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(56) Documents cited
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GB 0380459 A GB 0362509 A EP 0181072 A1

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(54) A power reducing device for ceiling fans

(57) A power reducing device for reducing an AC power supply of voltage V1 to a lower voltage V2 for a fan with a motor (M). The power reducing device is a capacitive circuit (SW1) serially connected between the AC power supply of voltage V1 and the motor (M), the device having a plurality of switching positions respectively corresponding to open-circuit states of this device and to different capacitance values.

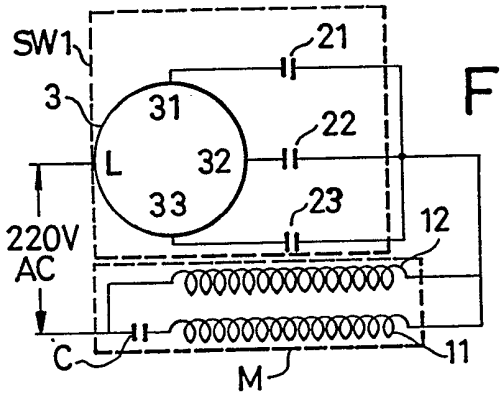

FIG. 2

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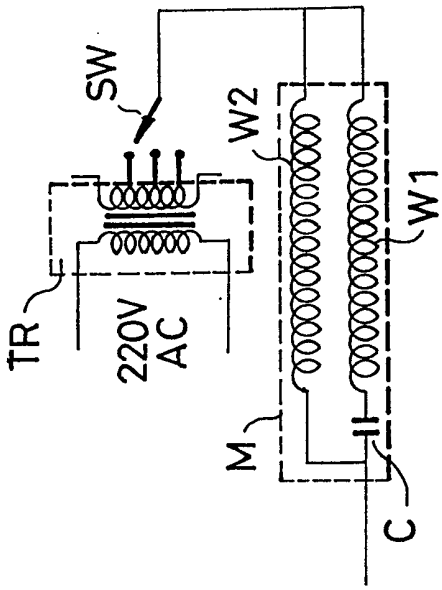

