

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

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Paper No. 28

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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Ex parte CHARLES R. JENSEN

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Appeal No. 2001-0300  
Application 08/819,527<sup>1</sup>

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ON BRIEF

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Before THOMAS, BARRETT, and LEVY, Administrative Patent Judges.  
BARRETT, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134 from the final rejection of claims 10-12.

We reverse.

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<sup>1</sup> Application for patent filed March 17, 1997, entitled "Coil for an AC Current Sensor."

BACKGROUND

The invention relates to a formable coil for an AC current sensor.

Claim 10, the sole independent claim, is reproduced below.

10. An AC current sensor having a coil structure for sensing current in a conductor, said coil structure comprising:

a wire wound in a predetermined number of turns, with a uniform mean turn area of wire for each turn, at a constant pitch over a predetermined length along a longitudinal axis in passes in opposite directions along said longitudinal axis to provide an elongate coil structure wherein a number of turns in each pass is defined by said predetermined length divided by said constant pitch, a number of passes in each direction is defined by said predetermined number of turns divided by said number of turns in each pass, and a diameter of said wire is defined by said constant pitch divided by said number of passes in one direction, so that gaps between adjacent turns of wire in any pass are substantially completely filled in with turns of wire in other passes,

wherein said coil structure is flexible along said length while maintaining substantially constant uniformity of mean turn area and number of turns per unit length.

The examiner relies on the following references:

Steen	3,449,703	June 10, 1969
Montross	3,489,974	January 13, 1970
Edwards	5,057,769	October 15, 1991

Claims 10-12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Steen, Montross, and Edwards.

We refer to the examiner's answer (Paper No. 23) (pages referred to as "EA\_\_") for a statement of the examiner's

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rejection, and to the amended appeal brief (Paper No. 24) (pages referred to as "Br\_\_") and reply brief (Paper No. 26) for a statement of appellant's arguments thereagainst.

#### OPINION

##### Notes

On page 4, line 25, of the specification, it appears that the equation " $P = 2 \sin\phi$ " should be " $P = 2D \sin\phi$ ."

On page 5, lines 4-8, of the specification, it appears that "31" on line 6 should be "62," the number of passes, and the computed maximum wire diameter should be "0.002 inch" instead of "0.004 inch" with the AWG adjusted accordingly. That is, if the pitch is 0.124 inch and there are 62 passes with one wire being laid down in the 0.124 inch pitch on each pass, the wire size should be  $0.124/62 = 0.002$  inch. This appears to be an obvious error that could be corrected without introducing new matter. Claim 10 correctly states that "a diameter of said wire is defined by said constant pitch divided by said number of passes in one direction." The number of turns per pass, "31," is not relevant to determining fill or wire diameter.

Obviousness

Initially, we look at the following limitations of the coil structure in claim 10:

a wire wound in a predetermined number of turns, with a uniform mean turn area of wire for each turn, at a constant pitch over a predetermined length along a longitudinal axis in passes in opposite directions along said longitudinal axis to provide an elongate coil structure wherein a number of turns in each pass is defined by said predetermined length divided by said constant pitch, a number of passes in each direction is defined by said predetermined number of turns divided by said number of turns in each pass . . . .

It appears that such general limitations would be necessarily inherent in any design for a coil where turns are wound on a linear mandrel, except for perhaps the limitation of "a uniform mean turn area of wire for each turn." A coil is designed for a predetermined number of turns to get the desired sensitivity. The mandrel has a known predetermined length. Turns are wound by machine at a known constant pitch. The number of turns per pass is determined by the predetermined length divided by the pitch and the number of passes is determined by the predetermined number of turns divided by the number of turns per pass. The wire must be wound in passes in opposite directions to use a continuous length of wire. It is known from Edwards (col. 6, lines 54-56) and appellant's description of Edwards (specification at 1, lines 11-14) that the mean turn area and the number of turns of wire per unit length should be

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uniform. The limitations do not specify anything special about the pitch. In particular, nothing in these limitations recites the pitch leaving a gap and nothing precludes the wires in each turn being placed against a preceding turn. More than one pass (a multiple-wound coil) is only indirectly recited by "a wire wound . . . in passes in opposite directions."

Although we find the limitations discussed above to be inherent in a linear coils, we have a problem with the examiner's application of Steen. Steen, because it is a toroidal coil, will necessarily have the wires of each turn spaced further apart at the outside radius of the coil than at the inside radius. This means that the pitch is different at the outside radius than the inside radius; thus, the pitch is not "constant" as claimed, except perhaps when measured at a fixed diameter. Nevertheless, we do not decide the case on this basis.

The "wherein" clause here is similar to a "whereby" clause which indicates that the structure or elements previously enumerated will necessarily give the result which follows the term "whereby," in which case no further structural limitations are implied. See Texas Instruments, Inc. v. United States Int'l Trade Comm'n, 988 F.2d 1165, 1172, 26 USPQ2d 1018, 1023 (Fed. Cir. 1993) ("A 'whereby' clause that merely states the result of the limitations in the claim adds nothing to the patentability or substance of the claim."). With a linear coil there would be

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little question about the results in the "wherein" clause. However, we agree with appellant's argument (Br5) that there is a question of whether the ring-wound coil in Steen can maintain substantially constant uniformity of mean turn area because of the gaps which necessarily result at the outside radius of the coil. Nevertheless, we do not decide the case on this basis.

In our opinion, the obviousness issue turns on whether the examiner has established the obviousness of the limitation, "a diameter of said wire is defined by said constant pitch divided by said number of passes in one direction, so that gaps between adjacent turns of wire in any pass are substantially completely filled in with turns of wire in other passes." We do not interpret the reference to "gaps" in this limitation as implying that the previously recited "pitch" purposely leaves gaps between turns or that the pitch is chosen to produce a mechanically stable coil: the gaps can be caused by variances in the winding process (e.g., specification at 1, line 19). It does not appear that claim 10 really captures what appellant regards as his invention. However, we address claim 10 as just a broad claim. We do not find any discussion in the examiner's rejection about the relationship between the wire diameter, pitch, and number of passes. The examiner's position appears to be just that multiple passes in Steen would substantially fill in gaps (EA5), but this does not address the claimed relationship. Accordingly, we

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conclude that the examiner has failed to establish a prima facie  
case of obviousness. The rejection of claims 10-12 is reversed.

REVERSED

JAMES D. THOMAS	)	
Administrative Patent Judge	)	
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	)	
	)	BOARD OF PATENT
LEE E. BARRETT	)	APPEALS
Administrative Patent Judge	)	AND
	)	INTERFERENCES
	)	
	)	
STUART S. LEVY	)	
Administrative Patent Judge	)	

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