

THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today
(1) was not written for publication in a law journal and
(2) is not binding precedent of the Board.

Paper No. 22

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte GRAHAM T. FORDYCE

Appeal No. 96-2551
Application 08/037,767¹

ON BRIEF

Before HAIRSTON, KRASS, and MARTIN, Administrative Patent Judges.
MARTIN, Administrative Patent Judge.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134 from the
examiner's final rejection of claims 1-3, 5-9 and 11-14 under the
second paragraph of 35 U.S.C. § 112 and of claims 10 and 15 under

¹ Application for patent filed March 26, 1993.

Appeal No. 96-2551
Application 08/037,767

§ 102(b). No claims have been indicated as allowable. We reverse both grounds of rejection.

The claimed subject matter is a gate drive for rapidly turning on and off a high current capacity power switch, such as an insulated gate bipolar transistor in an inverter operated in a pulse-width modulated mode of operation. Claim 1 reads as follows:

1. A drive circuit for a power switching device, comprising:

a transformer having a primary winding and a secondary winding across which secondary pulses of first and second polarities and first and second magnitudes are developed when input pulses of opposing polarities are provided to the primary winding;

a full-wave rectifier bridge having first and second nodes coupled to the secondary winding and third and fourth nodes;

first and second capacitors connected in series between the third and fourth nodes;

first and second controlled switches coupled between a control electrode of the power switching device and the first and second capacitors, respectively, each controlled switch having a control electrode coupled to the secondary winding of the transformer;

Appeal No. 96-2551
Application 08/037,767

wherein control current is drawn from the control electrode of the power switching device through the second controlled switch to the second capacitor in response to the development of a secondary pulse of the second polarity and the second magnitude, at which point charging current is provided to the first and second capacitors from the secondary winding of the transformer; and

wherein the control current is provided by the first capacitor to the control electrode of the power switching device through the first controlled switch in response to the development of a secondary pulse of the first polarity and the first magnitude, the first capacitor being discharged thereby until a voltage magnitude of the first capacitor discharges below the first magnitude of the secondary pulse of the first polarity and the first magnitude, at which point charging current is provided to the first capacitor from the secondary winding of the transformer.

A. The § 112 rejection

The § 112 rejection was applied against claim 2 for the first time as a new ground of rejection in the examiner's Answer. Appellant's reply brief was refused entry by the examiner on the ground that it was not limited to the new ground of rejection. Appellant filed a petition arguing that the reply brief is responsive to the § 112 rejection of claim 2 and to a number of arguments presented for the first time in the Answer. In a

Appeal No. 96-2551
Application 08/037,767

decision on petition mailed April 30, 1996, the Deputy Director of Group 2500 held that the reply brief is entitled to consideration only to the extent it concerns the § 112 rejection of claim 2 and the "capacitor charging/discharging" example used for the first time at page 9 of the Answer. Accordingly, we have considered the reply brief only to this extent.

The examiner contends claim 1 fails to particularly point out and distinctly claim the invention for several reasons. Regarding the limitation "secondary pulses of first and second polarities and first and second magnitudes," the examiner offers two criticisms. The first is that the phrase "secondary pulses of first and second polarities" is a complete description of both of the pulses shown in Figure 5, with the result that the further recitation of "first and second magnitudes" implies two additional types of pulses, which have no support in the specification (Answer at 6). We do not agree. While it is true that the phrase "secondary pulses of first and second polarities" implies that the pulses have amplitudes, the further recitation that these pulses have first and second magnitudes does not imply anything not shown in that figure. Instead, it merely makes explicit what is already

Appeal No. 96-2551
Application 08/037,767

implicit, i.e., that pulses have magnitudes, which is akin to reciting first and second circular openings having first and second diameters. Furthermore, the language in question provides antecedent basis for the limitation "below the first magnitude" in the second "wherein" clause. Consequently, we agree with appellant that it is not improper to recite that the secondary pulses have first and second polarities and first and second magnitudes.

