

**(12) United States Patent**  
**Suzuki et al.**

**(10) Patent No.: US 6,177,751 B1**  
**(45) Date of Patent: Jan. 23, 2001**

- (54) **ROTARY ELECTRIC MACHINE AND BOBBIN THEREOF**
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- (73) Assignee: **Minebea Co., Ltd.**, Nagano-Ken (JP)
- (\*) Notice: Under 35 U.S.C. 154(b), the term of this patent shall be extended for 0 days.

4,795,933 \* 1/1989 Sakai ..... 310/269

FOREIGN PATENT DOCUMENTS

359070160A \* 4/1984 (JP) .  
 403155347A \* 7/1991 (JP) .

\* cited by examiner

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- (51) **Int. Cl.<sup>7</sup>** ..... **H02K 1/24; H02K 15/00; H02K 1/00; H02K 1/18; H02K 1/12**
- (52) **U.S. Cl.** ..... **310/269; 310/42; 310/194; 310/218; 310/259**
- (58) **Field of Search** ..... 310/269, 264, 310/45, 214, 42, 194, 218, 259

**(57) ABSTRACT**

The object of the present invention is to provide a rotary electric machine that provides bobbins with good assembling efficiency and allows no dislocation of the stator. A motor 2 comprises a case 4, a stator 6 secured inside the case 4, a rotor 10 formed into one piece with a rotating shaft 8. The stator 6 comprises stator yokes 32 and the stator yokes are secured in a radial manner in the case 4. Furthermore, resin 58 is filled in between the stator 6 and the case 4 with a space for the rotor being left. The stator yokes 32 comprise a salient pole 34, a bobbin 36 for holding the salient pole 34, and a magnetic wire 38 wound around the bobbin 36. A collar 39b of the bobbin 36 is formed so as to contact each other with notches 3 formed on two, upper and lower edge portions. Accordingly, combining two bobbins 36, 36 allows through-holes 5 penetrating the collar 39b thereof. This allows the stator to be firmly assembled, provides good assembling workability, and allows no dislocation owing to resin flowing when the resin is injected.

- (56) **References Cited**  
 U.S. PATENT DOCUMENTS  
 2,655,613 \* 10/1953 Weiseman ..... 310/264  
 2,691,113 \* 10/1954 Ordas ..... 310/214  
 2,870,357 \* 1/1959 Vandenberg et al. .... 310/269

