

[54] **VARIABLE SPEED HVAC WITHOUT CONTROLLER AND RESPONSIVE TO A CONVENTIONAL THERMOSTAT**

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4,389,853	6/1983	Hile	62/89
4,390,826	6/1983	Erdman et al.	318/439
4,415,844	11/1983	Mendenhall et al.	318/254
4,423,765	1/1984	Hildebrand	165/12
4,459,519	7/1984	Erdman	318/254
4,467,617	8/1984	Morgan et al.	62/180
4,495,450	1/1985	Tokizaki et al.	318/138
4,500,821	2/1985	Bitting et al.	318/254
4,540,921	9/1985	Boyd, Jr. et al.	318/254
4,599,547	7/1986	Ho	318/594
4,636,936	1/1987	Boyd, Jr. et al.	364/148
4,642,536	2/1987	Boyd, Jr. et al.	318/254
4,642,537	2/1987	Young	318/254
4,648,551	3/1987	Thompson et al.	236/49
4,653,285	3/1987	Pohl	62/126
4,667,480	5/1987	Bessler	62/180

(List continued on next page.)

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 889,708, May 27, 1992.

[51] Int. Cl.⁶ **G05D 23/00; H02J 7/00**

[52] U.S. Cl. **318/471; 318/53; 34/562; 34/575**

[58] **Field of Search** **318/254, 439, 138, 471, 318/483, 432, 434, 53, 66, 68, 77; 364/493, 503; 34/523, 524, 535, 543, 562, 563, 572; 62/176, 6, 156, 157, 231; 454/222, 229, 236; 388/803, 809, 816, 730, 934**

References Cited

U.S. PATENT DOCUMENTS

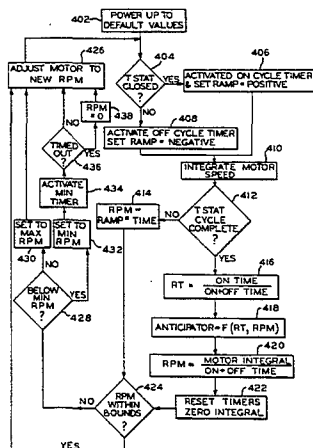
3,415,071	12/1968	Kompelien	62/158
3,545,218	12/1970	Greenberg	62/157
3,695,054	10/1972	Barry	62/115
3,762,178	10/1973	Yamada et al.	62/157
3,801,888	4/1974	Faulkner	318/471
3,853,174	12/1974	Kramer	165/39
3,877,243	4/1975	Kramer	62/180
3,890,798	6/1975	Fujimoto et al.	62/155
4,015,182	3/1977	Erdman	318/334
4,075,864	2/1978	Schrader	62/180
4,167,966	9/1979	Freeman	165/2
4,250,544	2/1981	Alley	364/110
4,267,967	5/1981	Beck et al.	236/49
4,271,898	6/1981	Freeman	165/16
4,292,813	10/1981	Paddock	62/158
4,345,162	8/1982	Hammer et al.	364/493
4,346,434	8/1982	Morinaga	364/183
4,373,663	2/1983	Hammer	364/505

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[57] **ABSTRACT**

A system for conditioning air in a space by heating or cooling the air to change its temperature. A thermostat located within the space generates a two state temperature signal having a cyclic parameter which corresponds to the temperature of the air in the space as it rises and falls. A compressor supplies refrigerant to a heat exchanger by means of which changes are made in the temperature of the air. A variable speed motor drives the compressor in response to a motor control signal. A controller responds to the temperature signal and senses the cyclic parameter of the temperature signal. The controller generates the motor control signal as a function of the sensed cyclic parameter whereby the motor control signal is provided to the motor to control the torque or speed of the motor.

