

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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HONEYWELL INTERNATIONAL INC.,  
Petitioner,

v.

INTERNATIONAL CONTROLS AND MEASUREMENTS CORP.,  
Patent Owner.

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Case IPR2014-00219  
Patent 6,222,719 B1

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Before HOWARD B. BLANKENSHIP, KARL D. EASTHOM, and  
BARBARA A. PARVIS, *Administrative Patent Judges*.

PARVIS, *Administrative Patent Judge*.

FINAL WRITTEN DECISION  
*35 U.S.C. § 318(a) and 37 C.F.R. § 42.73*

I. BACKGROUND

A. *Introduction*

On December 3, 2013, Honeywell International Inc. (“Petitioner”) filed a Petition (Paper 2, “Pet.”) requesting an *inter partes* review of claims 1–6 of U.S. Patent No. 6,222,719 B1 (Ex. 1001, “the ’719 patent”). On April 21, 2014, we granted the Petition and instituted trial as to claims 1–6

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of the '719 patent on one of the grounds of unpatentability, under 35 U.S.C. § 103, that was alleged in the Petition. Paper 22 (“Decision to Institute” or “Inst. Dec.”).

After institution of trial, Patent Owner, International Controls and Measurements Corp. (“Patent Owner”) filed a Patent Owner Response (“PO Resp.”). Paper 27. Petitioner filed a Reply to the Patent Owner Response. Paper 31 (“Pet. Reply”).

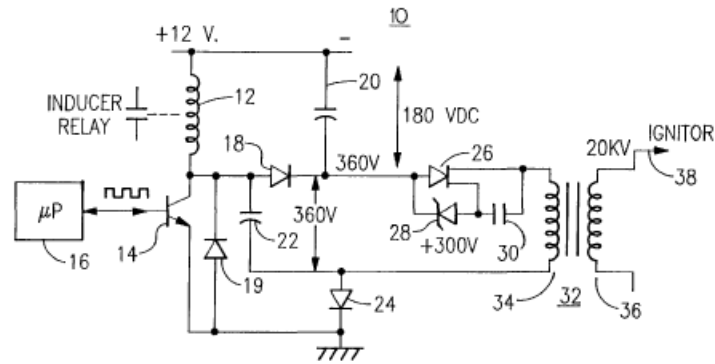
An oral hearing for IPR2014-00219 was held on January 21, 2015. The transcript of the hearing has been entered into the record. (Paper 42, “Tr.”)

We have jurisdiction under 35 U.S.C. § 6(c). This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a).

Petitioner has shown that claims 1–6 of the '719 patent are unpatentable.

*B. The '719 Patent*

The '719 patent relates to a gas furnace control circuit and electronic ignition of a gas burner. Ex. 1001, 1:5–7. Figure 1 illustrates ignition circuit 10 according to an embodiment of the invention. *Id.* at 3:48–50. Figure 1 of the '719 patent is reproduced below.



**FIG.1**

Figure 1 depicts a schematic diagram of an ignition circuit of the '719 patent.

Microprocessor 16 supplies square-wave gating pulses to the base of transistor 14. Ex. 1001, 3:53–54. Inducer relay coil 12 is in series with transistor 14 and is employed for switching an inducer motor (not shown). *Id.* at 3:50–53. Flyback pulses of high voltage, for example +180 VDC, pass through diode 18 to storage capacitor 20. *Id.* at 3:57–58. Another diode 19 between coil 12 and ground charges another capacitor 22. *Id.* at 3:58–59. Capacitors 20 and 22 are connected in series with diodes 18 and 24 and serve as a voltage doubler. *Id.* at 3:60–63.

A hysteresis switching arrangement is formed of Silicon Controlled Rectifier (“SCR”) 26, which is connected to the high end of capacitors 20 and 22, and Zener 28, which is connected between a gate and an anode of SCR 26. Ex. 1001, 3:66–4:2. Zener 28 has a threshold value of +300 volts so that SCR 26 turns on when the flyback voltage reaches that level and turns off when capacitors 20 and 22 are discharged. *Id.* at 4:4–7. Primary winding 34 of ignition transformer 32 is coupled between the cathode of SCR 26 and the junction of capacitor 22 and diode 24. *Id.* at 4:12–14. When SCR 26 is switched on, the accumulated charge on capacitors 20 and

22 is dumped through primary winding 34 at about 300 volts. *Id.* at 4:14–17. This produces a high voltage, for example 20,000 volts, from transformer secondary winding 36, which feeds igniter probe 38 within the gas burner. *Id.* at 4:17–19. The high voltage generates an arc that causes the flame to light in the burner. *Id.* at 4:19–21.

*C. Related Proceedings*

Petitioner states that the '719 patent has been asserted against Petitioner in a pending patent infringement lawsuit, *Int'l Controls & Measurements Corp. v. Honeywell Int'l, Inc.*, No. 5:12-cv-1766-LEK-ATB, in the Northern District of New York. Pet. 2.

*D. Illustrative Claim*

Of the challenged claims, only claim 1 is independent. Each of claims 2–6 depends, directly or indirectly, from claim 1. Claim 1 is reproduced below:

1. Igniter circuit for a furnace gas burner in which an igniter starts a flame in the burner, and in which pulsating current is applied to a coil in order to actuate the furnace; the igniter circuit comprising
  - a flyback rectifier having a first electrode connected to said relay coil and a second electrode;
  - charge storage means coupled to the second electrode of the flyback rectifier to accumulate a flyback voltage;
  - a step-up transformer having a primary winding and a secondary winding, the secondary winding being connected to the igniter to provide a high voltage thereto; and
  - switching means coupled between the first charge storage means and the primary winding of the step-up transformer for discharging the accumulated flyback voltage on said charge storage means, including a switching arrangement that automatically discharges said accumulated flyback voltage

through said primary winding whenever the flyback voltage reaches a predetermined threshold.

Ex. 1001, 5:65–6:19.