FIG. 1
PRIOR ART

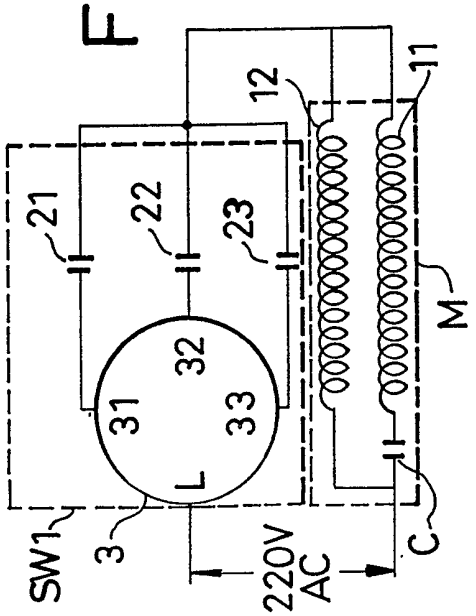

FIG. 2

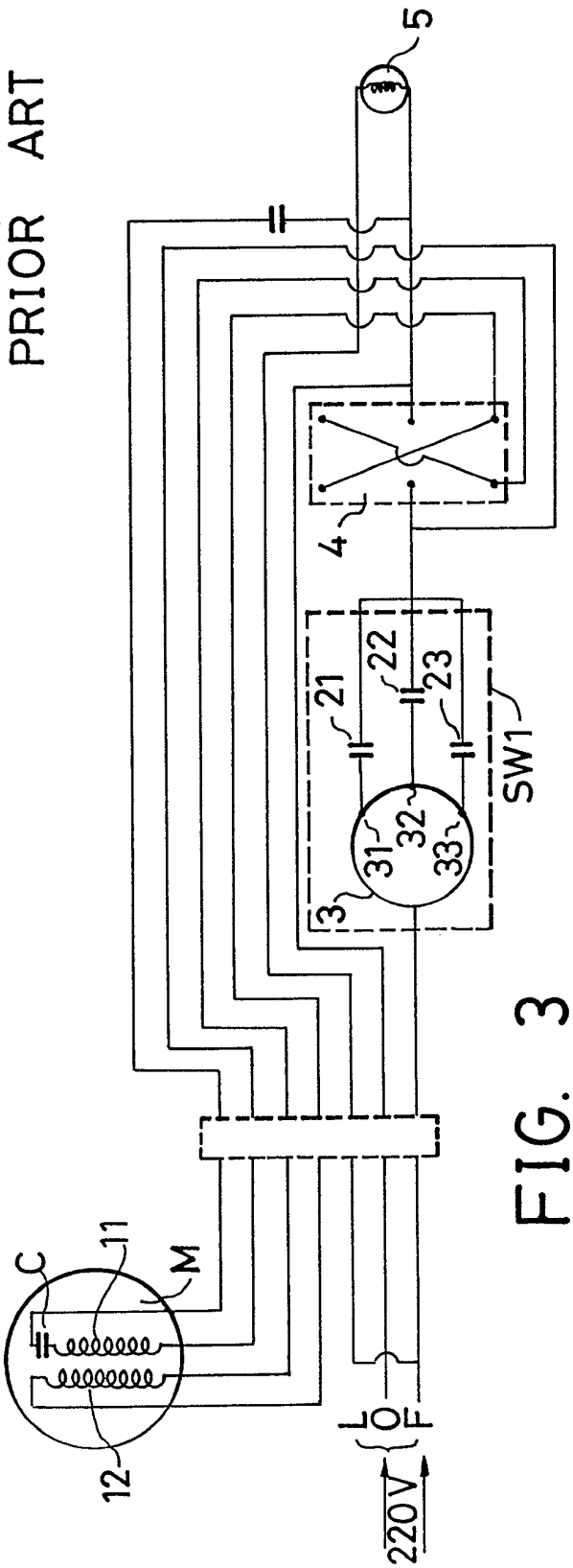

FIG. 3

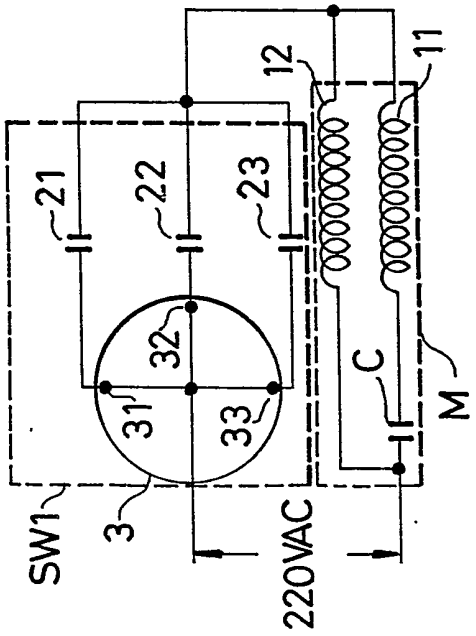

FIG. 4A

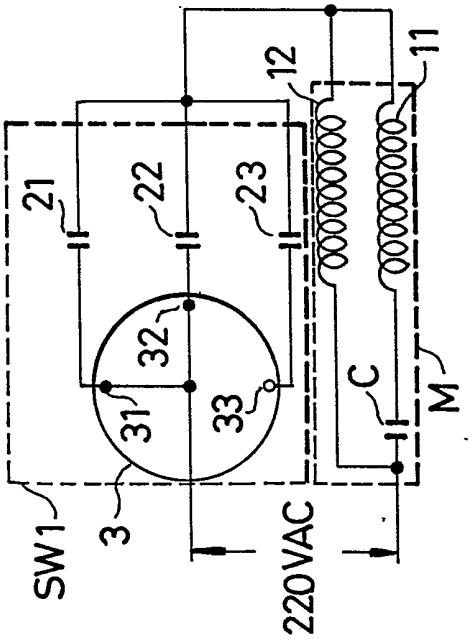

FIG. 4B

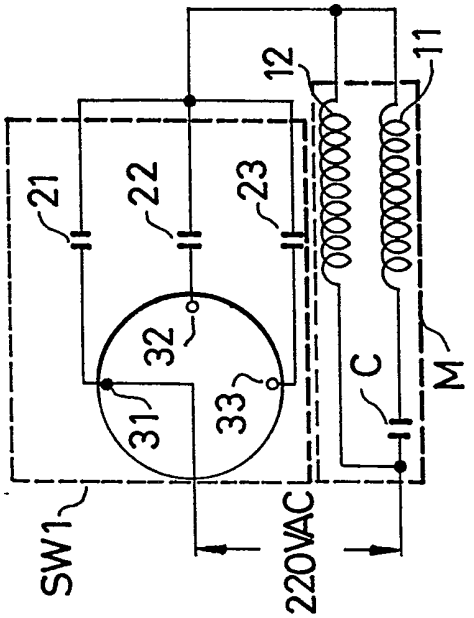

FIG. 4C

TITLE: A POWER REDUCING DEVICE FOR CEILING FANS

The present invention relates to a power reducing device for ceiling fans which transforms a power supply of 220V to a power supply of no greater than 110V to safely supply the ceiling fan.

Referring to Fig. 1, a conventional power reducing device for a ceiling fan involves a transformer (TR). A selector switch (SW) selectively connects one of the three outputs of the transformer (TR) to reduce the 220V to a lower voltage (for example, 110V) to drive a motor (M) of the ceiling fan at various speeds. The motor (M) has two parallel coils (W1), (W2) with a capacitor (C) to increase the voltage of the network to start the motor (M).

