

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

PRECISION PLANTING LLC,
Petitioner,

v.

MASCHIO GASPARDO S.p.A.,
Patent Owner

U.S. Patent No. 8,770,121
IPR Case No.: IPR2024-00008

SUR-REPLY DECLARATION OF HARRY DANKOWICZ, PH.D.

I, Harry Dankowicz, declare as follows:

I. INTRODUCTION

1. I hereby incorporate by reference my opening Declaration submitted as Exhibit 2012 in this proceeding.

2. I have prepared this Sur-Reply Declaration as an expert witness retained by Patent Owner MASCHIO GASPARDO S.p.A. (“Maschio”). In this Sur-Reply Declaration, I provide my opinions as responsive to the Petitioner’s Reply and Mark Fleming’s Reply Declaration. I provide factual and technical bases for these opinions as appropriate.

3. This declaration contains statements of my opinions formed to date and the bases and reasons for those opinions. I may offer additional opinions based on further review of the materials in this proceeding, including opinions and/or testimony of other expert witnesses.

4. I am being compensated for the time I spend on this matter, in addition to expenses. My compensation is not dependent upon the substance of the opinions I offer herein, the outcome of this proceeding, or any issues involved in or related to the ‘121 patent. I have no financial interest in, or affiliation with, any of the real parties in interest or the patent owner.

II. MATERIALS CONSIDERED

5. In addition to the materials considered for my opening Declaration, I also considered the papers and exhibits filed after my opening Declaration in this proceeding including Petitioner's Reply and its accompanying exhibits.

6. I have also drawn on my experience and knowledge, as described more fully in my deposition (Ex. 1023) and CV (Ex. 2012), in the areas of agricultural equipment generally and seed drills specifically.

III. LEGAL PRINCIPLES

7. I hereby incorporate by reference the legal principles set forth in my opening Declaration.

IV. Precision Offers Several Inconsistent Constructions of the TBE Limitation; Maschio Has Not Misconstrued that Limitation.

8. The structure conveyed by the claimed "TBE" includes a shaft 27, bearings 28, and a seat 29 located and supported rotatably in the movable portion 12 of the housing. Such structures are the only structures among those described in the specification of the '121 patent that are necessary or required to achieve the claimed function of "withstanding at least some of the axial load produced by the disc on the seal." More specifically, the shaft located in the movable portion bears the axial load and transmits that load through the bearings located in the movable portion to the seat on the movable portion so that the shaft, bearings, and seat together withstand at least some of the axial load produced by the disc on the seal while the shaft is

supported rotatably by the bearings and seat thereby enabling unrestricted rotation of the shaft with the disc.

9. For the shaft 27 to bear the axial load, the shaft must engage with the sowing disc, for example by having a geometry that includes surface areas in contact with the sowing disc. The shaft 27 may engage with the sowing disc simply by having a geometric shape that extends outside of the diameter of the separate drive shaft which drives the sowing disc. This can be accomplished by giving the shaft 27 a hollow geometry with an inner diameter larger than that of the drive shaft, or by giving the shaft 27 a geometry that includes flanging such as the flanging 30. Thus, the “flanging” disclosed in the ‘121 patent is not required additional structure; it is a description of a geometry of the shaft in an example embodiment: “The shaft 27 has flanging 30” ‘121 patent, 3:27. The flanging 30 is not a structure separate from the shaft 27. Regardless, the flanging 30 is not necessary for the shaft 27 to bear the axial load or for the claimed TBE to achieve the claimed function. Indeed, in the embodiment shown in Fig. 2 of the ‘121 patent, the flanging 30 is only required to enable the load path from the sowing disc to the housing to bypass the optional drive element 32.

10. Similarly, a POSA would not understand that the ring 31a or the seat 34 are structures separate from the thrust-bearing plate 31, nor that the appendages 33

or the polygonal profile 35 are structures separate from the drive element 32. Elements 31a, 33, 34, and 35 are all geometric features of a structural component.

11. Dependent claim 3 recites the optional thrust-bearing plate 31 but does not specify the geometry of this plate, i.e., whether it has a ring 31a (stated in 3:33-35) or the seat 34 (stated in 3:47).