*E. The Prior Art References Supporting Alleged Unpatentability*

Petitioner relies on the following references:

Reference	U.S. Patent No.	Issued Date	Exhibit No.
Courier de Méré (“Courier”)	Patent 4,167,767	Sept. 11, 1979	Ex. 1004
Potts	Patent 3,514,240	May 26, 1970	Ex. 1011

*F. The Pending Ground of Unpatentability*

The pending ground of unpatentability is that claims 1–6 are unpatentable, under 35 U.S.C. § 103(a), as obvious over the combined teachings of Courier and Potts.

## II. ANALYSIS

*A. Claim Construction*

*1. Principles of Law*

As a step in our analysis, we determine the meaning of the claims for purposes of this decision. In an *inter partes* review, claim terms in an unexpired patent are interpreted according to their broadest reasonable construction in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b); *see also In re Cuozzo Speed Techs., LLC.*, 778 F.3d 1271, 1281 (Fed. Cir. 2015) (“Congress implicitly adopted the broadest reasonable interpretation standard in enacting the [America Invents Act (Pub. L. No. 112–29, 125 Stat. 284 (2011)) (‘AIA’)],” and “the standard was properly adopted by [United States Patent and Trademark Office (‘USPTO’)] regulation.”). Under the broadest reasonable construction standard, claim terms are given their ordinary and customary meaning, as

would be understood by one of ordinary skill in the art in the context of the entire disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007) (quoting *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc)). We must be careful not to read a particular embodiment appearing in the written description into the claim if the claim language is broader than the embodiment. *In re Van Geuns*, 988 F.2d 1181, 1184 (Fed. Cir. 1993) (“[L]imitations are not to be read into the claims from the specification.”).

Additionally, the USPTO interprets limitations arising under 35 U.S.C. § 112, sixth paragraph, in light of the corresponding structure, material or acts described in the specification.<sup>1</sup> *In re Donaldson Co.*, 16 F.3d 1189, 1193 (Fed. Cir. 1994) (en banc) (“[P]aragraph six applies regardless of the context in which the interpretation of means-plus-function language arises, i.e., whether as part of a patentability determination in the [USPTO] or as part of a validity or infringement determination in a court.”). We construe the terms below in accordance with these principles.

## 2. *Decision to Institute*

In the Decision to Institute, we determined that Petitioner’s construction of “a coil” as “a relay coil” is reasonable and consistent with the specification, and we adopted it as a broadest reasonable construction. Inst. Dec. 7. Petitioner proposed a construction for “relay” within “relay

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<sup>1</sup> Section 4(c) of the Leahy-Smith America Invents Act (“AIA”) re-designated 35 U.S.C. § 112, paragraph six, as 35 U.S.C. § 112(f). Pub. L. No. 112-29, 125 Stat. 284, 296 (2011). Because the ’719 patent has a filing date before September 16, 2012 (effective date of § 4(c)), we will refer to the pre-AIA version of § 112.

coil.” Pet. 11. We did not adopt Petitioner’s construction for relay. Inst. Dec. 7.

We also evaluated Petitioner’s contentions regarding two means-plus-function limitations, i.e., “charge storage means” and “switching means.” *Id.* at 7–9. We determined that the function performed by the “charge storage means” is accumulating a flyback voltage. *Id.* at 7. We determined that the structure corresponding to the “charge storage means” is a network formed of capacitors 20 and 22 and diodes 18 and 24. *Id.* at 7–8. We additionally determined that the function performed by the “switching means” is discharging the accumulated flyback voltage and we identified a corresponding structure. *Id.* at 8–9.

Patent Owner agrees that “coil” and “relay coil” are used interchangeably in the ’719 patent, but contends that the term “coil” should be further construed. PO Resp. 12–15. Patent Owner also contends that the preamble of claim 1 is limiting and “requires using a coil for two purposes: (a) generating energy to accumulate a flyback voltage on the charge storage means *and* (b) to activate a furnace.” *Id.* at 20. Patent Owner additionally agrees with the identification of the function of the “charge storage means,” but disagrees with the identification of the corresponding structure. *Id.* at 15–18. Patent Owner further agrees with the identification of the function of the “switching means” and agrees that the structure identified is one of the corresponding structures disclosed in the specification. *Id.* at 18–20. Patent Owner does not dispute that the combination of Courier and Potts teaches the claimed “switching means.” *Id.* at 5–8.

Below we evaluate Patent Owner’s contentions regarding the construction of “coil” and identification of the corresponding structure of the

“charge storage means.” We additionally evaluate Patent Owner’s contention that the preamble of claim 1 is limiting and requires using a coil for two purposes (PO Resp. 20). We discern no reason, based on the complete record now before us, to change either our determination regarding the function of the “charge storage means” or our determinations regarding the “switching means.”

3. *“a coil” and “said relay coil”*

The term “a coil” is recited, for example, in claim 1. Petitioner contends that “a coil” means “a relay coil,” because “said relay coil” in the body of the claim refers back to “a coil” in the preamble. Pet. 10. Patent Owner agrees that “a coil” is used interchangeably with “relay coil” in the ’719 patent. As discussed in the Decision to Institute, we determine, consistent with Petitioner’s and Patent Owner’s contentions, that “a coil” is used interchangeably with “a relay coil” in the ’719 patent specification. Inst. Dec. 7. We evaluate Patent Owner’s contention that “coil” (and “relay coil”) means “winding of a conductor.” *See* PO Resp. 15.

Patent Owner points to a definition of “coil” in IEEE STANDARD DICTIONARY OF ELECTRICAL AND ELECTRONIC TERMS, (4th ed. 1998) (“1998 IEEE Dictionary,” Ex. 2004): “[a]n assemblage of successive convolutions of a conductor.” PO Resp. 13 (citing Ex. 2004, 162). Patent Owner also points to a definition of “relay coil” in this same technical dictionary: “[o]ne or more windings on a common form.” *Id.* (citing Ex. 2004, 815).

We agree with Patent Owner. Patent Owner more precisely points to the definition of “relay coil” (PO Resp. 13), whereas Petitioner refers to the definition of “relay” (Pet. 11). The dictionary definitions of “coil” and “relay coil” are useful in ascertaining the way in which one of ordinary skill



in the art would use these claim terms. *Starhome GMBH v. AT&T Mobility LLC*, 743 F.3d 849, 856–57 (Fed. Cir. 2014). The dictionary definition is consistent with the use of the term in the ’719 patent specification. In particular, the ’719 patent specification refers to inducer relay coil 112 (Ex. 1001, 5:13–14), which is illustrated as a winding (*id.* at Fig. 3).