The examiner's second criticism of the limitation "secondary pulses of first and second polarities and first and second magnitudes" is that it is "misdetrictive" because it implies that the magnitude of the pulses of the first polarity can be different from the magnitude of the pulses of the second polarity, when the magnitudes are depicted as being the same in Figure 5 and there is no indication in the specification that they can have different magnitudes. He further contends it is well known that pulse sources, such as source 20 of Figure 4, conventionally provide pulses that are equally spaced and have equal width and magnitude. Even assuming that all of these allegations are correct, they do not establish that claim 1

Appeal No. 96-2551
Application 08/037,767

violates the second paragraph of § 112 by claiming more than appellant regards as his invention. See In re Borkowski, 422 F.2d 904, 909-10, 164 USPQ 642, 645-46 (CCPA 1970):

The examiner's approach to determining whether appellants' claims satisfy the requirements of § 112 appears to have been to study appellants' disclosure, to formulate a conclusion as to what he (the examiner) regards as the broadest invention supported by the disclosure, and then to determine whether appellants' claims are broader than the examiner's conception of what "the invention" is. We cannot agree that § 112 permits of such an approach to claims. The first sentence of the second paragraph of §112 is essentially a requirement for precision and definiteness of claim language. If the scope of subject matter embraced by a claim is clear, and if the applicant has not otherwise indicated that he intends the claim to be of a different scope [footnote 3: "See In re Prater, 56 CCPA 1381, 415 F.2d 1393, 162 USPQ 541 (1969), where the applicant did indicate an intended scope different from our interpretation"], then the claim does particularly point out and distinctly claim the subject matter which the applicant regards as his invention. [Emphasis in original.]

As the examiner has not explained why the scope of the claim language is unclear or why he believes the applicant has indicated that he intends to limit his claims to pulses having the same

amplitude, the rejection based on the second paragraph of § 112 cannot be sustained.²

The examiner also finds fault with claim 1's second "wherein" clause to the extent it recites that "a voltage magnitude on the first capacitor discharges below the first

² If the examiner believes the breadth of the claim language is such that it lacks either written description or enabling support, he should have rejected the claim under the first paragraph of § 112 rather than the second. See Borkowski, 422 F.2d at 909, 164 USPQ at 646:

[I]f the "enabling" disclosure of a specification is not commensurate in scope with the subject matter encompassed by a claim, that fact does not render the claim imprecise or indefinite or otherwise not in compliance with the second paragraph of § 112; rather, the claim is based on an insufficient disclosure [footnote omitted](§ 112, first paragraph) and should be rejected on that ground. See In re Fuetterer, 50 CCPA 1453, 319 F.2d 259, 138 USPQ 217 (1963); In re Kamal, 55 CCPA 1409, 398 F.2d 867, 158 USPQ 320 (1968); and In re Wakefield, 164 USPQ [636, 422 F.2d 897 (CCPA 1970)], decided concurrently herewith. [Emphasis in original.] See also In re Cormany, 477 F.2d 998, 999-1000, 177 USPQ 450, 451 (CCPA 1973) (indefiniteness of claim language and inadequate support for it in the specification are distinct questions under the second and first paragraphs, respectively, of 35 U.S.C. § 112); and In re Miller, 441 F.2d 689, 693, 169 USPQ 597, 600 (CCPA 1971)("Even if it is not true, as appellant asserts, that it is generally understood in the art that omission of temperature from such a recitation indicates that room temperature is intended and the claims are therefor broader than they otherwise would be, breadth is not to be equated with indefiniteness, as we have said many times.").

magnitude of the secondary pulse of the first polarity and the first magnitude." This "wherein" clause describes the effect of activating the "first controlled switch [Q3] in response to the development of a secondary pulse of the first [i.e., negative] polarity and the first magnitude." The examiner contends the passage in question is "not understood" because

[i]t is not seen possible that either the "first capacitor" or the "second capacitor" can discharge. When either a positive or a negative pulse is provided from the secondary winding (turning on either Q3 or Q4, respectively), a positive voltage is provided between nodes 30 and 32 due to rectifier [diodes] D1-D4 and diodes D5 and D6. With a positive voltage being applied across nodes 30 and 32, and thus across the "first capacitor" and the "second capacitor," the "first capacitor" cannot discharge. [Answer at 7; emphasis in original.]