12. Dependent claim 4 recites the optional drive element 32 but does not specify the geometry of this element, i.e., whether it has appendages 33 that fit into the seats 34 of the plate or a polygonal profile 35 that matches the polygonal profile 21 of the drive shaft, which in turn has chamfers 20 that facilitate centering and engagement (3:42-52) in order to also achieve dependent claim 5.

13. It is noteworthy that the specification teaches the drive element 32 “is coupled with limited radial and/or circumferential clearance to the [thrust-bearing] element 26,” 3:43-45, which suggests that 32 should not be understood as part of 26, even though both are shown in the example embodiment in Fig. 2.

14. Fig. 2 illustrates eight features (27, 30, 31, 31a, 32, 33, 34, and 35) as structures or geometries -- all but the shaft 27 optional -- of a specific example embodiment of the TBE. They are features of a possible embodiment of the claimed TBE that also includes optional structure; distinguish the claimed TBE from this embodiment of the TBE.

15. Geometric features are possible design embodiments to achieve additional claimed functions. They are not additional structures necessary or required to achieve the claimed function of the TBE.

16. A POSA would not construe the flanging 30 as “structure” but rather as a “geometry” of the shaft 27. Regardless, the flanging 30 is unnecessary to achieve the claimed function. Its function in the disclosed embodiment is to allow the attachment of the optional thrust-bearing plate 31 while still giving clearance for the optional drive element 32 which must be able to self-center without experiencing any axial load.

17. At 3:27-29, the specification makes clear (“The shaft 27 has flanging 30 by means of which it is fixed to a thrust-bearing plate 31 which can bear on that surface of the disc . . .”) that the purpose of the flanging geometry is to attach the optional thrust-bearing plate 31 to the shaft 27. The thrust-bearing plate 31 bears on the surface per dependent claim 3, but independent claim 1 already states that the claimed TBE withstands at least some of the axial load even without the presence of the optional thrust-bearing plate 31. To do so does not require the optional thrust-bearing plate 31 (or the flanging 30 for its optional attachment).

18. Instead, it would suffice for the shaft alone to press against the sowing disc. For example, the inner diameter of a hollow realization of the shaft 27 could be greater than that of the drive shaft. The precise geometry of the shaft 27 relative

to the drive shaft or disc is not described in the specification or figures. Were shaft 27 hollow and sufficiently wide, its distal end would press against the sowing disc.

19. For the given embodiment, it may be that the inventor proposes a geometry in which the diameter of the shaft 27 is equal to that of the drive shaft 20, in which case additional geometry might be necessary to create surface contact with the sowing disc 16. The optional thrust-bearing plate 31 certainly widens the surface contact to encompass a larger radial region. But the optional thrust-bearing plate 31 does one more thing, which has nothing to do with thrust bearing and is another function of the '121 invention. It provides a geometry (the seats 34) in which the appendages 33 of the drive element 32 can slide so as to enable the self-centering function of dependent claim 5.

20. There is absolutely no support for Precision's assertion that the ring 31a is necessary to the claimed function. Certainly contact between the shaft 27 (and, more specifically, the thrust-bearing plate 31 in one embodiment) and the disc 16 will be made somewhere but the text at 3:33-35 cited by Precision to support its assertion ("The bearing between the thrust-bearing plate 31 and the disc 16 takes place in the region of a ring 31a in relief on the surface of the plate which faces the disc 16.") is simply referring to a particular embodiment that includes the self-centering drive element 32 (dependent claims 4 and 5) for which "bearing" (i.e., contact) takes place on the thrust-bearing plate 31 in the region of the ring 31a. The

use of the thrust-bearing plate 31 is optional, in general, and a more precise feature for bearing on the sowing disc surface in particular. Moreover, in the proposed embodiment, the plate provides the way in which loads are carried in order to allow for the self-centering drive element, which must not be loaded axially in order to be able meet the requirements of dependent claim 5. This is important to understanding Fig. 2 and the specification.

