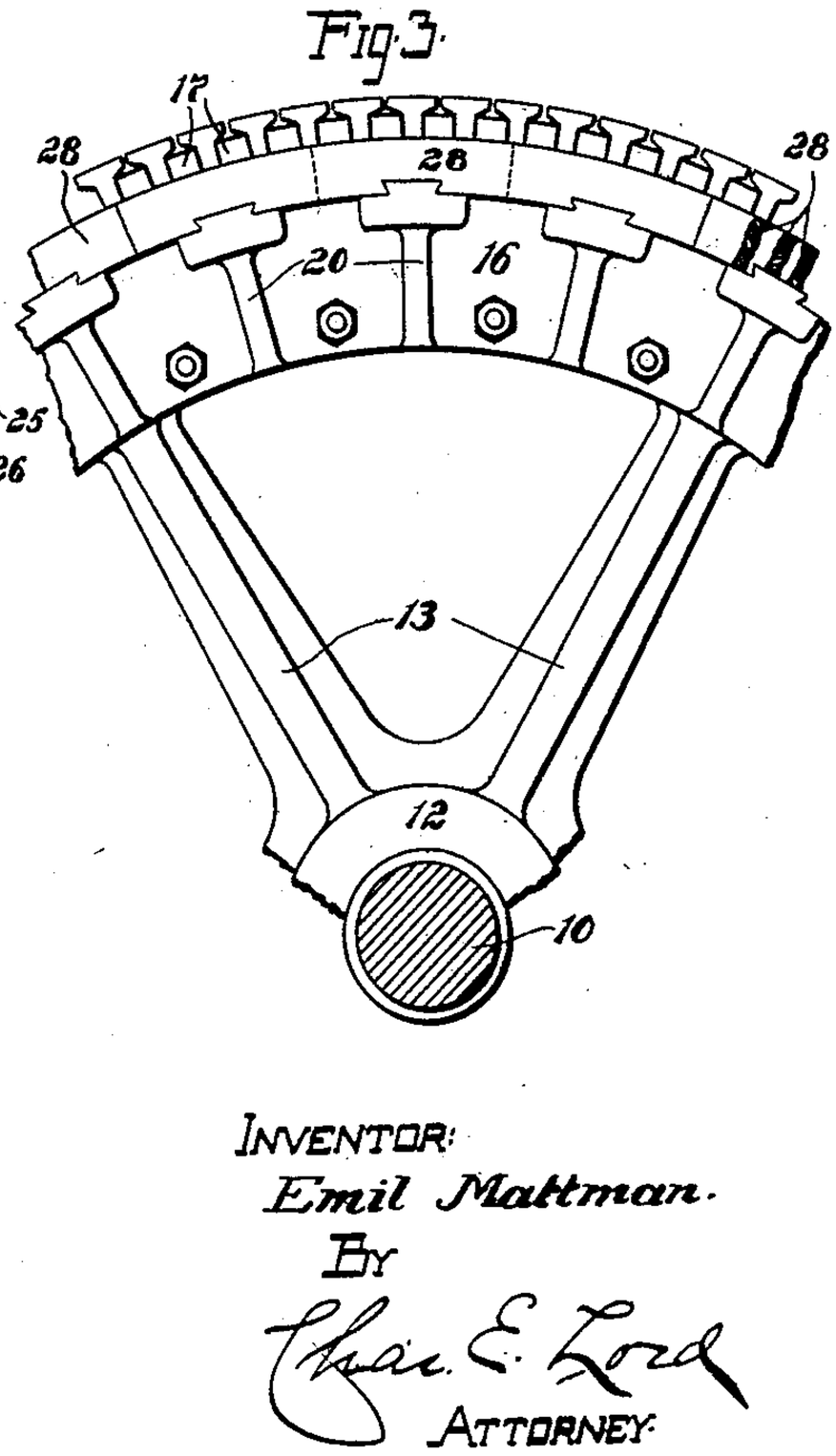


Fig. 3.



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INDUCTION-MOTOR.

No. 917,471. Specification of Letters Patent. Patented April 6, 1909.

Application filed March 17, 1906. Serial No. 306,553.