63 Claims, 5 Drawing Sheets



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 Zhongshan Broad Ocean Motor Co., Ltd., Petitioner
 Nidec Motor Corporation, Patent Owner

U.S. PATENT DOCUMENTS

4,672,816	6/1987	Takahashi	62/180	4,845,418	7/1989	Conner	318/778
4,682,473	7/1987	Rogers, III	62/89	4,860,231	8/1989	Ballard et al.	364/571
4,688,547	8/1987	Ballard et al.	126/116 A	4,860,552	8/1989	Beckey	62/158
4,710,691	12/1987	Bergstrom et al.	318/696	4,868,467	9/1989	Davis	318/254
4,712,050	12/1987	Nagasawa et al.	318/254	4,872,123	10/1989	Morita	364/571
4,722,018	1/1988	Pohl	361/29	4,879,502	11/1989	Endo et al.	318/808
4,736,143	4/1988	Nakamura et al.	318/432	4,902,952	2/1990	Lavery	318/645
4,743,815	5/1988	Gee et al.	318/254	4,939,437	7/1990	Farag et al.	318/473
4,763,425	8/1988	Grennan	34/48	4,941,325	7/1990	Nuding	62/158
4,773,587	9/1988	Lipman	236/11	4,950,918	8/1990	O'Breartuin et al.	307/242
4,806,833	2/1989	Young	318/335	4,992,715	2/1991	Nakamura et al.	318/432 X
4,829,221	5/1989	Grunberg et al.	318/587	5,107,685	4/1992	Kobayashi	318/807
				5,119,071	6/1992	Takezawa	318/811
				5,129,234	7/1992	Alford	62/176.6
				5,197,375	3/1993	Rosenbrock et al. ..	364/557

