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## United States Court of Appeals for the Federal Circuit

01-1409

MOLTEN METAL EQUIPMENT INNOVATIONS, INC.

Plaintiff-Appellant,

v.

METAULLICS SYSTEMS CO., L.P. and METAULLICS SYSTEMS CO.,

Defendants-Appellees.

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DECIDED: January 30, 2003

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Before MAYER, Chief Judge, NEWMAN and CLEVINGER, Circuit Judges.

Opinion for the court filed by Circuit Judge NEWMAN. Dissenting opinion filed by Circuit Judge

CLEVINGER.

NEWMAN, Circuit Judge.

Molten Metal Equipment Innovations, Inc. (MMEI) appeals the decision of the United States District Court for the Northern District of Ohio, granting summary judgment of non-infringement of United States Patent No. 5,203,681 (the Cooper or '681 patent) in favor of Metaullics Systems Co., L.P. and Metaullics Systems Co. (collectively Metaullics).<sup>[1]</sup> Final judgment was granted upon the Federal Circuit's decision in Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., 234 F.3d 558, 56 USPQ2d 1865 (Fed. Cir. 2000) (*en banc*) (Festo I), the district court vacating the jury verdict of infringement. While this appeal was pending the Supreme Court vacated our decision. Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., 535 U.S. 722, 122 S. Ct. 1831, 62 USPQ2d 1705 (2002) (Festo II). MMEI now seeks reversal of the district court's judgment and reinstatement of the jury verdict.

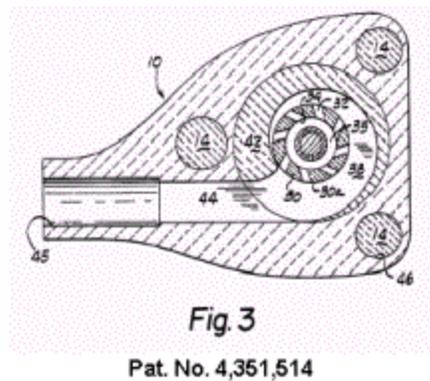
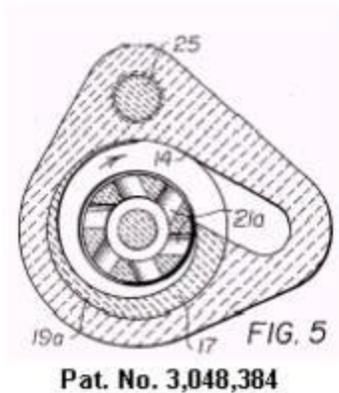
We confirm the district court's claim construction, reinstate the jury verdict, affirm the judgment that there is not literal infringement, vacate the judgment of non-infringement under the doctrine of equivalents, and remand to the district court for further proceedings.

### ***The Invention***

Non-ferrous metals such as aluminum and zinc may be processed by melting in furnaces at extremely high temperatures. Centrifugal pumps were known for use to circulate and mix the molten metal in the furnaces. Such pumps are typically made of graphite, a material that tolerates the high temperatures and corrosive environment of these procedures.

In the operation of centrifugal pumps, the molten metal enters the pump chamber through one or more inlet openings, generally in parallel with the pump shaft. An impeller rotates within the chamber, moving the metal through the pump and expelling it through the pump outlet, which is oriented radially or tangentially to the chamber. The metal charge often contains solid impurities such as rock, brick, and

cement, which do not melt at the high temperature at which the metal melts, and tend to damage or clog the pump. Before Cooper's invention as set forth in the '681 patent, the problems presented by such solid impurities had not been well solved. Some centrifugal pumps, including those manufactured by Metallurgicals, placed barriers such as baffle plates or deflector disks in the pump in order to inhibit solid debris from entering and damaging the pump. These barriers were not fully effective, and prior molten metal pumps required frequent shutdowns for servicing and cleaning.