21. The drive element 32 serves no purpose whatsoever in achieving the claimed thrust-bearing function. The drive element 32 achieves a separate function, namely, to ensure the outcome of dependent claim 4 (which could be achieved by other means as well) in an embodiment of the invention. A paragraph of the specification (3:36-47) makes this clear: “The thrust-bearing element 26 is driven in rotation with the sowing disc 16 when the fixed and movable portions 11, 12 are closed against one another by means of a drive element 32 which comprises a coupling device constrained for rotation with the thrust-bearing plate but with radial and/or circumferential clearance in such a way as to be self-centred [sic, centered] in the rotational coupling with the drive shaft of the disc 16. For this purpose, in the present form of embodiment, the drive element 32 is coupled with limited radial and/or circumferential clearance to the element 26 by means of one (or more) appendage(s) 33 protruding radially towards the outside and fitted into corresponding seats 34 of the plate.” (Emphasis added.)

22. It is clear from the claimed invention that there is a load path from the sowing disc to the movable portion of the housing. At least some of the load that is produced by the disc on the seal (in the absence of the claimed TBE) is transmitted first to the shaft then, via the bearings, to the seat on the movable portion of the housing. This chain of bodies in contact (all of which experience various forms of deformation in order to achieve the required reaction forces) is the totality of the load path. All components of this load path are structural elements required for the function (and in order to enable unrestricted rotation). Here, the seat is understood as an interface between the bearings and the movable portion of the housing. It is the hollowed cylindrical area in the movable portion of the housing in which the bearings are located and relative to which the bearing elements roll when the shaft rotates. The seat is a structure of the movable portion of the housing. The claimed TBE includes not only the shaft and bearings, but also the structure of the movable portion of the housing (the seat) in which the bearings are located and relative to which the bearing elements roll. Without such a receiving interface, the bearings cannot achieve their function of bearing axial load while allowing rotation. This is a basic understanding of what a “thrust bearing” is: two axially loaded components with bearings in between allowing relative rotation. Here, the two components are the shaft and the seat in the movable portion of the housing.

23. The shaft is a body that makes contact with the sowing disc on one end and the bearings on the other. The interaction with the disc should be understood as an axial load. The interaction with the bearings should be understood as an opposing axial load. Because the shaft does not move axially, these loads must be equal. In the absence of the bearings, the shaft will not be able to resist axial movement and therefore will not be able to resist movement of the disc, which will instead press against the seal.

24. It is accurate to understand the claimed TBE as defining a load path, where loads are transmitted between structural components. The entire load path is required in order to achieve the desired function. The load path redirects some of the load experienced by the sowing disc from the pressure differential into the movable portion of the housing (via the shaft and bearings, located in the seat) rather than onto the seal.

25. Precision mistakes an embodiment for the claimed invention. The embodiment requires a thrust-bearing plate 31 in order to support a drive element 32 which achieves the self-centering function that permits alignment when the movable portion of the housing is brought into the closed position against the fixed portion. Features 30, 31, and 31a are optional because they introduce a separate load path that allows the optional drive element 32 to not be loaded axially and further to be able to self-center. Because 32 is not required, neither are 30, 31, or 31a. Feature 32

is only required by dependent claims 4 and 5, not by claim 1. Omission of 31 does not mean that nothing is in contact with the sowing disc because independent claim 1 already states that the claimed TBE which includes a shaft (of some unspecified geometry) withstands at least some of the axial load. A POSA would understand that the shaft geometry must be such that contact exists, but would not assume that it would require a thrust-bearing plate. For example, the shaft could be hollow with an inner diameter larger than that of the drive shaft.

26. On page 6 of its Reply, Precision states: “Even if the TBE were not a name for structure by itself, the remaining claim language in combination identifies that the thrust-bearing element is located in the movable portion, is supported rotatably, and withstands at least some of the axial load produced by the disc on the seal.” A POSA would agree that the claimed TBE must be located in the movable portion and supported rotatably. In addition, the claimed requirement that the “thrust-bearing element is supported rotatably in the movable portion” must mean two things. First, “supported in the movable portion” and second, “rotatably.” The former requires a load path from the disc to the movable portion when the housing is closed, the latter implies that the load path allows unrestricted rotation of individual parts of the TBE relative to others.