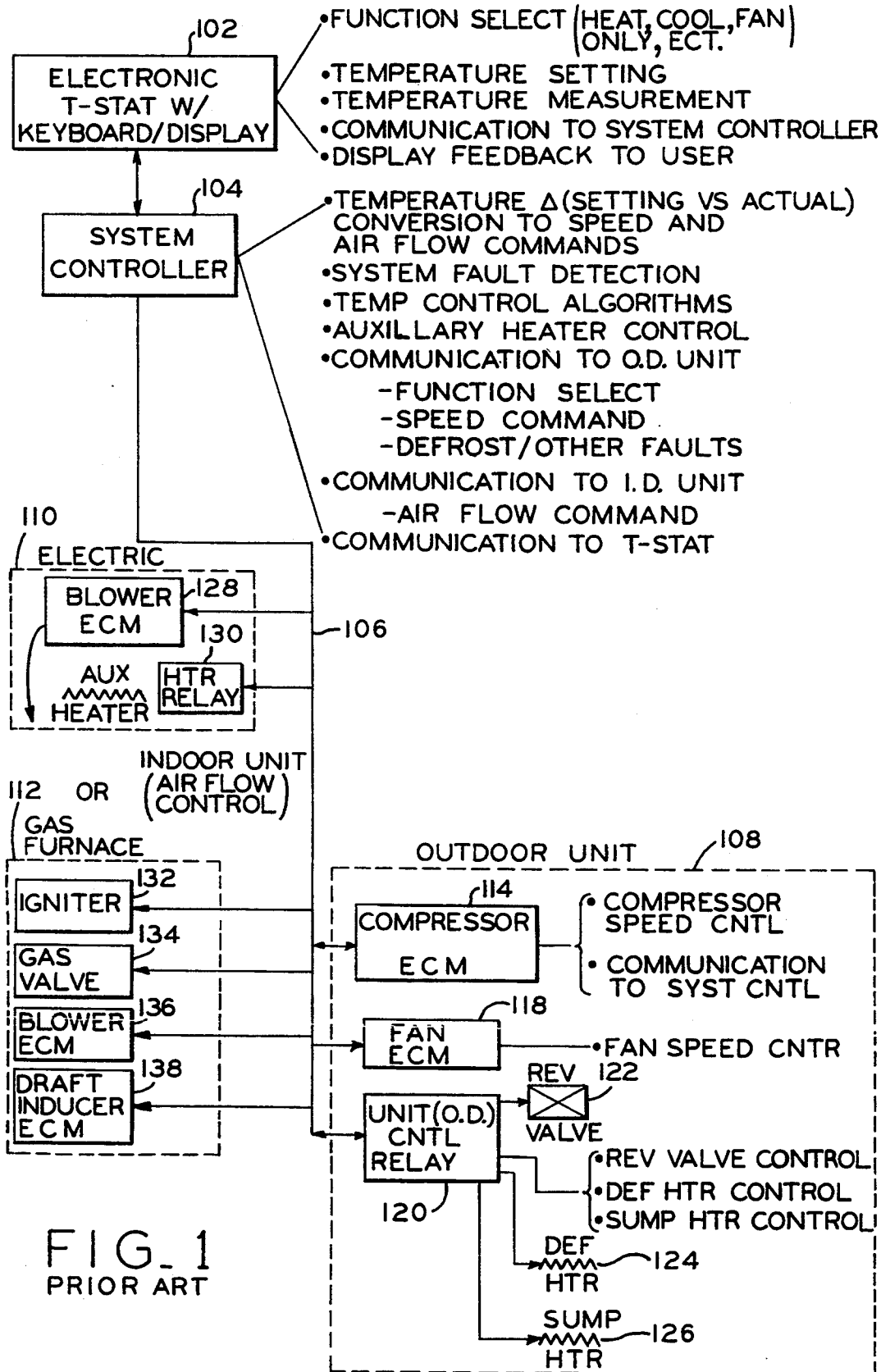
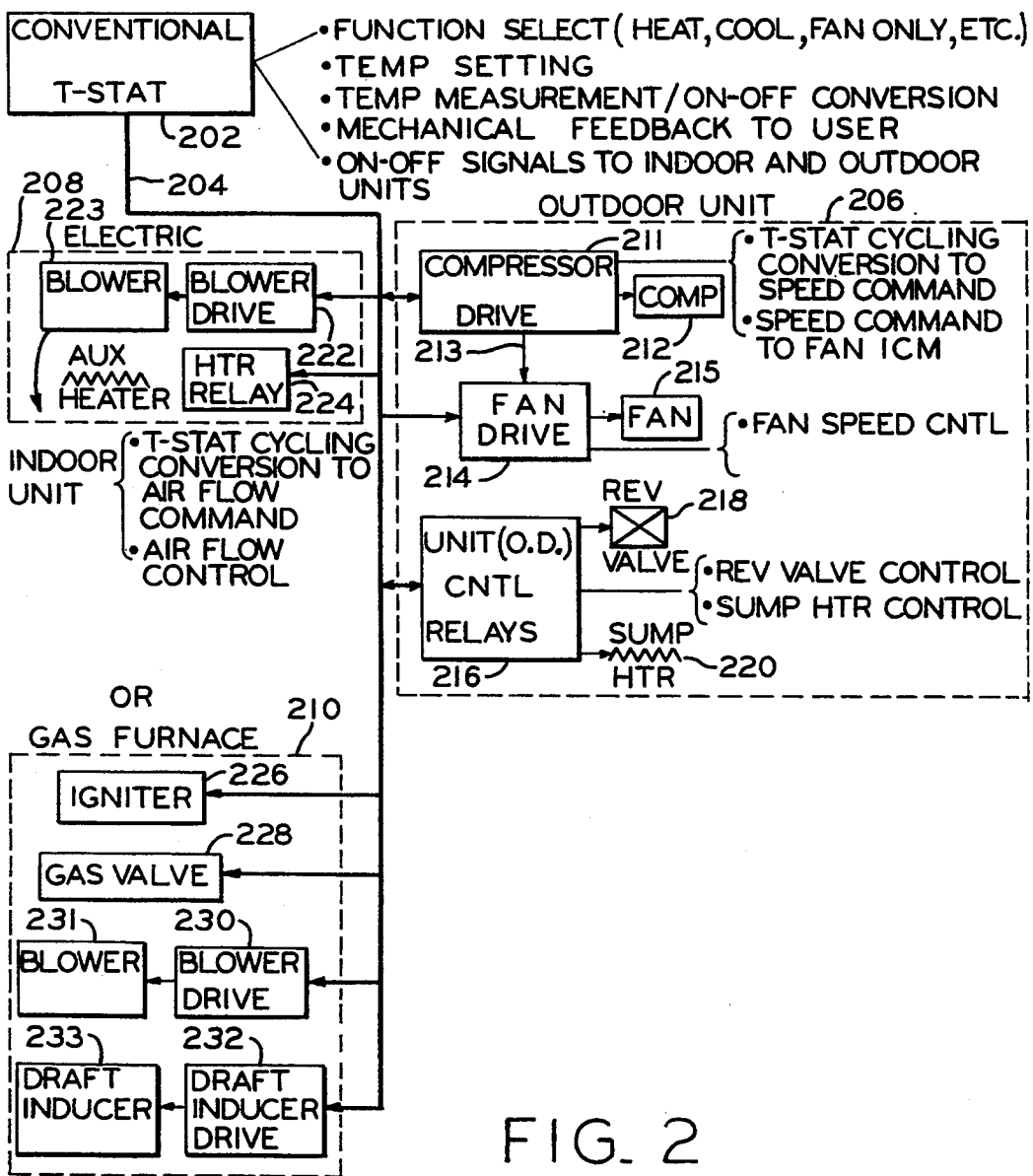