The prior art includes "volute" centrifugal pumps, wherein the cross-sectional area of the spiral pump chamber generally increases as the pump outlet is approached. The record illustrates several forms of volute pumps, two of which are illustrated below:

In contrast, the Cooper pump here at issue has a "cylindrical non-volute" chamber. The '681 patent specification explains that the cross-sectional area of the pump chamber does not generally increase as the pump outlet is approached, as illustrated in Figures 2 and 3 of the Cooper patent:

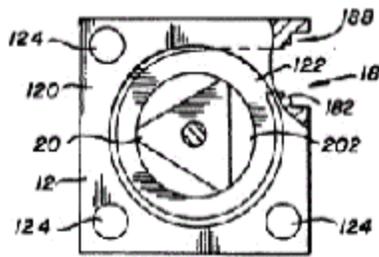


Fig. 2

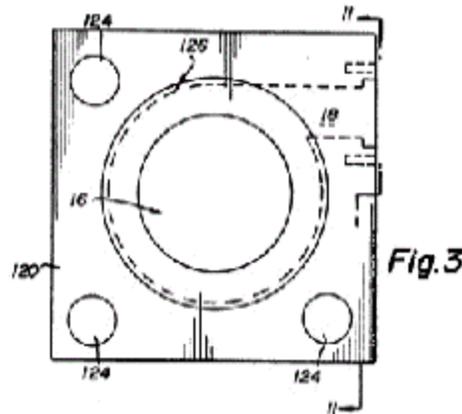


Fig. 3

The outer wall of the pump chamber is depicted in Figure 3 by the circumferential dotted line (the first edge of the stepped surface 126 of the monoblock), with a tangential discharge opening (the pump outlet) shown at 18. The inner boundary of the pump chamber is depicted in Figure 2 by the outer edge of the rotor 20. Cooper explains in the '681 patent that by this non-volute shape he achieves the advantages of a centrifugal pump but with ingestion and expulsion of solid debris without damaging the pump. The Cooper pump thus eliminates the need for baffles or disks to exclude debris, and avoids the frequent shutdowns for servicing and cleaning that characterize prior molten metal pumps.

Before issuance of the Cooper patent, employees of Metallurgs saw the new Cooper pump at a customer's plant, learned of its advantages, and photographed, measured, and sketched it. Metallurgs documents at trial showed their recognition of the improvement effected by the Cooper pump; an internal memo described it as "a very serious threat to our business." There was evidence that Metallurgs made various engineering efforts at adaptation, attempts at alternative designs, and proposed improvements on the Cooper pump. Metallurgs soon produced similar pumps, which they advertised as a "re-invention of molten metal pumps" with an "impeller [that] cannot clog or fill with rocks" and therefore "[u]nder normal conditions, daily cleaning is not required." A Metallurgs pump was illustrated at trial as follows:



MMEI charged Metallurgics with infringement of the Cooper patent, literal or in terms of the doctrine of equivalents. Trial was to a jury.

### *Claim Construction*

The district court construed the claims, and instructed the jury accordingly. We review the claim construction as a matter of law, including any fact-based questions relating to claim construction. Cybor Corp. v. FAS Technologies, Inc., 138 F.3d 1448, 1456, 46 USPQ2d 1169, 1174 (Fed. Cir. 1998). See Markman v. Westview Instruments, Inc., 517 U.S. 370, 116 S. Ct. 1384, 38 USPQ2d 1461 (1996). Jury instructions are reviewed for correctness in their statement of the law, with due attention to their clarity, objectivity, and adequacy. United States Surgical Corp. v. Ethicon, Inc., 103 F.3d 1554, 1564, 41 USPQ2d 1225, 1232 (Fed. Cir. 1997).

Claim 1 of the Cooper patent is representative:

1. A submersible molten metal pump comprising:
  - a pump casing having a cylindrical non-volute pump chamber defined therein, at least one inlet opening, and a tangential discharge opening;
  - a rotor in said chamber sized to fit through said at least one inlet opening;
  - a rotor shaft attached to said rotor and extending upwardly therefrom;
  - at least one support post attached to said casing and extending upwardly therefrom in parallel with said rotor shaft; and
  - superstructure positioned above said casing and including a mounting plate, means on said plate engaging said at least one support post, a motor mount attached to said plate,
  - a motor on said motor mount, and coupling means for operatively connecting said motor to said rotor shaft.

The issues of infringement turned on the meaning and application of the claim element "cylindrical non-volute pump chamber." This element is defined in the Cooper patent in terms of the known spiral pump with increasing cross-section:

The pump chamber in the [prior art] casing generally defines a volute which is defined for the purpose of this application and as known in the art as a spiral casing for a centrifugal pump with an increasing cross sectional area viewed circumferentially as the outlet of the pump is approached.