This analysis ignores the fact that the diodes do not conduct immediately upon receipt of a negative or a positive secondary pulse and turn-on of control transistor Q3 or Q4. The diodes do not begin to conduct until after some charge has been transferred via Q3 or Q4 between the capacitors and control electrode 24 of transistor Q1. See the specification at page 3, line 20 to page 4, line 7, and page 12, lines 7-8. The examiner has not explained, and it is not apparent to us, why appellant's circuit

Appeal No. 96-2551
Application 08/037,767

cannot operate in this manner. Thus, it is clear that the claimed discharging of the first capacitor (C4, C5) occurs after Q3 begins to conduct but before D2, D3, D5, and D6 begin to conduct. Consequently, we will not sustain the § 112 rejection of claim 1 or the § 112 rejection of dependent claim 2, which was rejected for the same reasons as claim 1.

The examiner contends that dependent claim 3, which specifies that the precharging means of claim 2 "comprises a third controlled switch coupled between a voltage source and the first capacitor" (examiner's emphasis) is misdescriptive of transistor Q5, whose base-emitter path is used to precharge the first capacitor (C4, C5) (Spec. at page 14, lines 20-26). According to the examiner, the claim language would be understood to mean that the switched terminals of the switch (i.e., the emitter and collector of a transistor) are connected between the voltage source and the first capacitor, which whereas in the disclosed arrangement only one of the switched terminals (the emitter) and the control terminal (the base) are connected between the voltage source and the first capacitor. We agree with appellant that since the claim does not specify which terminals of the controlled

switch are to be connected between the voltage source and the first capacitor, it is broad enough to read on connecting the base and emitter terminals in this manner. The examiner also argues that because only the base and emitter are involved in precharging the first capacitor, Q5 is effectively operating as a diode rather than as the "controlled switch" required by the claim. This argument fails because Q5 actually functions as an emitter-collector switch, albeit for a purpose not set forth in claim 3, i.e., for applying a high potential to the control electrodes of transistors Q3 and Q4 (Spec. at sentence bridging pages 14 and 15).³ The claim does not require that the precharging of the first capacitor be responsive to switching of the controlled switch. As a result, we will not sustain the § 112 rejection of claim 3.⁴

For the foregoing reasons, we are also reversing the

³ This connection is recited dependent claim 5.

⁴ The contention in the final Office action (at 3) that "first capacitor" in claim 3 should be changed to "control electrodes of the first and second controlled switches" was not repeated in the Answer and is therefore presumed to have been withdrawn.

§ 112 rejection of claims 5-9, which were rejected "for the reasons discussed in claims 1 and 3," of claim 11, which was rejected "for similar reasons as discussed above with respect to claim 3," and of claims 12-14, which were rejected "for the reasons discussed above with claim 11" (Answer at 5).

B. The § 102(b) rejection of claims 10 and 15.

Claims 10 and 15 are directed to precharging of the first capacitor, which, as noted above in the discussion of claim 3, is performed by transistor Q5. Those claims read as follows:

10. In a drive circuit for a power switching device wherein the drive circuit includes a transformer having a primary winding and a secondary winding across which a secondary pulse is developed when an input pulse is provided to the primary winding at a particular time, means coupled to the secondary winding for rectifying the secondary pulse, a capacitor connected across the rectifying means and a controlled switch having a control electrode coupled to the secondary winding of the transformer and first and second main current path electrodes, the first main current path electrode coupled to the capacitor and the second main current electrode coupled to a control electrode of the power switching device, the improvement comprising:

means coupled to the first capacitor and operable before the particular time for precharging the capacitor.