**14 Claims, 7 Drawing Sheets**

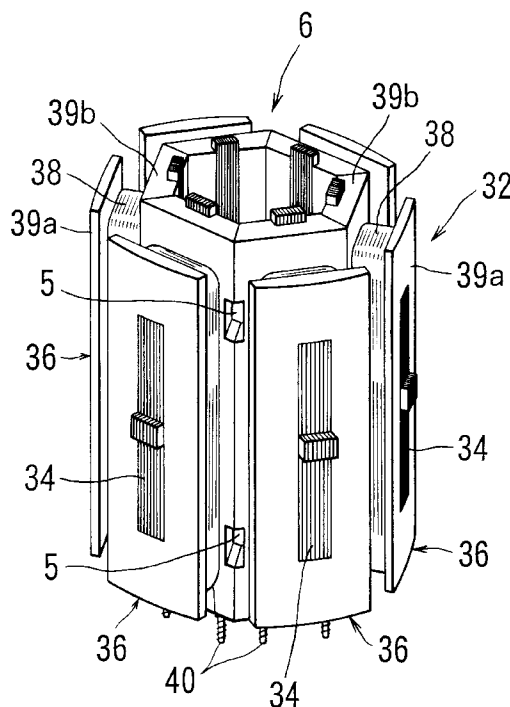


FIG. 1

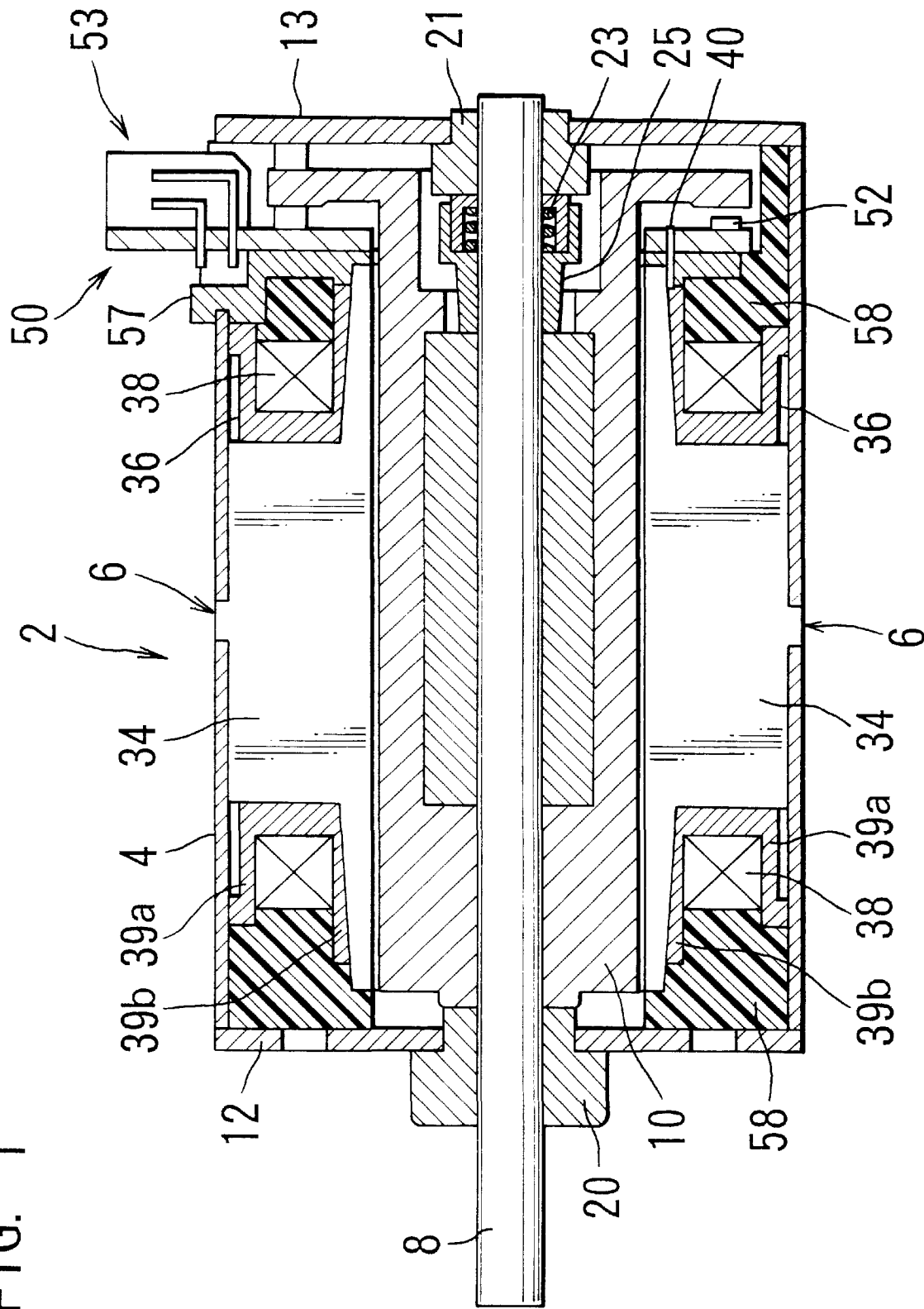