To all whom it may concern:

Be it known that I, EMIL MATTMAN, citizen of the Republic of Switzerland, residing at Norwood, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Induction-Motors, of which the following is a full, clear, and exact specification.

My invention relates to induction motors and especially to the short-circuiting rings for the conductor-bars of squirrel-cage rotors, and to the means for securing the rings firmly in position.

In the usual construction of rotors of the squirrel cage type, the ends of the bars at each end of the rotor are secured to a short-circuiting ring which is held in position either by the bars themselves or by brackets or extensions on the frame. This construction is satisfactory for rotors of comparatively small diameters, and for those intended for ordinary speeds. In rotors, however, of very large diameters and which are intended for very high peripheral speeds, the short-circuiting rings as ordinarily constructed and supported are in danger of being distorted or entirely displaced by centrifugal action. Furthermore, in rotors of very large diameters, it is a difficult matter, if not impossible to provide short-circuiting rings each composed of one continuous piece.

The object of my invention is to provide suitable short-circuiting means for the rotors of squirrel-cage induction motors of large diameters, which will have great current carrying capacity and which will not become displaced or distorted at the highest speeds.

In carrying out my invention I secure the short-circuiting rings of the squirrel cage rotors to supports by any desired fastening means, preferably by dove-tailed connections.

Considering my invention more specifically, I provide short-circuiting means consisting of a number of rings arranged side by side, each ring being composed of a number of segments which are dove-tailed to supports and are so arranged that the segments of each ring break-joint with the segments of the adjacent ring or rings.

My invention still further consists in certain novel details of construction and combinations of elements described in the specification and set forth in the appended claims.

For a better understanding of my invention, reference is had to the accompanying drawings in which—

Figure 1 is an end view of a portion of a high speed squirrel-cage rotor having my invention applied thereto, parts being broken away and in section; Fig. 2 is a vertical section of a portion of the rotor and the stator, showing a modification of my invention; the construction shown in this figure being intended especially for rotors of large diameters; and Fig. 3 is a partial end elevation of the rotor shown in Fig. 2.

Referring now to the figures of the drawing, 10 indicates the shaft on which is mounted a spider 11 consisting of a hub 12, spokes 13, and rim 14. Mounted on the rim 14 is the usual laminated core 15 held between end-heads 16. This core is provided with the customary slots in which are mounted the conductor bars 17 the ends of which project beyond each end of the core. Surrounding the rotor is the stator core 18, in the slots of which are supported the stator windings, an end-turn of which is shown at 19.

In the drawings are shown short-circuiting rings especially adapted for rotors intended for high peripheral speeds and of large diameters. Extending outwardly and horizontally from each end of the frame are supporting brackets 20 to which the short-circuiting means are secured. These brackets are preferably integral with the end-heads 16 and may be arranged as closely together as desired. In Fig. 1 is shown one form of short-circuiting means and the manner in which it is secured to the supports 20. The short-circuiting means, in this case, is a solid ring 21, of one continuous piece. This ring is secured to the brackets by dove-tail connections. Each bracket is in this case provided with an undercut rib or projection 22, forming one portion of a dove-tail joint, and the ring 21 is provided with grooves 23, corresponding in number, shape and position to the undercut ribs of the brackets. It is seen that, when the ring is placed in position on the brackets with the under-cut ribs 22 engaging the grooves 23, it will be impossible for the ring or any portion of it to be distorted or displaced at the highest speeds. The end of each conductor is held to the short-circuiting ring by one or more bolts or screws 24.

It is obvious that the short-circuiting means at each end of the machine may con-

sist of two or more such rings arranged side by side, and may be secured to the rotor frame against centrifugal action by means other than those herein illustrated without departing from the spirit and scope of the invention.