Col. 2, lines 21-26. The district court instructed the jury, with respect to the definition of non-volute, as follows:

[A] non-volute pump chamber is a pump chamber that is not a volute pump chamber.

A volute pump chamber is . . . [a] three dimensional region wherein fluid is subjected to the force of an impeller, with a spiral casing, such that, when viewed circumferentially, the cross-sectional area of the chamber generally increases as the outlet of the pump chamber is approached.

"Viewed circumferentially," means viewed along the path that the liquid in the chamber follows; i.e., rotating around the chamber, in the direction of the outlet.

The "cross-sectional area," refers to the area defined that is between the pump chamber wall and the outer edge of the impeller.

"Generally increases," does not mean that the increase must be constant; however, the "widest" point must occur at the outlet of the pump, or as the outlet of the pump is approached, and the narrowest point occurs at the cutwater (or the other edge of the outlet).

Jury Instructions 28.

The definition of "volute" in the jury instruction is in accordance with the specification, which described its "non-volute" pump in comparison with the volute pumps of the prior art. The instruction has not been shown to be in error, and is confirmed.

### ***Literal Infringement***

MMEI argued at trial that "non-volute" as used in the Cooper patent can include trivial departure from a perfectly circular form, and that the Metaullics pump chambers are non-volute. Metaullics' position was that its pumps are not non-volute because they increase, albeit only slightly, in cross-sectional area as the outlet is approached, and that non-volute requires no increase whatsoever in cross-section. MMEI's response was that the Metaullics pumps are not like the spiral volute pumps of the prior art, but that they are like the Cooper cylindrical non-volute pumps, and that if they differ at all from a perfect cylindrical non-volute shape it is by only an "insignificant sliver." The district court charged the jury to decide whether the accused Metaullics pumps were within the literal scope of claim 1:

Do you find that MMEI has proved by a preponderance of the evidence that the accused Metaullics' L-series pumps listed in Appendix A literally possess the disputed "cylindrical non-volute pump chamber," "means . . . engaging," and "coupling means" and therefore infringe claim 1 of the Cooper '681 patent literally?

The jury answered this question "no." After Festo I, the district court vacated the entire jury verdict, and subsequently held on summary judgment that there was no literal infringement. We have reinstated the jury verdict, taking note both that the question of literal infringement is unaffected by the decisions in Festo I or Festo II, and that the matter has been consistently decided by judge and jury.

Although MMEI argues that the judgment is incorrect, the evidence was undisputed that the Metaullics pumps were not of perfectly uniform cross-section, but did slightly increase in cross-section as the outlet was approached. The judgment that there is not literal infringement is affirmed.

### ***The Doctrine of Equivalents***

The jury instructions with respect to the law of equivalency were as follows:

. . . Even if a given claim element is not literally present in an accused device, that device can nevertheless infringe if each element that is not literally present in the accused device has an equivalent element that is present. A claim element is present by equivalence if the difference between it and the accused corresponding component is insubstantial. One

way to determine equivalence is to determine whether the accused device performs substantially the same function, to achieve substantially the same result, in substantially the same way as the limitation or element disclosed in the claim in question. . . . [E]ach element of the allegedly infringed claim must be represented . . .

. . . In determining infringement under the doctrine of equivalents, the relevant functions for a given element are those identified in the Cooper >681 patent for that element. . . .

Application of the doctrine of equivalents always depends upon the character of the invention involved. In the event an invention achieves a major or extraordinary advance over the prior art, and as such may properly be characterized as a pioneering invention, the claims are entitled to a broad or liberal range of equivalents. On the other hand, if the advances over the prior art are narrow or minor, the range of equivalents is correspondingly more restricted and the claims are entitled to only a narrow range of equivalents.

Jury Instructions 21-22. Other than as affected by the Festo decisions, no error was ascribed to these instructions.