We determine that Patent Owner’s contention that “coil” (and “relay coil”) means “winding of a conductor” (PO Resp. 15) is reasonable and consistent with the ’719 patent specification, and we adopt it as the broadest reasonable interpretation.

4. *the preamble*

Petitioner contends that “[t]he preamble is limiting because it provides antecedent basis for the ‘said relay coil’ and ‘the igniter.’” Pet. 10. Patent Owner agrees that “[t]he preamble of claim 1 is limiting because ‘limitations in the body of the claim rely upon and derived antecedent basis from the preamble.’” PO Resp. 20–21 (citing *NTP, Inc. v. Research In Motion, Ltd.*, 418 F.3d 1282, 1306 (Fed. Cir. 2005)). In the Decision to Institute, we determined, consistent with Petitioner’s and Patent Owner’s contentions, that “a coil” in the preamble of claim 1 provides antecedent basis for “said relay coil.” Inst. Dec. 7.

We consider whether the preamble is limiting in view of the principles below.

“Generally,” we have said, “the preamble does not limit the claims.” *Allen Eng’g Corp. v. Bartell Indus., Inc.*, 299 F.3d 1336, 1346 (Fed. Cir. 2002). Nonetheless, the preamble may be construed as limiting “if it recites essential structure or steps, or if it is ‘necessary to give life, meaning, and vitality’ to the claim.” *Catalina Mktg. Int’l, Inc. v. Coolsavings.com, Inc.*, 289 F.3d 801, 808 (Fed. Cir. 2002), quoting *Pitney Bowes, Inc. v.*

*Hewlett-Packard Co.*, 182 F.3d 1298, 1305 (Fed. Cir. 1999). A preamble is not regarded as limiting, however, “when the claim body describes a structurally complete invention such that deletion of the preamble phrase does not affect the structure or steps of the claimed invention.” *Catalina*, 289 F.3d at 809.

*Am. Medical Sys., Inc. v. Biolitec, Inc.*, 618 F.3d 1354, 1358–59 (Fed. Cir. 2010). As Petitioner correctly notes (Pet. 10), two terms in the preamble provide antecedent basis: coil and igniter. Neither party has provided persuasive argument regarding any other reason why we should consider the preamble to be limiting. We, therefore, determine that the preamble is limiting to the extent it recites structure that provides antecedent basis to the terms “said relay coil” and “the igniter.”

Patent Owner contends that claim 1 “by its limiting preamble, requires using a coil for two purposes — (a) generating energy to accumulate a flyback voltage on the charge storage means *and* (b) to activate a furnace.” PO Resp. 20. Contrary to Patent Owner’s assertion, the preamble of claim 1 does not recite the first purpose identified by Patent Owner, i.e., “generating energy to accumulate a flyback voltage on the charge storage means” (PO Resp. 20). The preamble of claim 1 recites: “pulsating current is applied to a coil in order *to actuate the furnace*” (emphasis added). The body of claim 1 further recites, “the igniter circuit comprising[:] a flyback rectifier having a first electrode connected to said relay coil . . . charge storage means couple to the second electrode of the flyback rectifier to accumulate a flyback voltage,” which provides the basis for the first function identified by Patent Owner, i.e., “generating energy to accumulate a flyback voltage on the charge storage means” (PO Resp. 20).

We note that Patent Owner characterizes its proposed construction for the preamble differently throughout its Patent Owner Response. For

example, the Patent Owner also characterizes its position as follows: “the contested claims claim, an igniter circuit that includes a coil that performs two functions: (a) ignite a gas furnace burner and (b) activate *another component* of the furnace.” PO Resp. 1 (emphasis added); *see also id.* at 23 (“activating a component of the furnace *other than ignition*” (emphasis added).); *id.* at 21 (“[t]o meet all the requirements of claim 1, there must at least be a coil powering some component of the gas furnace *other than the igniter*” (emphasis added)). In other words, Patent Owner contends that “the preamble of claim 1 requires using a coil for two purposes,” and one of those purposes is activating a component other than the igniter. *Id.* at 20–23.

According to Patent Owner (*id.*), activating a component other than the igniter is required by the preamble’s recitation of: “pulsating current is applied to a coil *in order to actuate the furnace*” (emphasis added). We, therefore, determine the broadest reasonable interpretation of the emphasized phrase. We start by noting that Patent Owner contends that the construction of “actuate” is “render active.” Tr. 45:11–14; *see also id.* at 51:3–5 (“actuate means switching on, rendering active”). According to Petitioner, “actuate” means “providing energy to any component of.” Pet. Reply 15.

The ’719 patent specification does not define “actuate.” The *IEEE Dictionary* sets forth a plain and ordinary meaning of “actuator” as follows: “[a] component that *provides a physical output* in response to a stimulating variable or signal.” Institute of Electrical and Electronics Engineers, *The Authoritative Dictionary of IEEE Standard Terms* 16 (7th ed., IEEE Press 2000) (Ex. 3001) (emphasis added).

The dictionary definition is consistent with the specification. For instance, the specification of the '719 patent states, “[p]ulsating current is applied respectively to inducer and gas valve relay coils *to actuate the furnace.*” Ex. 1001, Abstract (emphasis added). With respect to the inducer relay coil, the '719 patent specification states, “the inducer relay coil is used for generating the ignition voltage.” *Id.* at 3:24–25. With respect to the gas valve relay, the '719 patent specification states, “a gas valve relay actuator coil 42 is employed, which is also used to actuate the gas valve that supplies a combustible gas to the gas burner (not shown).” *Id.* at 4:38–41.

The phrase “to actuate the furnace,” in light of the specification of the '719 patent means providing a physical output to activate the furnace, and includes generating the ignition voltage (*see e.g., id.* at 2:63–3:28). As is evident from the examples above, the specification of the '719 patent does not limit “to actuate the furnace” to components other than the igniter circuit, as Patent Owner contends.