The disadvantage of the conventional power reducing device lies in the large size of the transformer (TR) which makes the switch an unsightly site in a well decorated room.

Accordingly, it is the object of the present invention to provide an improved power reducing device for ceiling fans where the size is far smaller than conventional transformer-type devices.

According to the present invention, the capacitive switching device SW1, as shown in Fig. 2, comprises a switch with three capacitors instead of a transformer. The motor (M) can be regarded as an inductive circuit. Every electrician knows that when an alternating

current is applied to a serial circuit comprising a capacitive part of capacitance C (reactance $X_C=1/2\pi fC$) and an inductive part of inductance L (reactance $X_L= 2\pi fL$), then the total voltage V_{total} the two components will be distributed in the two parts, depending on the impedances thereof. The capacitive part receives a partial voltage of $V_C=V_{total} * X_C/(X_C+X_L)$, while the inductive part receives $V_L=V_{total} * X_L/(X_C+X_L)$. Since V_{total} and X_L are constant, by properly selecting the value X_C (therefore the capacitance of the capacitive part) the voltage V_L of the motor can be reduced to a value of no greater than 110V. Since the size of capacitors which provide the required capacitance is far smaller than the transformer (TR), the size of the power reducing device can be greatly decreased. Furthermore, the power loss caused by the capacitive switching device is less than that of a transformer.

In the drawings:

Fig. 1 is a circuit diagram of a conventional transformer-type power reducing device for a ceiling fan;

Fig. 2 is a circuit diagram of the present invention;

Fig. 3 is a circuit diagram of this invention with a reverse device and a bulb;

Fig. 4A shows a circuit diagram with a switch set

on "high speed";

Fig. 4B shows a circuit diagram with the switch set on "medium speed"; and

Fig. 4C shows a circuit diagram with the switch set on "low speed".

Referring to Fig. 2, and as stated before, a capacitive switching device (SW1) in used to replace the transformer (TR) in Fig. 1. In the example, the capacitive switching device (SW1) comprises three capacitors (21), (22), and (23) of capacitance C1, C2, and C3, which can be equal in value. The capacitive switching device (SW1) has four switching positions. In a first position, a switch being set on "high speed", the capacitance is C=C1+C2+C3 (see Fig. 4A); in a second position, the switch being set on "medium speed", the capacitance is C=C1+C2 (see Fig. 4B), in a third position, the switch being set on "low speed", the capacitance is C=C1 (see Fig. 4C); and in a fourth position, the switching device (SW1) is in an "OFF" state. Such switching devices are available on the market thus its details are not necessary. It is only noteworthy that in the first position, when a motor (M) receives a greatest partial voltage V_L, the partial voltage V_L value must not be greater than 110V.

Referring to Fig. 3, a reverse circuit (4) is provided to reverse the direction of the motor (M) when only a fan is desired to cause circulation of air in

a room. Optionally a bulb (5) can be provided at the center of the fan. Since accessories (4), (5) are known means, their details are not necessary.

CLAIMS:

A power reducing device for reducing an AC power supply of voltage V1 to a lower voltage V2 for a fan with a motor (M), characterized in that said power reducing device is a capacitive circuit (SW1) serially connected between a source of said AC power supply of voltage V1 and said motor (M), said power reducing device having a plurality of switching positions respectively corresponding to open-circuit states of said power reducing device and to different capacitance values.

Examiner's report to the Comptroller under Section 17 (The Search Report)

9025105.9

Relevant Technical fields

(i) UK Cl (Edition K) H2J (JSAX,JSVV,JSSS)

(ii) Int Cl (Edition 5) H02P 7/40

Databases (see over)

(i) UK Patent Office

(ii)

Search Examiner

B J EDE

Date of Search

27.02.91.

Documents considered relevant following a search in respect of claims 1

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	GB 2,105,931 A (SHELL) see 7, 8 Figure 1 and 7, 8 10, Figure 2	1
A	GB 1,207,347 (JUNKERS) see Figure 2	1
X	GB 1,045,253 (SPERRY RAND) C1, C2, Figures 1 and 4	1
X	GB 380,459 (GRAMOPHONE CO) see 5, Figure 1	1
X	GB 362,509 (ELECTRICAL RESEARCH PRODUCTS) see 16-22	1
X	EP 0,181,072 A1 (VENT-AXIA LTD) see C1, C2 Figures 1A, 1B and 1C	1

SF2(p)

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Category	Identity of document and relevant passages	Relevant to claim(s)

Categories of documents

X: Document indicating lack of novelty or of inventive step.

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P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

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Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).

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