MMEI's argument as to equivalency was that Metaullics inserted a "sliver" of graphite inside the pump chamber to slightly modify the cross-section of the chamber, but that the modification was an insubstantial change, not sufficient to produce, or even to approach, the standard volute shape of enlarging cross-section. MMEI's witnesses testified that the graphite sliver did not detract from the new and highly advantageous properties of the Cooper invention, and that the new design of the Metaullics pumps was an insignificant departure from the major change represented by the new Cooper pump. Thus MMEI argued that the Metaullics design, if not literal infringement, was infringement under the doctrine of equivalents. The jury found that some models of Metaullics pumps infringed claims 1, 2, 3, 6, 8, 9, 15, and 16 under the doctrine of equivalents.

After the jury verdict but before the district court acted on Metaullics' post-trial motions, the Federal Circuit issued its decision in Festo I. The district court then ruled that Festo I and its absolute bar eliminated all access to equivalency, because the Cooper claims had been narrowed during

prosecution; the district court determined that the narrowing amendment to claim 19 created prosecution history estoppel to all equivalency of the claim term "non-volute." The court granted judgment of non-infringement under the doctrine of equivalents, and did not reach the post-trial motions concerning the jury verdict.

MMEI filed this appeal, but before its argument the Supreme Court vacated the Festo I decision, rejecting its absolute bar. Festo II, 722 U.S. at \_\_\_, 122 S. Ct. at 1840-41. On this appeal MMEI now proposes that we simply reinstate the jury verdict of infringement under the doctrine of equivalents. Metaullics proposes that prosecution history estoppel under Festo II can still bar equivalency. With respect to Festo II, the '681 patent experienced an unusually simple prosecution. None of the claims found to be infringed under the doctrine of equivalents, claims 1-3, 6, 8, 9, 15, and 16, had been amended. Claims 1-3, 6, 8, and 9 were granted as filed, without rejection and without amendment or argument. Thus these claims are clearly unaffected by any holding of Festo II with respect to prosecution history estoppel.

Claims 15 and 16 were rejected on the ground of obviousness based on prior art, and MMEI argued that claims 15 and 16 were distinguished from the cited reference in that they "recite a cylindrical, non-volute chamber . . . an important element of the claimed invention, which results in . . . significant advantages [over the prior art]." No amendment was made to claims 15 or 16, which were allowed on this argument.

Metaullics' argument on this appeal is that claim 19 (not in suit) did not contain the non-volute limitation when filed, and upon rejection based on prior art the term "non-volute" was added by amendment. Metaullics argues that this amendment to claim 19 bars assertion of equivalency as to the term "non-volute." That is incorrect. The amendment whereby "non-volute" was added to claim 19 does not bar access to equivalency of unamended claims "unless the applicant took a position before the PTO that would lead a competitor to believe that the applicant had disavowed coverage of the relevant subject matter." Schwing GmbH v. Putzmeister, Inc., 305 F.3d 1318, 1324, 64 USPQ2d 1641, 1645 (Fed. Cir. 2002). Cooper did not disavow subject matter that could include the potential equivalent of

"non-volute" represented by the accused pumps, and in all events the unrejected claims are unaffected. We conclude that estoppel with respect to the jury verdict of equivalency did not arise upon the prosecution history of the Cooper patent. The doctrine of equivalents was available to MMEI, on the jury instructions that were given. We vacate the district court's judgment of no equivalency based on Festo I, and reinstate the jury verdict, for Festo II presents no estoppel to the jury verdict.

Turning to the merits of the jury verdict, the district court did not review the merits of the verdict or other issues that had initially been raised by post-trial motion.

The procedure in the district court was further complicated by the filing and then withdrawal of a premature notice of appeal, and the grant and then withdrawal of a new trial, all before the district court entered final judgment. The parties had filed several post-trial motions after the initial judgment entered on the jury verdict; these motions became moot when the district court withdrew the jury verdict in view of Festo I and granted a new trial. The court three months later withdrew the grant of a new trial and issued the final judgment here on appeal. Since the jury verdict had been withdrawn, since the district court's decision was now in the form of summary judgment, and since the result as to infringement had changed, the originally presented post-trial motions were mooted by these events. On remand the district court may entertain the revived post-trial motions, in the interest of just procedure and in recognition of the somewhat unusual progress of these proceedings.