27. The specification of the ‘121 patent defines specific structure for the claimed TBE, i.e., the claimed structure is not open-ended. Once a POSA decided to

locate the TBE in the movable portion and wanted the TBE to be supported rotatably, however, a POSA could imagine a number of suitable structures other than that disclosed in the '121 patent. For example, a slewing bearing (<https://www.skf.com/us/products/slewing-bearings>) could accomplish the function while being supported rotatably in the movable portion. The corresponding structure consists of two rings that can rotate relative to one another with rolling elements transferring axial loads. One of the two rings could be positioned to bear against the sowing disc, while the other would be fixed relative to the movable portion (by being attached to it and therefore not able to move axially). Although the specification of the '121 patent identifies a shaft, i.e., a structural element with a length significantly greater than its width, the rings in a slewing bearing have widths significantly greater than their length.

28. Another possibility is a structure consisting of an axial needle roller thrust bearing (<https://www.grainger.com/product/4ZZN7>). This consists of a ring-shaped cage that could be positioned to bear against the sowing disc, while the exposed bearings could roll directly against the housing, thereby withstanding axial load. Such a structure would not include a shaft.

29. Without reading the specification and the figures of the '121 patent, therefore, a POSA is unable to determine which of the many possible structures comprise the claimed TBE. A POSA could not exclude a suitably dimensioned

slewing bearing, which would not need a shaft. A POSA could not exclude an axial needle roller thrust bearing, which would not need a shaft. Of course, both alternatives might require additional design solutions in order to be included in a kit for easy retrofitting.

30. On page 4 of its Reply, Precision argues that the claim language requiring the TBE to be “of the sowing disc” imparts structure, suggesting that the TBE is part of the sowing disc. I disagree. The claim language denotes that the TBE bears thrust exerted by the sowing disc. Indeed, in the last paragraph on page 5 of its Reply, Precision clarifies that “a POSA would understand [the claimed TBE] to be a thrust bearing for a spinning disc that is exerting thrust in a known direction” rather than of a spinning disc.

V. Venhuizen Does Not Anticipate (Ground 1).

31. Even if the claimed TBE were interpreted to mean “an [i.e., any] element that provides support against an axial force” or “an [i.e., any] element that supports against axial load,” VenHuizen fails to anticipate the subject matter recited in claims 1 and 10 of the ‘121 patent. The claims require that the entire TBE be located and “supported” in the movable portion and that certain structures of the TBE be “rotatabl[e]” relative to other structures (allowing unrestricted, 360° rotation of structures of the TBE along with the disc) in the movable portion in order to

withstand at least some of the axial load produced by the disc on the seal -- limitations VenHuizen does not meet.

32. VenHuizen discloses a drive shaft 55, a retaining hub 56, and bearings X retained by a housing rear wall 54. All of those structures are located in and on the fixed first housing member 50. A handle 58 is located within the physical confines of the movable second housing member 90 when the two housing members are closed against one another.

33. The handle alone cannot perform the function of constraining the movement of the sowing disc when vacuum is applied to absorb some of the forces that would otherwise be applied to the seal. The shaft, bearings, and hub, located on one side of the disc, and the handle located on the opposite side of the disk combine to lock or pin the disc between them (i.e., to constrain movement of the disc to that of the drive shaft). VenHuizen's hub handle, hub, and locking pin have the function of ensuring that the sowing disc rotates with the drive shaft. As taught by VenHuizen, "a handle 58 . . . for removable retaining a seed disk 60 on the hub 56" (column 5, lines 64-67); "A removable spring locking pin, not shown, locks the tubular retaining hub 56 to the inner drive shaft 55" (column 6, lines 5-7); and "Adjusting the retaining hub 56 causes the axial adjustment of the seed disk 60, after which the parts are locked into their desired orientation by locking pin 59" (column 6, lines 16-18).

34. Although I agree that the elements marked by an “X” in Fig. 6 of VenHuizen depict bearings, a POSA could reasonably understand those bearings to be radial rather than thrust bearings. VenHuizen does not describe these bearings in the ‘807 patent. Radial bearings allow rotation while withstanding radial loads. In contrast, thrust bearings allow rotation while withstanding axial loads.

