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**D E C I S I O N**  
**of 30 July 2001**

**Case Number:** T 0457/96 - 3.4.1

**Application Number:** 92304387.1

**Publication Number:** 0514184

**IPC:** G01P 5/06

**Language of the proceedings:** EN

**Title of invention:**

Method and apparatus for wind speed and direction measurement

**Applicant:**

PEET BROS. COMPANY INC.

**Opponent:**

-

**Headword:**

-

**Relevant legal provisions:**

EPC Art. 56

**Keyword:**

"Inventive step (yes) - after amendment"

**Decisions cited:**

-

**Catchword:**



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Boards of Appeal

Chambres de recours

**Case Number:** T 0457/96 - 3.4.1

**D E C I S I O N**  
**of the Technical Board of Appeal 3.4.1**  
**of 30 July 2001**

**Appellant:** PEET BROS. AND COMPANY INC.  
601 Woodland Road  
West Allenhurst, NJ 07711 (US)

**Representative:** Pacitti, Pierpaolo A.M.E.  
Murgitroyd and Company  
373 Scotland Street  
Glasgow G5 8QA (GB)

**Decision under appeal:** Decision of the Examining Division of the  
European Patent Office posted 13 February 1996  
refusing European patent application  
No. 92 304 387.1 pursuant to Article 97(1) EPC.

**Composition of the Board:**

**Chairman:** G. Davies  
**Members:** M. G. L. Rognoni  
U. G. O. Himmler

## Summary of Facts and Submissions

I. The appellant (applicant) lodged an appeal, received on 5 April 1996, against the decision of the Examining Division, dispatched on 13 February 1996, refusing the application No. 92 304 387.1 (publication No. 0 514 184). The fee for the appeal was paid on 11 April 1996 and the statement setting out the grounds of appeal was received on 5 April 1996.

II. In the decision under appeal, the Examining Division held, *inter alia*, that the subject-matter of claim 1 did not involve an inventive step within the meaning of Article 56 EPC, having regard to the following documents:

D2: US-A-4 548 074

D3: SU-A-970 224

and to the skilled person's general knowledge.

III. In response to a communication from the Board, the appellant filed new claims 1, 8 and 9, and pages 7 and 18 of the description with a letter dated 11 December 2000, received on 15 December 2000.

IV. The applicant requested that the decision under appeal be set aside and a patent be granted on the basis of the following documents:

**Claims:** No. 1, 8 and 9 filed with the letter dated 11 December 2000;  
No. 2 to 7 and 10 as filed with a letter dated 20 June 1995;

**Description:** pages 7 and 18 as filed with the letter dated 11 December 2000;  
pages 3, 3a and 6 as filed with the letter dated 20 June 1995;  
pages 1, 2, 4, 5 and 8 to 17 as originally filed;

**Drawings:** sheets 1/3 to 3/3 as originally filed.

V. The wording of claim 1 reads as follows:

"1. Apparatus for measuring fluid speed and direction comprising:

a stationary member (10);

a first member (42) rotatably mounted on said stationary member;

a fluid speed transducer means (16), mounted on said first member (42), for rotating in a predetermined direction with an angular velocity proportional to the speed of the fluid;

first circuit means (72) for providing a first signal having a frequency dependent upon the angular velocity of the fluid transducer means and thus corresponding to the speed of the fluid;

a second member (44) rotatably mounted on said stationary member;

fluid direction transducer means (20) mounted on said second member (44) for rotating to a position in which the fluid direction transducer means is parallel

to the direction of flow of the fluid;

second circuit means (74) for providing a second signal which has a phase difference with respect to the first signal, said phase difference corresponding to the direction of the fluid flow;

a source of stimulus (30);

sensor means (26), responsive to said source of stimulus, mounted on the stationary member for providing an output signal to said second circuit means; and

means (28) mounted on said first member for varying the level of stimulus which reaches said sensor means to indicate said relative angular displacement between said stationary and second members, in order to provide said second signal;

characterised in that:

said source of stimulus (30) is mounted upon said second member and rotates about and external to said stationary member; and

said sensor means (26) is mounted substantially at the axis of rotation of the first and second members."