In addition to not reflecting the plain and ordinary meaning, Patent Owner’s attempt to redefine “to actuate a furnace,” as recited in claim 1 to mean activating a component of the furnace other than the igniter (PO Resp. 20–23) is at odds with claim 1, which is directed to an igniter circuit. For instance, the preamble of claim 1 recites: “[*i*]gniter circuit for a furnace gas burner *in which an igniter* starts a flame, and *in which* pulsating current is applied to a coil in order to actuate the furnace, the *igniter circuit* comprising . . .” (emphasis added). The use of “in which” indicates that the coil is within the igniter circuit. This interpretation is consistent with the body of the claim, which as indicated by the preamble, recites elements of the igniter circuit, including “said relay coil.” Additionally, Patent Owner’s

contention is contrary to legal precedent that the preamble is limiting because it recites structure that provides antecedent basis to the terms “said relay coil” and “the igniter.”

Furthermore, Patent Owner’s failure to identify the required activated component clearly is telling. Patent Owner asserts that “[t]o meet all the requirements of claim 1, there must at least be a coil powering *some component* of a gas furnace *other than the igniter.*” PO Resp. 21 (emphasis added). Patent Owner does not identify another component recited in claim 1 that Patent Owner contends is activated.

Instead of identifying “a component . . . other than ignition” (PO Resp. 23) in the claim, Patent Owner points to the specification of the ’719 patent. In particular, Patent Owner states, “[t]he specification shows an example of a coil that is a ‘relay actuator coil 12,’ which is ‘employed for switching on an inducer motor (not shown).’” *Id.* at 21 (citing Ex. 1001, 3:50–52). Claim 1, however, does not recite “an inducer motor” (Ex. 1001, 3:50–52). “[L]imitations are not to be read into the claims from the specification.” *In re Van Geuns*, 988 F.2d at 1184.

Patent Owner also relies on the testimony of Dr. William R. Eisenstadt (PO Resp. 21 (citing Ex. 2003 ¶¶ 21–22)), who states “[t]he specification shows an example of a coil . . . which is ‘employed for switching on an inducer motor’” and then provides the following conclusory statement: “[t]herefore, to meet all the requirements of claim 1, there must at least be a coil powering some component of a gas furnace other than the igniter . . . .” (Ex. 2003 ¶ 22 (citing Ex. 1001, 3:50–52)). Dr. Eisenstadt does not provide persuasive reasoning or evidence regarding why claim 1 requires that the coil power a component of the gas furnace other than the

igniter. *See* 37 C.F.R. § 42.65(a) (“Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight.”).

During oral argument, Patent Owner was asked to clarify its contentions to explain if the “component . . . other than ignition” (PO Resp. 23) refers to a component that is a necessary condition for the furnace to be on. Tr. 54:10–12. Instead, Patent Owner stated “[i]t would be one of them, because there are, you know, a furnace is a relatively complicated piece of machinery [including] a number of safety standards that surround it.” *Id.* at 54:13–16. To the extent that Patent Owner contends that “to actuate the furnace” recited in claim 1 of the ’719 patent means switching on or rendering active (*id.* at 51:3–5) every component—or more than one other component—of the furnace, Patent Owner also has not provided persuasive reasons or evidence to support this construction. As Patent Owner acknowledged, its construction of “actuate” “has not been part of the briefing.” *Id.* at 45:13–14. Furthermore, such a construction would introduce ambiguity into claim 1 as to what components and how many components need to be switched on or rendered active, thereby rendering claim 1 indefinite.

Patent Owner has not provided persuasive argument or evidence that “to actuate the furnace,” as recited in the preamble of claim 1 is limited to actuating or activating a component other than the igniter. We determine that the broadest reasonable interpretation of “to actuate the furnace” is providing a physical output to activate the furnace. We further determine that “to actuate the furnace,” as recited in claim 1 includes generating the

ignition voltage, applying current to a coil such that a flyback voltage is accumulated, or otherwise starting the igniter.

Regarding whether the coil is single-purpose or dual-purpose, we determine that the two purposes identified by Patent Owner appear to overlap in light of our construction of “to actuate the furnace.” We, therefore, determine that Patent Owner has not identified persuasively two dissimilar purposes or functions performed by the coil. We determine that no further construction of the preamble is needed.

5. “charge storage means”

The term “charge storage means” is recited, for example, in claim 1. We determined that “charge storage means” is in means-plus-function format the function performed by the “charge storage means” is accumulating a flyback voltage. Inst. Dec. 7. Patent Owner agrees with both of these determinations. PO Resp. 15. Patent Owner, however, disputes the structure corresponding to the claimed function. *Id.* at 15–16.

According to Petitioner, the corresponding structure is “[a] network formed of capacitors 20 and 22 and a diode 24.” Pet. 13 (citing Ex. 1001, 3:59–65, Fig. 1). The portion of the ’719 patent specification that Petitioner relies on is below.

Flyback pulses, of relatively high voltage, e.g., +180 VDC, pass through the diode 18 to a storage capacitor 20. Another diode 19 between coil 12 and ground charges another capacitor 22. A network [is] formed of capacitors 20 and 22 and a diode 24. The capacitors 20 and 22 are connected in series with the diodes 18 and 24 between the positive and negative rails (+12 and ground) and serve as a voltage doubler. The diode 18 connects between the capacitors 20 and 22, so that flyback voltage across the capacitor 22 builds up towards +360 VDC.

Ex. 1001, 3:56–66. In the Decision to Institute, we determined that the structure corresponding to the “charge storage means” is a network formed of capacitors 20 and 22 and diodes 18 and 24, based on the record at that stage in the proceeding. Inst. Dec. 7–8.

Patent Owner contends “[t]hat is one disclosed structure corresponding to the ‘charge storage means[,]’ [but] [t]he specification of the [’719 patent] identifies and discloses other corresponding structures as well.” PO Resp. 15–16. In particular, Patent Owner points to the following excerpt of the ’719 patent.