FIG. 2

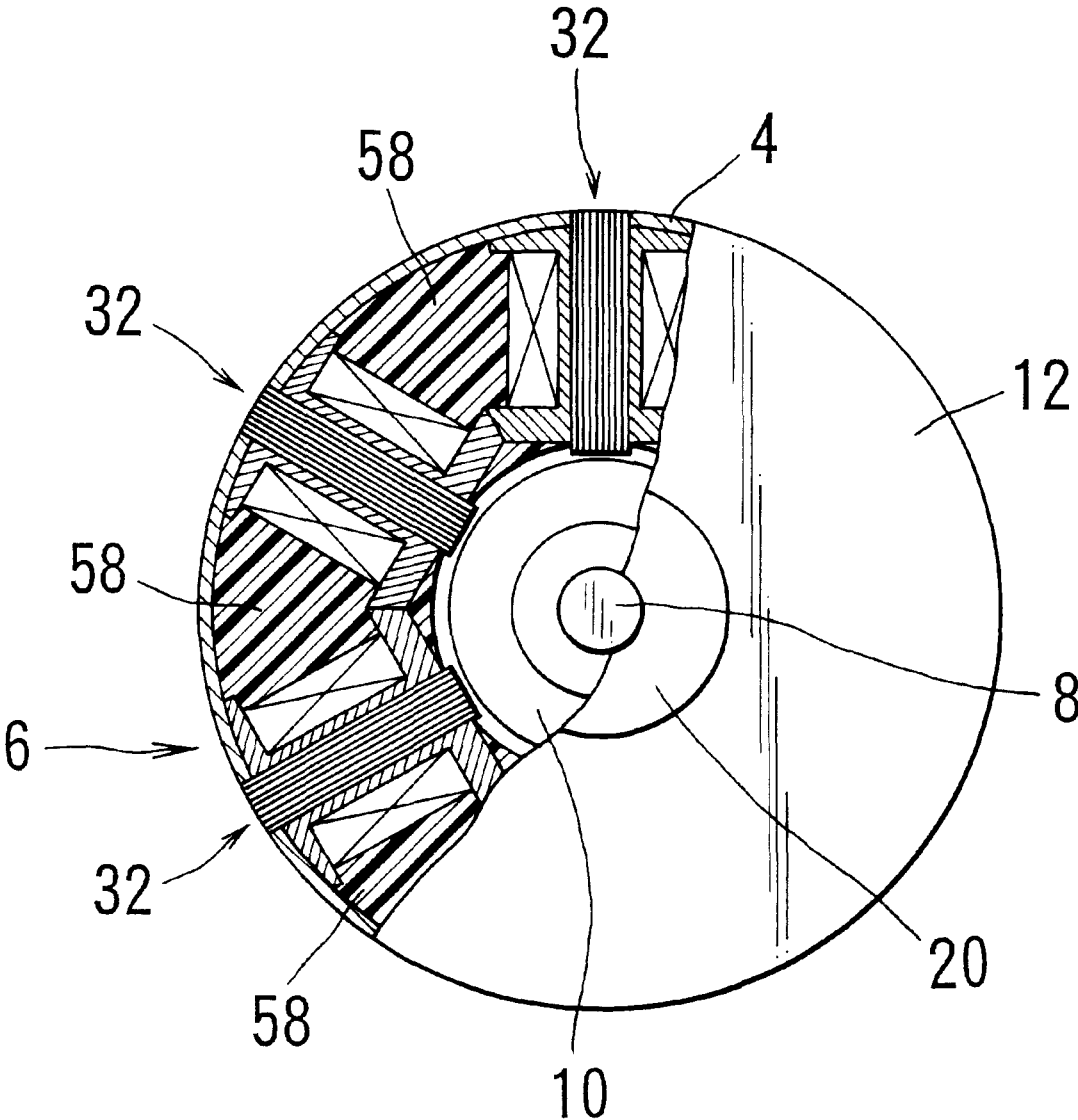


FIG. 3

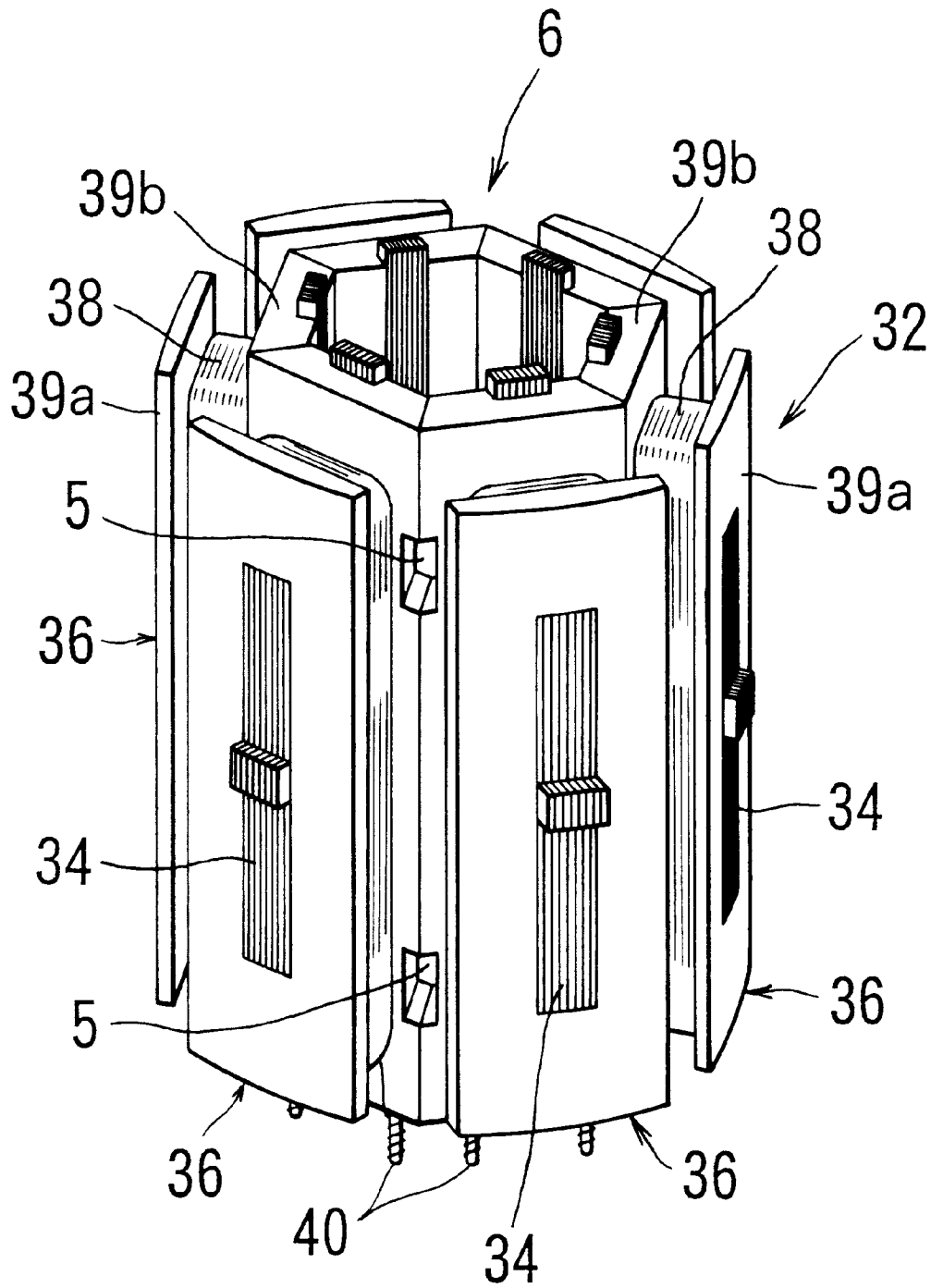


FIG. 4