The wording of claim 9 reads as follows:

"9. A method of measuring the direction and velocity of a fluid flow using a system for measuring fluid speed and direction which includes fluid speed (16) and direction (20) transducers separately rotatably mounted

on a stationary member (10), the method of measuring the direction and velocity of fluid flow comprising the steps of:

mounting on said stationary member first (22) and second (26) magnetic flux sensors;

providing first (24) and second (30) magnets to actuate the respective first and second magnetic flux sensors, said first and second magnets being mounted on said respective fluid speed and direction transducers, said second magnet rotating about and external to said stationary member, said first magnet selectively activating said first magnetic flux sensor in response to the fluid speed;

mounting said second magnetic flux sensor (26) substantially at the axis of rotation of the fluid speed (16) and direction (20) transducers;

mounting a ferromagnetic body (28) on said fluid speed transducer so as to be interposed between said second magnet and said second magnetic flux sensor as said fluid speed transducer rotates, said ferromagnetic body selectively deactivating the second sensor in response to the fluid speed and fluid direction;

generating a first pulse electrical signal from said first magnetic flux sensing means, wherein the frequency of the pulse signal is proportional to the speed of the fluid;

generating a second pulse electrical signal from a second magnetic flux sensor, said second pulse electrical signal having a phase difference with

respect to said first pulse electrical signal which indicates the direction of fluid flow; and

measuring the frequency of said first pulse signal to determine the fluid speed and the phase difference between said first and second pulse signals to determine the direction of fluid flow".

The wording of claim 10 reads as follows:

"10. A method of calibrating the apparatus set forth in any one of claims 1 to 8, in which the apparatus includes a digital data processor (60), and in which the method includes the further steps of:

mounting said stationary member;

aligning said fluid direction transducer towards a specified direction;

manually actuating the fluid speed transducer;

providing first and second pulse electrical signals to the data processor from the fluid speed transducer and the fluid direction transducer, respectively;

determining a calibration constant, using the data processor, in response to a measured phase difference between said first and second pulse electrical signals, and storing said calibration constant; and

using the calibration constant to determine fluid direction."

Claims 2 to 8 are dependent on claim 1.

VI. The appellant's arguments can be summarized as follows:

The problem to be solved by the present invention was to achieve an apparatus which used more compact and less expensive sources of stimulus and sensor means than those used in the prior art apparatuses. The solution of the present invention was twofold. Firstly, the source of stimulus which rotated with the fluid direction transducer means rotated about and external to the stationary member. Secondly, the sensor means which responded to the source of stimulus was mounted substantially at the axis of rotation of the first and second members.

Using an external source of stimulus allowed for a wide choice of sources of stimulus and sensors, for example a light source and light sensor or a magnet source and wire coil sensor. This was in contrast to the apparatus of D2 which had to use wire coil sensors because the apparatus relied on the interruption of the air gap to generate a signal. Furthermore, none of the cited prior art documents disclosed sensor means mounted substantially at the axis of rotation of the first and second members. The skilled person would not consider it obvious to include this feature in the apparatus of D2, particularly since the sensor means of D2 was relatively bulky and would not fit at the axis of rotation. As to D3, there was no suggestion in this document to couple the fluid direction transducing means (i.e. the wind vane) to the rotating source of stimulus (i.e. the rotating magnet 2). Hence, the subject matter of claim 1 involved an inventive step within the meaning of Article 56 EPC.



## Reasons for the Decision

1. The appeal is admissible.
  
- 2.1 Claims 1 and 9 differ from the corresponding claims considered in the contested decision essentially in that it is specified in the former that the **sensor means** is mounted substantially **at the axis of rotation** of the first and second members.
  
- 2.2 All amendments made to the claims and the description find support in the application documents as originally filed and, therefore, are admissible under Article 123(2) EPC.
  