15. In a drive circuit for a power transistor having main current path electrodes one of which is coupled to a power source wherein the drive circuit

includes a pulse transformer having a primary winding and a secondary winding across which positive and negative secondary pulses are developed when positive and negative input pulses are provided to the primary winding following a particular time, means coupled to the secondary winding for rectifying the secondary pulses, first and second series-connected capacitors connected to the rectifying means and first and second controlled switches each having a control electrode coupled to the secondary winding of the transformer and main current path electrodes coupled between the capacitors and a control electrode of the power transistor, the improvement comprising:

means coupled to the first capacitor and operable before the particular time for precharging the first capacitor including a third controlled switch coupled between the power source and the first capacitor; and

means coupled between the power transistor and the third controlled switch for detecting an overcurrent condition in the power transistor wherein the third controlled switch is responsive to such overcurrent detection to turn off the power transistor.

The examiner reads the limitations of claim 10, which is the broader of the two claims, on Landseadel as follows:

- (a) "transformer" - transformer 26;
- (b) "rectifying means" - rectifier circuit 36;
- (c) "capacitor" - capacitors 46 and/or 48;
- (d) "controlled switch" - MOSFET 14 or 22;
- (e) "means for precharging" - resistor 54.

Appeal No. 96-2551
Application 08/037,767

The only point in dispute is whether the means for precharging, i.e., resistor 54, precharges one of the capacitors prior to application of an input pulse to the primary winding of the transformer, as required by the claim. The examiner contends that "prior to the transformer receiving pulses, resistor 54 will cause capacitor 46 to have a charge of approximately zero volts" (final Office action at 4). Most of appellant's discussion of the rejection concerns whether the examiner is correct to construe the term "precharge" as broad enough to read on discharging a capacitor to approximately zero volts. However, whether or not the examiner is correct on this point, the rejection fails because, as appellant correctly notes in an alternative argument at page 16 of the brief: "The circuit of Landseadel cannot precharge the capacitor until the power supply, and specifically the transformer, receives an input. Prior to this time there is no voltage with which to charge a capacitor." Appellant is correct in this regard because the transformer, rectifier circuit 36 and capacitors 46 and 48 are part of a DC power supply 24, which produces DC power supply voltages only when the transformer primary is receiving AC power (col. 2, lines 31-51). As a result,

Appeal No. 96-2551
Application 08/037,767

prior to the application of the first AC "pulse" to the primary winding of the transformer, resistor 54 is unable to transfer charge to or from either of the two capacitors. For this reason, the rejection of claim 10 is reversed.

The rejection of claim 15, which like claim 10 requires "precharging" to occur prior to application of the first pulse to the primary winding of the transformer, is reversed for the same reason. It is also reversed for an additional reason argued by appellant (Br. at 18), which is that the final Office action fails to address the claimed "means . . . for detecting an overcurrent condition in the power transistor wherein the third controlled switch is responsive to such overcurrent detection to turn off the power transistor." Nor was this limitation addressed in the Answer, which improperly treats claim 15 as standing or falling with claim 10 (Answer at 10) even though it is separately argued in the brief.

For the foregoing reasons, the § 102(b) rejection of claims 10 and 15 is reversed.

REVERSED

KENNETH W. HAIRSTON)	
Administrative Patent Judge)	
)	
)	
)	
ERROL A. KRASS)	BOARD OF PATENT
Administrative Patent Judge)	APPEALS AND
)	INTERFERENCES
)	
)	
JOHN C. MARTIN)	
Administrative Patent Judge)	

Jeffery S. Makeever
 Patent Department #441-3
 Sundstrand Corporation
 4949 Harrison Avenue
 P.O. Box 7003
 Rockford, IL 61125-7003