FIG. 1
PRIOR ART



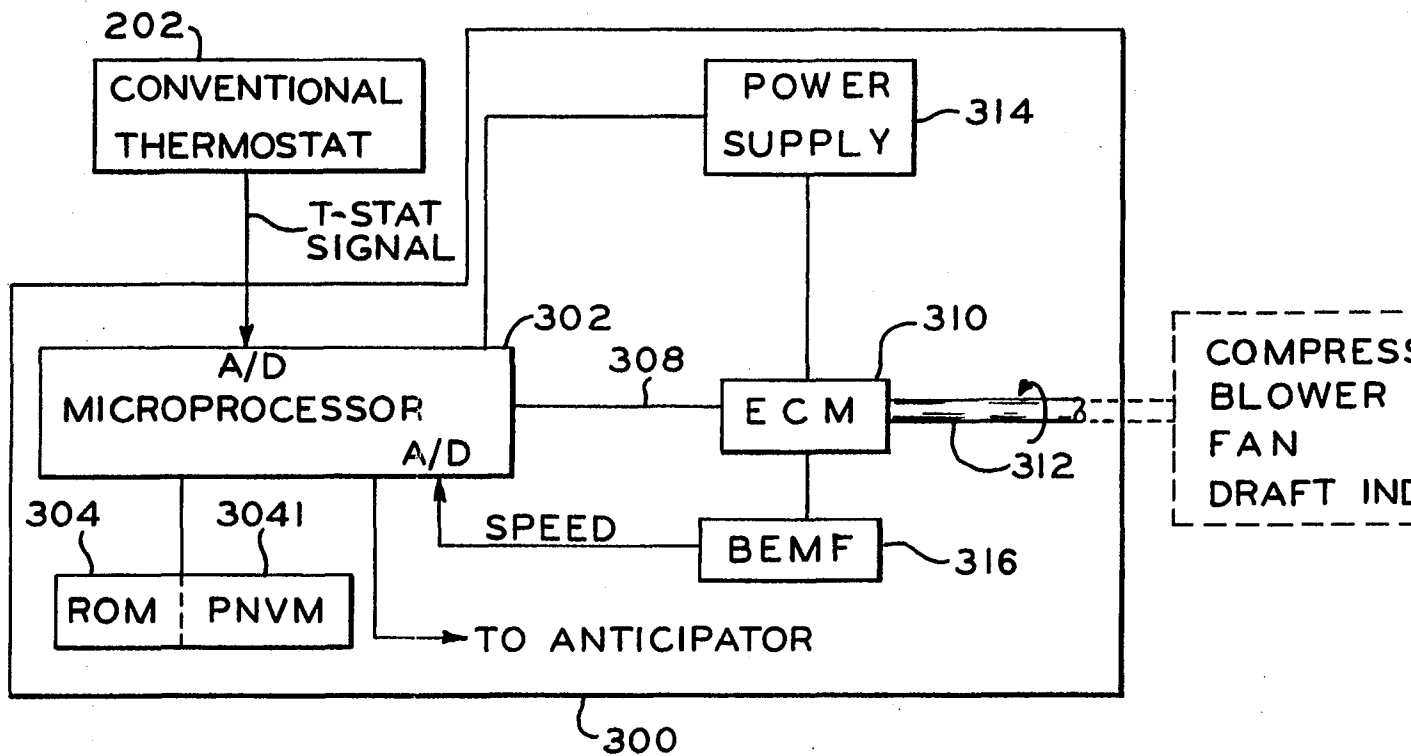


FIG. 3

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