We remand to the district court for review of the reinstated verdict of infringement under the doctrine of equivalents, and the previously filed post-trial motions as appropriate to the present posture of the case. See Railroad Dynamics, Inc. v. A. Stucki Co., 727 F.2d 1506, 1513, 220 USPQ 929, 936 (Fed. Cir. 1984) (When presented with a motion for JNOV, the trial judge "(1) determine[s] what facts are supported by substantial evidence; and (2) determine[s] whether those facts support the legal conclusion necessarily drawn by the jury enroute to its verdict." Furthermore, "the judge who was present at trial is best positioned, when presented a motion for JNOV, to review in detail the evidence and events at trial.").

Each party shall bear its costs.



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Defendants-Appellees.

CLEVENGER, Circuit Judge, dissenting.

There is no question that the claims in suit are not literally infringed: I agree with the majority on that point. At issue is whether the jury verdict of infringement under the doctrine of equivalents is correct.

Metaullics challenged the jury verdict in its renewed motion for judgment as a matter of law, asserting that the patentee had surrendered, during prosecution, any claim to "volute" structure. The prosecution history clearly shows such a surrender, and therefore the district court should have granted

Metaullics's post-verdict motion.

The majority correctly notes that a patentee may limit the range of otherwise applicable equivalents as a result of assertions made during prosecution of the patent. Metaullics argues that the patentee surrendered any "volute" structure by comments made in the process of amending claim 19. Although claim 19 is not in suit, the majority recognizes that if there is a surrender of "volute" structure in connection with claim 19, the same surrender follows on any attempt by patentee to assert "volute" structure as equivalent to "non-volute" structure found in any of the claims in suit. So the bottom-line question is whether the record discloses a clear and unmistakable surrender of "volute" structure during the prosecution of claim 19.

The majority answers this question with a single phrase: "Cooper did not disavow subject matter that could include the potential equivalent of 'non-volute' represented by the accused pumps[]."

The majority ignores the portions of the file history pertinent to the surrender inquiry. First, claim 19 was rejected as being anticipated by the Thut patent (U.S. Patent 4,786,230). By amending claim 19 to narrow "pump chamber" to "non-volute pump chamber" through the addition of the word "non-volute," the patentee asserted that "[c]laim 19, as amended recites subject matter which is neither disclosed nor suggested in Thut."

Further, the patentee, referring to a discussion with the examiner during an interview, stated that:

[A]n important element of the claimed invention, which is not disclosed or suggested in the prior art, is the fact that the pump chamber is non-volute. Thut discloses, and in fact requires, a volute portion in the pump housing . . . . [T]he examiner agreed that Thut did not seem to disclose or suggest a non-volute pump chamber.

What is more, the applicant, in describing its new claim 33 which added at the same time claim 19 was amended, points out that new claim 33 recites a non-volute pump chamber, and states again that "Thut neither discloses nor suggests the use of a non-volute chamber."

The full prosecution history of the amendment of claim 19, which I recite above, reveals a clear and unmistakable assertion by the patentee that his invention does not reach volute pump structure. This is so, because the claim was expressly amended to overcome the anticipation rejection over Thut:

something present in Thut had to be removed from, or changed in, the patentee's application to escape being treated as the same as Thut. The patentee chose to distinguish his invention over Thut by saying that his invention is limited to non-volute pump structure, whereas Thut directs his invention to volute pump structure.

Metaullics is correct: the patentee here has informed the interested public, through its clear and unmistakable assertions in the prosecution history, that it stakes no claim to volute pump structure. In doing so, the patentee surrenders any claim that volute pump structure can infringe the applicant's patent under the doctrine of equivalents. See Bayer AG v. Elan Pharm. Research Corp., 212 F.3d 1241, 1251, 54 USPQ2d 1710, 1719 (Fed. Cir.), cert. denied, 531 U.S. 993 (2000).

The majority remands the case for consideration of Metaullics's post-verdict motion, the primary ground of which was that the jury verdict of equivalents infringement could not stand because of the prosecution history which is recounted above. The majority removes that ground from Metaullics, with no discussion or analysis of the prosecution history. As a matter of judicial process and incorrectness, I respectfully dissent.

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[1] Molten Metal Equipment Innovations, Inc. v. Metaullics Systems Co., No. 1:97CV2244 (N.D. Ohio April 19, 2001).