The charge storage capacitor arrangement can employ only a single capacitor coupled between the diode and a point of DC reference voltage, such as ground. In a preferred embodiment, the capacitor arrangement can be configured as a voltage doubler, with a pair of capacitors and a diode connected in series between points of positive and negative DC voltage.

*Id.* at 16 (quoting Ex. 1001, 2:22–28).

We agree with the Patent Owner to the extent that Patent Owner contends that the ’719 patent specification links the function of accumulating a flyback voltage to two arrangements as described in the ’719 patent specification at column 2, lines 22 through 28 (PO Resp. 16). The first of these arrangements is “a single capacitor coupled between the diode and a point of DC reference voltage, such as ground” (referred to herein as “the single capacitor arrangement”). Ex. 1001, 2:22–24. The single capacitor arrangement is recited in claim 2, which adds to claim 1 “wherein said first charge storage means includes a first capacitor coupled between the second electrode of said diode and a point of reference voltage.” *Id.* at 6:20–23. The second of these arrangements is “the capacitor arrangement can be configured as a voltage doubler, with a pair of capacitors and a diode



connected in series between points of positive and negative DC voltage” (referred to herein as “the voltage doubler arrangement”). *Id.* at 2:25–28. Claim 3 recites a two capacitor arrangement, such as the voltage doubler arrangement described in the specification.

We also agree with Petitioner that the ’719 patent links the function of accumulating a flyback voltage with the arrangement described in the ’719 patent specification at column 3, lines 59 through 65 and Figure 1. Pet. 12–13. The portion of the specification that Petitioner points to describes the voltage doubler arrangement and is very similar to the portion of the ’719 patent specification at column 2 lines 22 through 28, which is referred to by Patent Owner (PO Resp. 16).

We, therefore, conclude that the corresponding structure is disclosed in the specification of the ’719 patent at column 2, lines 22 through 28, and column 3, lines 59 through 65, as well as the corresponding components illustrated in Figure 1. For ease of reference throughout this Decision, we further note the structure corresponding to the claimed function of “accumulating a flyback voltage” encompasses the single capacitor arrangement and the voltage doubler arrangement, discussed above.

*B. Alleged Obviousness of Claims 1–6 over Courier and Potts*

For the reasons given below, after consideration of the arguments in the Petition, the Patent Owner Response, and the evidence cited therein, we conclude that Petitioner has shown by a preponderance of the evidence that claims 1–6 of the ’719 patent are unpatentable, under 35 U.S.C. § 103, as they would have been obvious over the combination of Courier and Potts. *See* Pet. 20–32.

1. *Courier*

*Courier* describes a combustible gas ignition device. Ex. 1004, 1:7–9.

Figure 3 illustrates one embodiment of a combustible gas ignition device.

*Id.* at 3:40–41.

*Courier*'s Figure 3 is reproduced below:

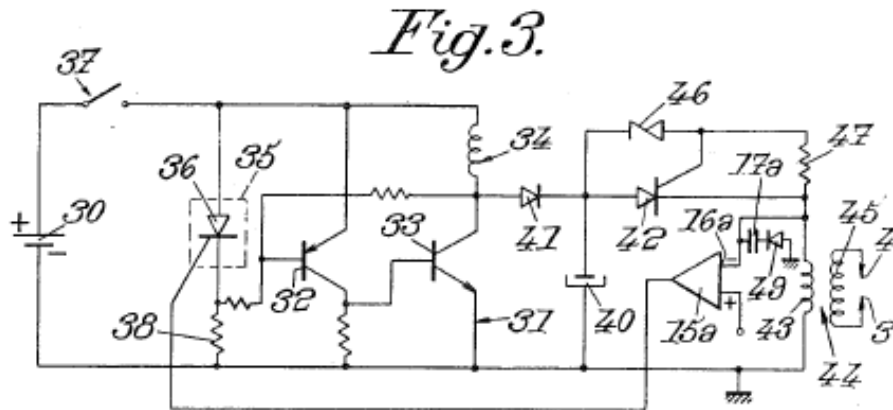


Figure 3 depicts “a combustible gas ignition device conforming to the invention in a detailed fashion.” Ex. 1004, 3:40–41.

The ignition circuit shown in Figure 3 has battery 30, which feeds oscillator circuit 31 with transistors 32 and 33. Ex. 1004, 5:12–18. Connected to the collector of transistor 33 is winding 34, which has a high magnification factor. *Id.* at 5:18–20. Oscillator 31 is connected to the output of inhibition device 35, which is composed of thyristor 36. *Id.* at 5:20–22.

The voltage taken from winding 34 is used for charging capacitor 40 via diode 41. Ex. 1004, 5:31–32. A circuit for discharging capacitor 40 is provided, which includes thyristor 42 and voltage step-up transformer 44, which has primary winding 43 and secondary winding 45. *Id.* at 5:32–37. To ensure discharge of capacitor 40 to a well-specified value, a triggering

mechanism is included for thyristor 42. *Id.* at 5:37–39. In particular, an anode of Zener diode 46 is connected to the trigger of thyristor 42 and a cathode is connected to the anode of thyristor 42. *Id.* at 5:37–42.

Additionally, resistor 47 is installed between the trigger and cathode of thyristor 42. *Id.* at 5:42–43.

2. *Potts*

Potts describes spark generator 50, which consists of rectifier diode 104, resistor 106 and capacitor 108, as well as additional components. Ex. 1011, 4:18–21. Capacitor 108 receives charge through diode 104 and resistor 106. *Id.* at 4:21–23. Potts also describes an alternate arrangement for charging capacitor 108 from a voltage doubling circuit consisting of capacitor 134 and rectifier diodes 136 and 138, as well as resistor 140. *Id.* at 5:3–5.