3. The present application relates to an **apparatus for measuring wind speed and direction** comprising essentially an anemometer and a wind vane. According to the detailed embodiment of the invention referred to in the description, the anemometer 16 has a cylindrical piece 42 which is rotatably mounted on the fixed base of the apparatus 10. A second cylindrical piece 44 supporting the wind vane is rotatably mounted on the same fixed base above the anemometer. As it rotates, the anemometer produces a series of pulses by means of a magnet which is located on the inside of the cylindrical piece 42 so as to close a reed switch 22 placed on the fixed base 10 every time it travels past it. The wind vane comprises also a magnet on the inside of the cylindrical piece 44. Inside the core of the fixed base on which the wind vane is mounted there is located a second reed switch 26 which is kept closed by the magnet 30. The cylindrical piece 42 of the

anemometer has a cylindrical portion extending between the core of the fixed base and the cylindrical portion of the wind vane. This portion supports a screen which, as the anemometer rotates, passes between the magnet 30 and the reed switch 26 so as to shield the magnetic field and open the switch.

In operation, the apparatus according to the present invention generates two trains of pulses which have the same frequency (depending on the speed of the anemometer) and a phase difference which is a function of the angular position of the magnet 30 with respect to the reed switch 22. The phase shift between the two trains of pulses gives an indication of the wind direction.

4. Document D2, which represents the closest prior art, shows an apparatus for measuring fluid speed and direction comprising the following features recited in claim 1:

- a stationary member (i.e. the housing 23);
- a first member rotatably mounted on said stationary member (i.e. the axis of the anemometer);
- a fluid speed transducer means, mounted on said first member, for rotating in a predetermined direction with an angular velocity proportional to the speed of the fluid (i.e. the anemometer 55);
- first circuit means for providing a first signal having a frequency dependent upon the angular velocity of the fluid transducer means and thus

- corresponding to the speed of the fluid (i.e. the magnet 82, the coil 79, the elements 67, 68, 106 and 71 of the associated magnetic circuit and the electronics used to process the signal produced by the coil 79);
- a second member rotatably mounted on said stationary member (i.e. the member supporting the wind vane 35);
  - fluid direction transducer means mounted on said second member for rotating to a position in which the fluid direction transducer means is parallel to the direction of flow of the fluid (i.e. the wind vane);
  - second circuit means for providing a second signal which has a phase difference with respect to the first signal, said phase difference corresponding to the direction of the fluid flow (i.e. the electronics connected to the coil 83 which provides the second signal from which the wind direction is determined);
  - a source of stimulus (i.e. the magnet 94);
  - sensor means responsive to said source of stimulus, mounted on the stationary member for providing an output signal to said second circuit means (i.e. the coil 83 which picks up the magnetic flux produced by the magnet 94);
  - means mounted on said first member for varying the level of stimulus which reaches said sensor means to indicate said relative angular displacement

between said stationary and second members, in order to provide said second signal (i.e. the element which rotates together with the anemometer and during this rotation travels within the gap formed by the tang 53 and the cup-shaped element 84; by modifying the gap it influences the amount of flux picked up by the sensor).

5. The Examining Division's decision to refuse the present application rests essentially on the following assumptions:

- (a) Though in D2 the actual source of the magnetic flux is the permanent magnet 94, the skilled person would regard the tip of the tang 53 as the "source of stimulus", i.e. as the "effective source of the relevant (local) magnetic flux" which is periodically interrupted by the actuator end 109 to generate a train of pulses.
- (b) The claimed subject-matter differs from the apparatus of D2 only in that in the former the source of stimulus rotates about and external to the stationary member. This arrangement represents a normal design alternative which would be considered by the skilled person as a matter of routine.