In machines of exceptionally large diameter it is a difficult matter and practically impossible to provide rings made from a single piece. It is necessary therefore to provide short-circuiting rings in such machines each of which consists of two or more segments. Such construction is shown in Figs. 2 and 3. Instead of a single ring being employed at each end of the machine, I prefer to employ, when the ring is built up of segments, two or more rings arranged side by side. In Figs. 2 and 3, three rings 25, 26 and 27 are shown side by side. Each of these rings consists of segments 28. As is shown in Fig. 3 by the dotted and full lines, the segments are so arranged that the segments of one ring break-joint with the segments of the adjacent ring or rings. Preferably, for mechanical reasons, the joints occur between the supporting brackets. In this case, as is shown in Fig. 3, each segment is dove-tailed to three supporting brackets. This construction possesses several advantages. By employing several rings, the segments of each of which break-joint with the segments of the others, a much stronger construction results than if a single large segmental ring were employed. In case it is found that the resistance of the rings is too high, an additional ring can easily be added to reduce the resistance. Or in case the number of short-circuiting rings at each end of the machine is found to be larger than necessary, one or more can be easily removed or one can be removed and machined to a less thickness and again restored without disturbing the remaining rings, or their connections with the conductor bars.

It is evident that this construction can be employed in rotors of any size or diameter and in rotors for any speeds, and that there is little danger of any ring being displaced, or any portion of a ring being distorted.

I aim in my claims to cover all modifications which do not involve a departure from the spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent is:—

1. In a squirrel-cage rotor for induction motors, a frame, a slotted core, conductors in the slots of said core, brackets extending outward from each end of the rotor frame, and a plurality of short-circuiting members attached to the ends of the conductors at each end of the machine, the short-circuiting members at each end of the machine being arranged side by side and held to the brackets by dove-tail connections.

2. In a squirrel-cage rotor for induction motors, a slotted core, conductors in the slots thereof and extending beyond each end of the core, and short-circuiting rings for the conductors, each ring consisting of two or more segments, each segment being held by a dove-tail connection to a support.

3. In a squirrel-cage rotor for induction motors, a frame, a slotted core supported thereby, conductors in the slots of said core, a short-circuiting ring secured to the ends of the conductors at each end of the machine, each ring consisting of a plurality of segments, and supports for said segments, said supports and segments being held together by dove-tail connections.

4. In a squirrel-cage rotor for induction motors, a frame, a slotted core supported thereby, conductors in the slots of said core, one or more short-circuiting rings for the conductors at each end of the machine, each of said short-circuiting rings consisting of a plurality of segments, and brackets extending outward from the frame for supporting said rings, each segment being held in position on the brackets by a plurality of dove-tail connections.

5. In a squirrel-cage rotor for induction motors, a frame, a slotted core supported thereby, conductors in the slots thereof, a plurality of short-circuiting rings secured to the conductor-bars at each end of the rotor, and supports for the short-circuiting rings, each ring consisting of a number of segments held to said supports by dove-tail connections.

6. In a squirrel-cage rotor for induction motors, a frame, a slotted core supported thereby, conductors in the slots of said core, a plurality of short-circuiting rings for said conductors arranged side by side at each end of the rotor, and brackets on the frame for supporting said rings, each ring consisting of a number of segments secured to said brackets, the segments of each ring breaking joint with the segments of the adjacent ring or rings.

7. In a squirrel-cage rotor for induction motors, a frame, a slotted core supported thereby, conductor-bars in the slots thereof, brackets extending outwardly from each end of the frame, and a plurality of short-circuiting rings secured to the ends of the bars and arranged side by side on the brackets at each end of the machine, each short-circuiting ring consisting of a plurality of segments, each segment being dove-tailed to a plurality of said brackets, and the segments being so arranged that the segments of each ring break joints with the segments of the adjacent ring or rings.

8. In a squirrel-cage rotor for induction motors, a frame, a slotted core, conductors in the slots of the core, segmental short-circuiting rings for the conductors, supports for the segments, and means for securing the

segments to the supports so that the segments cannot be displaced by centrifugal action.

9. In a squirrel-cage rotor for induction motors, a frame, a slotted core, conductors in the slots of the core, a plurality of short-circuiting rings for the conductors at each end of the machine, each ring consisting of a plurality of segments, supports for the rings, and means for securely fastening the segments in place on the supports so that there is no danger of the rings being distorted or displaced by centrifugal action.

In testimony whereof I affix my signature, in the presence of two witnesses.

EMIL MATTMAN.

Witnesses:
ARTHUR F. KWIS,
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