3. *Claim 1*

We have reviewed Petitioner’s obviousness argument and supporting evidence, including the disclosure of Courier and Potts, the Declaration of Mr. Thomas A. Gafford (Ex. 1003, “Gafford Declaration”), and the detailed claim analysis appearing on pages 20–32 of the Petition, which reads persuasively all elements of claims 1–3 onto the disclosure of Courier and Potts, taken together. For instance, we are persuaded that Petitioner has shown by a preponderance of the evidence that Courier teaches an “[i]gniter circuit for a furnace gas burner[,] in which an igniter starts a flame in the burner, and in which pulsating current is applied to a coil to actuate the furnace,” as recite in the preamble of claim 1. Pet. 24–25 (citing Ex. 1004, Abstract, 1:7–9, Figs. 1, 3); *see also id.* at 21–22 (citing Ex. 1002, 28, 39–40; Ex. 1003 ¶¶ 23–24; Ex. 1004, Fig. 1). In particular, as Petitioner

correctly notes (*id.*), Courier teaches an igniter because Courier states, “[t]he invention relates to a flame or spark detection system as well as to a combustible gas *ignition device* including such a detection system.” Ex. 1004, 1:7–9 (emphasis added); *see also id.* at 1:5–6 (Applications: Ignition circuit . . . [for a] boiler”); *id.* at 2:16–42 (“flame generator . . . including . . . a burner located close to the spark gap and able to be ignited by the sparks produced by the said spark gap.”). Additionally, as Petitioner correctly notes (Pet. 25 (citing Ex. 1004, 5:31–32), Courier teaches winding 34 “used for charging capacity 40 via diode 41.” Ex. 1004, 5:31–32, Fig. 1. Petitioner also has shown by a preponderance of the evidence that Courier’s teaching is applicable to coils that are pulse driven. Pet. 21 (citing Ex. 1002, 28, 39–40; Ex. 1003 ¶¶ 23–24).

We also are persuaded that Petitioner has shown by a preponderance of the evidence that Courier and Potts, taken together, teach each of the four elements of the igniter circuit recited in the body of claim 1. First, we are persuaded that Petitioner has shown by a preponderance of the evidence that Courier and Potts, taken together, teach “a flyback rectifier having a first electrode connected to said relay coil and a second electrode,” as recited in claim 1. Pet. 25 (citing Ex. 1004, 5:31–32). In particular, as Petitioner correctly notes (*id.*), Courier teaches “[t]he voltage taken from winding 34 is used for charging capacitor 40 via diode 41.” Ex. 1004, 5:31–32; *see also id.* at Fig. 3 (cited for showing the igniter circuit (Pet. 24–25) and illustrating a connection between winding 34 and diode 41).

Second, we are persuaded that Petitioner has shown by a preponderance of the evidence that Courier and Potts, taken together, teach a “charge storage means coupled to the second electrode of the flyback

rectifier to accumulate a flyback voltage,” recited in claim 1. Pet. 25–26 (citing Ex. 1004, 5:31–32); *see also id.* at 23–24 (citing Ex. 1002, 28; Ex. 1003 ¶¶ 25, 27; Ex. 1004, 5:31–43, Fig. 1; Ex. 1011, 5:3–5, Fig. 3). In particular, regarding the function of “to accumulate a flyback voltage,” as Petitioner correctly notes (*id.*), Courier teaches, “[t]he voltage taken from winding 34 is used for charging capacitor 40 via diode 41.” Ex. 1004, 5:31–32. Regarding the corresponding structure, we note that Petitioner has shown by a preponderance of the evidence that the combination of Courier and Potts teaches at least equivalents of the structures disclosed in the ’719 patent specification. Pet. 25–26 (citing Ex. 1004, 5:31–32); *see also id.* at 23–24 (citing Ex. 1002, 28; Ex. 1003 ¶¶ 25, 27; Ex. 1004, 5:31–43, Fig. 1; Ex. 1011, 5:3–5, Fig. 3). In particular, as correctly noted by Petitioner (*id.*), Courier teaches a single capacitor arrangement including capacitor 40 and diode 41 (Ex. 1004, 5:31–43). As also correctly noted by Petitioner, Potts teaches a voltage doubling circuit comprising capacitor 134 and rectifier diodes 136 and 138 that charge capacitor 108 (Ex. 1011, 5:3–5; Fig. 3).

Third, we are persuaded that Petitioner has shown by a preponderance of the evidence that Courier and Potts, taken together, teach “a step-up transformer having a primary winding and a secondary winding, the secondary winding being connected to the igniter to provide a high voltage thereto,” as recited in claim 1. Pet. 26 (citing Ex. 1004, 5:32–37). In particular, as Petitioner correctly notes (*id.*), Courier teaches “[a] circuit for discharging capacitor 40 is provided, which includes thyristor 42, on the one hand, and primary winding 43 of voltage step-up transformer 44, on the other hand, to the terminals of secondary winding 45 of which are connected electrodes 3 and 4.” Ex. 1004, 5:32–37.

Fourth, we are persuaded that Petitioner has shown by a preponderance of the evidence that Courier and Potts, taken together, teach “switching means coupled between the first charge storage means and the primary winding of the step-up transformer,” as recited in claim 1. Pet. 26–27 (citing Ex. 1004, 2:38–42, 5:31–43, Fig. 3). For instance, Petitioner has shown by a preponderance of the evidence that Courier and Potts, taken together, teach the following: (1) the function performed by the “switching means,” which is discharging the accumulated flyback voltage, and (2) the corresponding structure, which is a hysteresis switching device consisting of an SCR, whose anode is connected to the high end of the two capacitors, a zener diode that is connected between the gate and the anode of the SCR, and a filter capacitor connected between the cathode and the gate of the SCR. *Id.* Regarding the function, Courier states, “[t]o ensure discharge of capacitor 40 to a well specified value, triggering means for thyristor 42 are included, having Zener diode 46.” Ex. 1004, 5:37–39. Regarding the corresponding structure, Courier teaches thyristor 42 connected to Zener diode 46. *Id.* at 5:31–43, Fig. 3. Petitioner also has shown by a preponderance of the evidence that Courier and Potts, taken together, teach that the switching means includes “a switching arrangement that automatically discharges said accumulated flyback voltage through said primary winding whenever the flyback voltage reaches a predetermined threshold,” as recited in claim 1. *See id.* at 5:37–39, Fig. 3.