6.1 In the "exemplary embodiment" of the invention the source of the stimulus is a magnet. The description, however, specifies that the term "source of stimulus" is meant to cover a wide range of physical entities (e.g. light, radiation, magnetic field) which can be detected by a sensor. In document D2 the magnetic field produced by the magnet 94 is directed by the tang 53

towards the air gap 91. In fact, this apparatus shows several ferromagnetic pieces, such as the cylindrical member 84 and the cup-shaped member 45, which constitute a magnetic circuit bundling the magnetic flux and leading it towards the coil 93. According to the Examining Division's interpretation of the wording of claim 1, any of these magnetic circuit elements could, in principle, be regarded as a "source of stimulus", in the sense that each element either generates or "carries" the magnetic flux to the coil 93. In the present application, however, the term "source of stimulus" clearly identifies a "source" which **generates** a "stimulus" and interacts **directly** with the sensor without the interposition of any "circuit element".

6.2 In fact, the tang 53, as part of a magnetic circuit shown in D2, becomes a "source of stimulus" only when it is magnetically linked to the magnet 94 via the cylindrical member 45. Therefore, it does not appear to be justified to single out only this element of the magnetic circuit and, after assimilating it to the actual source of magnetic flux, to conclude that it would be obvious to redesign the apparatus of D2 in the sense of the present invention (i.e. with the "source of stimulus" rotating about and external to the stationary member) without explaining how the other magnetic circuit elements shown in D2 and, in particular, the magnet should be rearranged or modified so that the different parts of the apparatus may retain their functionality.

6.3 In the opinion of the Board, the only element of D2 which matches the definition of "source of stimulus" given in the present application is the magnet 94.

Therefore, claim 1 of the present application differs from D2 in that it further comprises the following features:

- the source of stimulus is mounted upon said second member 44;
- said source of stimulus rotates about and external to said stationary member 10;
- said sensor means is mounted substantially at the axis of rotation of the first and second members 42, 44.

7. In the apparatus according to document D2, both the source of stimulus (the magnet 94) and the sensor means (the coil 83) are located inside the casing and are fixed. It is therefore necessary to have a magnetic flux circuit with a moving member (the tang 53) which rotates with the wind vane and relates the position of wind vane to the magnetic flux in order to generate a pulse train indicative of the position of the wind vane. Whereas D2 has a magnetic circuit with a moving member, in the apparatus according to the present invention, it is the "source of stimulus" which is placed on the revolving member 44 so that its position is indicative of the position of the wind vane. Since it does not require a "circuit" with moving parts to direct the stimulus to the sensor, this arrangement constitutes a simplification of the apparatus shown in D2 suitable for different and more compact sources of stimulus and sensors, as pointed out by the appellant and underscored by the further feature that the "sensor means 26 is mounted substantially at the axis of rotation of the first and second members".

8. D3 relates also to an apparatus for measuring wind speed and direction and was cited in the contested decision only to show a source of stimulus rotating about and external to a stationary member, whereby the stationary member is an annular magnetic core. However, the apparatus according to D3 shows an arrangement which is substantially different both from D2 and from the present invention. Thus, this document does not give the skilled person any incentive to modify the apparatus of D2 in such a way as to arrive at the claimed subject-matter.
9. For these reasons, the Board finds that it was not obvious to the skilled person starting from D2 to arrive at an apparatus falling within the terms of claim 1. Hence, the subject-matter of this claim involves an inventive step within the meaning of Article 56 EPC.
10. The method claim 9 is based essentially on the same features of claim 1 expressed in terms of method steps, whereas claim 10 relates to a method of calibrating the apparatus according to any one of claims 1 to 8. Hence, the subject-matters of these claims complies with the requirements of Articles 52 and 56 EPC.
11. Claims 2 to 8 are dependent, and, therefore, their subject-matters also involve an inventive step.
12. In summary, the Board finds that the appellant's request complies with the requirements of the EPC and that a patent can be granted on the basis thereof.

## Order

**For these reasons it is decided that:**

1. The decision under appeal is set aside.
2. The case is remitted to the department of the first instance with the order to grant a patent on the basis of the appellant's request (cf. point IV).

The Registrar:

The Chairman:

R. Schumacher

G. Davies