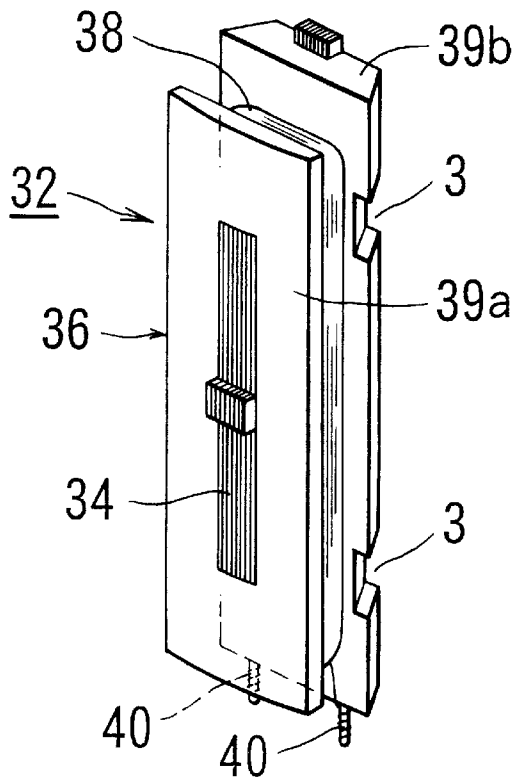
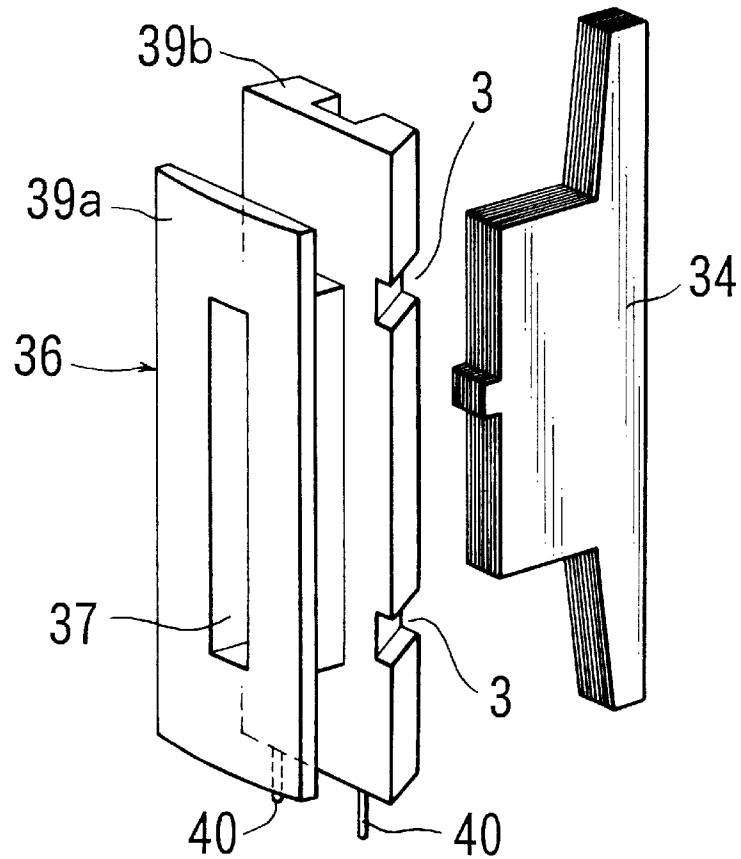


FIG. 5



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