Furthermore, we are persuaded that Petitioner has set forth a sufficient showing of articulated reasoning with rational underpinning to combine Courier and Potts. *See KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007). Specifically, Petitioner relies on the testimony of Mr. Gafford

(Pet. 24 (citing Ex. 1003 ¶¶ 25, 27) who states that a voltage-doubling circuit was well known and “[a] PHOSITA would have a good reason to pursue the known option” in light of a design need to increase the amount of voltage accumulated. Ex. 1003 ¶ 25; *see also* Pet. 23 (citing Ex. 1002, 28) (“[V]oltage doubling circuits are well known in the art and hence to use such in situations demanding higher voltage is thus obvious.”). Mr. Gafford further states “there are a finite number of identified, predictable solutions” to increase the amount of voltage accumulated. Ex. 1003 ¶ 25.

We now turn to Patent Owner’s contentions. Patent Owner contends that the combination of Courier and Potts does not teach using a coil for both igniting and activating a furnace. PO Resp. 5, 6, 20–26. Patent Owner’s contentions are based on Patent Owner’s construction, which we decline to adopt for the reasons given.

Patent Owner also contends that Potts fails to teach or suggest a “charge storage means” under the construction in the Decision to Institute. PO Resp. 26. In particular, Patent Owner contends that the corresponding structure “is a specific kind of voltage doubler, with capacitors and diodes connected to each other in a specific way[,] . . . not any random collection of capacitors and diodes.” *Id.* at 27. Patent Owner further contends that Petitioner’s declarant, Mr. Gafford, provides reasoning that “is illogical and reflects a lack of understanding of the clear and rudimentary differences between various configurations of capacitors.” *Id.* at 28. Patent Owner points to Mr. Gafford’s statement that “using two capacitors in parallel instead of a single capacitor would have been obvious.” *Id.* at 27 (citing Ex. 1003 ¶¶ 25, 27). According to Patent Owner, the voltage doubler arrangement of the ’719 patent specification shows “capacitors (20, 22) . . .

connected in series with a diode 18 in between, not in parallel with each other.” *Id.* (citing Ex. 2003 ¶ 32).

As discussed above with respect to claim construction, we determined that “charge storage means” is in means-plus-function format and that the function performed by the “charge storage means” is accumulating a flyback voltage. Additionally, for the reasons discussed above, we determine that Petitioner has shown by a preponderance of the evidence that the combination of Courier and Potts teaches the claimed function of accumulating a flyback voltage. Patent Owner does not dispute these determinations.

Also, for the reasons discussed above with respect to claim construction, we conclude that the structure corresponding to the claimed function of accumulating a flyback voltage is disclosed in the specification of the ’719 patent at column 2, lines 22 through 28, and column 3, lines 59 through 65, as well as the corresponding components illustrated in Figure 1. We further noted above that the structure corresponding to the claimed function of “accumulating a flyback voltage” encompasses the single capacitor arrangement and the voltage doubler arrangement.

As indicated above, we determine that Petitioner has shown by a preponderance of the evidence that the combination of Courier and Potts teaches at least equivalents of the structures disclosed in the ’719 patent specification. Pet. 25–26 (citing Ex. 1004, 5:31–32); *see also id.* at 23–25 (citing Ex. 1002, 28; Ex. 1003 ¶¶ 25, 27; Ex. 1004, 5:31–43, Fig. 1; Ex. 1011, 5:3–5, Fig. 3). In particular, as correctly noted by Petitioner (*id.*), Courier teaches a single capacitor arrangement including capacitor 40 and diode 41 (Ex. 1004, 5:31–43). Potts also teaches a single capacitor



arrangement in which capacitor 108 receives charge through diode 104 (Ex. 1011, 4:11–26). Patent Owner does not dispute persuasively Petitioner’s evidence regarding the single capacitor arrangement taught either by Courier or Potts.

Additionally, we determine Petitioner also has shown by a preponderance of the evidence that the combination of Courier and Potts teaches at least the equivalent of the voltage doubler arrangement. Pet. 23–24 (citing Ex. 1002, 28; Ex. 1003 ¶¶ 25, 27; Ex. 1004, 5:31–34, Fig. 1; Ex. 1011, 5:3–5, Fig. 3). For instance, Potts teaches a voltage doubling circuit comprising capacitor 134 and rectifier diodes 136 and 138 that charge capacitor 108 (Ex. 1011, 5:3–5; Fig. 3). We are not persuaded by Patent Owner’s contentions regarding Mr. Gafford’s statement that “using two capacitors in parallel instead of a single capacitor would have been obvious” (PO Resp. 27 (citing Ex. 1003 ¶¶ 25, 27)). Although we agree with Patent Owner to the extent that Patent Owner contends the ’719 patent specification describes the voltage doubler arrangement as “a pair of capacitors and a diode connected in series” (Ex. 1001, 2:26–27), we determine Petitioner’s other evidence is sufficient (Pet. 23 (citing Ex. 1011, 5:3–5, Fig. 3)). For instance, as Petitioner correctly notes (*id.*), Potts teaches a voltage doubler arrangement “[i]n FIG. 3, capacitor 108 is charged from a voltage doubling circuit consisting of capacitor 134, rectifier diodes 136 and 138 and resistor 140.” Ex. 1011, 5:3–5, Fig. 3.

We note further that Patent Owner relies on the testimony of Dr. Eisenstadt (PO Resp. 26–30 (citing Ex. 2003 ¶¶ 32–37)), whose opinions do not differ substantially from the contentions we evaluated above. We are not persuaded for the reasons given. Furthermore, Dr. Eisenstadt made certain

acknowledgements during his deposition regarding the charge storage means.

Q. Could I have you turn back to Claim 1 please. Based on your review of the materials that we talked about today, what is it about Claim 1 that you believe is inventive over the prior art?

A. Again, I think it's that the actuation of the furnace in addition to – – the preamble actuation of the furnace in addition to all the elemental claims.

....

Q. And if you go to the charge storage means, you don't have any opinion that there's anything novel or inventive about that?

A. No.

Q. That also is within the grasp of a person having ordinary skill?

A. Yes.

Ex. 1019, 126:19–127:13. Similarly, as Petitioner correctly notes (Pet. 23 (citing Ex. 1002, 28)), during prosecution of the application leading to the '719 patent, the Examiner said, “voltage doubling circuits are well known in the art and hence to use such in situations demanding higher voltage is thus obvious.” Ex. 1002, 28. Patent Owner does not refute persuasively the Examiner’s statement.

Patent Owner additionally contends “[a] person of ordinary skill in the art would have no reason to combine *Courier* with *Potts*.” PO Resp. 31 (citing Ex. 2003 ¶ 39). According to Patent Owner, *Courier* teaches circuits with DC power supplies and *Potts* teaches a voltage doubler with an AC power supply. *Id.* The test for obviousness is not whether the features of a secondary reference may be incorporated bodily into the structure of the primary reference. *In re Keller*, 642 F.2d 413, 425 (CCPA 1981). We are persuaded by Petitioner’s evidence that one of ordinary skill in the art would have been motivated to pursue a voltage doubling circuit to increase the

amount of voltage accumulated. Ex. 1003 ¶ 25; *see also* Ex. 1002, 28 (“use [of voltage doubling circuits] in situations demanding higher voltage is thus obvious.”).

4. *Claims 2–6*

We are persuaded that Petitioner has shown by a preponderance of the evidence that the combination of Courier and Potts teaches the additional elements of dependent claims 2–6. Pet. 20–32. For instance, we are persuaded that Petitioner has shown by a preponderance of the evidence that the combination of Courier and Potts teaches the further recitations of dependent claims 2 and 3, each of which depend directly from claim 1. Pet. 25–28 (citing Ex. 1002, 28; Ex. 1003 ¶ 27; Ex. 1004, 5:31–32, Fig. 3); *see also id.* at 23–24 (citing Ex. 1002, 28; Ex. 1003 ¶¶ 25, 27; Ex. 1004, 5:31–43, Fig. 1; Ex. 1011, 5:3–5, Fig. 3). In particular, Courier teaches capacitor 40 and diode 41 coupled appropriately to render obvious the single capacitor arrangement recited in claim 2 (*id.*), and Potts teaches a voltage doubling circuit comprising capacitor 134 and rectifier diodes 136 and 138 that charge capacitor 108 (Ex. 1011, 5:3–5; Fig. 3), which in combination with Courier renders obvious claim 3.

With respect to claim 3, for the reasons discussed above with respect to claim 1, we are not persuaded by Patent Owner’s contentions that the combination of Courier and Potts fails to teach the equivalent of the voltage doubler arrangement, which is one of two structures disclosed in the ’719 patent specification for the charge storage means. For these same reasons, we are not persuaded by Patent Owner’s contentions to the extent that they apply to claim 3. We determine that Petitioner has shown by a preponderance of the evidence that the combination of Courier and Potts

teaches the further recitation of claim 3, which is: “wherein said charge storage means includes a pair of capacitors and a diode connected between points of positive and negative voltage.”

Claim 4 also depends from claim 1 and adds that the switching arrangement includes a hysteresis switching arrangement. We are persuaded that Petitioner has shown by a preponderance of the evidence that the combination of Courier and Potts teaches the further recitation of dependent claim 4, for the reasons discussed with respect to the “switching means,” recited in claim 1.

Claim 5 depends from claim 4 and adds the following limitation: “wherein said hysteresis switching arrangement includes a controlled switching device having main electrodes connected respectively to the second terminal of said diode and to the primary winding of said step-up transformer.” Ex. 1001, 6:29–33. We also are persuaded that Petitioner has shown by a preponderance of the evidence that the combination of Courier and Potts teaches the further recitation of dependent claim 5. Pet. 30–31 (citing Ex. 1004, Fig. 3; Ex. 1011, 4:11–26). For instance, Courier teaches that thyristor 42 is connected to diode 41 and the primary winding 43 of step-up transformer 44. Ex. 1004, Fig. 3. Additionally, Potts teaches thyristor 102 that forms a connection when oscillator 44 has an output. Ex. 1011, 4:11–26.

Claim 6 depends from claim 5 and adds the following limitation: “wherein said controlled switching device includes also a control electrode, and said hysteresis switching arrangement further comprises a zener device connected between said control electrode and one of said main electrodes.” Ex. 1001, 6:34–38. We also are persuaded that Petitioner has shown by a

preponderance of the evidence that the combination of Courier and Potts teaches the further recitation of dependent claim 6. Pet. 31–32 (citing Ex. 1004, 3:14–19, 5:30–43, Fig. 3). For instance, Courier teaches that thyristor 42 is controlled by Zener diode 46. Ex. 1004, 5:31–43.

Patent Owner has not asserted that limitations of dependent claims 2–6 further distinguish over the combination of Courier and Potts. PO Resp. 31–32. For the reasons given, we are persuaded that Petitioner has shown, by a preponderance of the evidence, that each of claims 2–6 is unpatentable as obvious over Courier and Potts.

*C. Other Matters*

The parties submitted demonstrative exhibits, as Exhibit 1020 (submitted by Petitioner) and Exhibit 2006 (submitted by Patent Owner). Petitioner stated it was “fine with” expunging these demonstrative exhibits. Tr. 4:10–11. Patent Owner stated they “have no objection” to expunging the demonstrative exhibits. Tr. 4:14–15. Because we did not rely on the demonstrative exhibits in our decision, the demonstrative exhibits submitted as Exhibit 1020 and Exhibit 2006 are expunged.

### III. CONCLUSION

We conclude that Petitioner has demonstrated by a preponderance of the evidence that each of claims 1–6 of the ’719 patent is unpatentable, under 35 U.S.C. § 103, as obvious over the combined teachings of Courier and Potts. This is a Final Written Decision of the Board under 35 U.S.C. § 318(a).

IV. ORDER

For the reasons given, it is

ORDERED that claims 1–6 of U.S. Patent No. 6,222,719 B1 are determined by a preponderance of the evidence to be *unpatentable*;

FURTHER ORDERED that demonstrative exhibits Exhibit 1020 and Exhibit 2006 are expunged; and

FURTHER ORDERED that because this is a Final Written Decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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