35. Precision recognizes another distinction between the “ways” in which the claimed and VenHuizen structures achieve their functions: a “true distinction between the structures required by Maschio and those disclosed by VenHuizen is that the shaft that transfers the axial forces to relieve wear on the seal is in *tension* in VenHuizen and in *compression* in the ’121 patent.” Reply, 23 (emphasis in original). I agree that this is another important distinction.

36. The amount of seal wear depends on the abrasion experienced where contact is established. Neither the ‘121 patent nor VenHuizen specify how much load is borne by the claimed TBE or the handle (which VenHuizen only describes as holding the disk against the retaining hub). The VenHuizen hub handle depicted in Fig. 6 has a radius that is about half of the distance to the apertures. It is also shaped like a bar, not a disc, so only resists deformations of the disc along this bar-like shape with half the radius of the aperture path. The claimed TBE is not described in terms of dimensions. The embodiment illustrated in Fig. 2, which includes the optional thrust-bearing plate, depicts a greater radius of contact, which will reduce further the

deformations of the disc where the seal is located. At issue is the introduction of an alternative load path that bypasses the seal. The further out from the center of the disc that such an alternative path is introduced, the more it will be able to alleviate pressure on the seal.

37. The claims of the '121 patent literally recite that the TBE "is supported rotatably in the movable portion." As properly construed, the claims require the entire TBE (i.e., each, and not only one, of its structural components) to be supported in the movable portion. The structure of VenHuizen does not meet this requirement.

VI. Amazone, AAPA, and Fiorido Do NOT Render the Challenged Claims Obvious (Ground 4).

38. A POSA would have no motivation to combine all or any part of Fiorido's drive mechanism (the shaft 29 and its related components including the hub 27, the bearings 28, the cog-wheel 30, the driving disk 31, the centering dowel 32, and the driving pin 33 -- all of which combine to rotatably drive the disk 13) with the Amazone reference which has its own gear mechanism for driving the disk. The '121 claimed invention solves the problems of streamlined replacement of the seal and/or sowing disk that inventor Enrico Bragatto first identified to exist when a thrust-bearing element is positioned on the fixed housing. Neither Amazone nor Fiorido recognized the source of those problems and neither identifies a thrust-bearing element; therefore, a POSA would have no motivation to combine the two references (i.e., there can be no motivation to solve unknown problems). If the

modification were made (i.e., the Amazone reference were modified to include Fiorido's drive mechanism), then Amazone would simply have the drive of Fiorido rather than its own drive -- and not two, separate drives and certainly not the claimed drive and a separate TBE. Similarly, if Amazone were modified to include a TBE known in the prior art, the TBE would be introduced on the fixed side, not the movable side.

39. The hub of Amazone does not contact the sowing disk. Nor does the driving disk 31 of Fiorido necessarily contact the sowing disk. "If" the driving disk were to contact the sowing disk on the appropriate side, it would absorb some of the axial load. But Fiorido does not teach axial contact and "if" such contact existed the POSA would know of Fiorido's capability to act as a drive structure, not a TBE as claimed.

40. The modification proposed by Precision of the Amazone hub with the disclosure of Fiorido would not be operable as intended in Amazone. Precision suggests placing 29, 31, 32, and 33 of Fiorido's drive mechanism into the Amazone device. Even if the projection that extends from the center of Amazone's hub were removed, and even if 32 fit the hole at the center of the Amazone disk, driving pin 33 would bear against the sowing disk; driving disk 31 would not contact and, therefore, could not directly absorb load on the disk.

41. Inserting Fiorido’s drive structure on the fixed side would not make it act like the claimed TBE. It would need to be on the movable side (where the vacuum is applied), in which case it would mean having a drive shaft on the movable portion, which would render this portion no longer movable. Precision argues that the driving mechanism of Fiorido proposed to modify Amazone “is nearly identical to, and at least equivalent to the disclosed structure from the ‘121 patent.” Reply, 29. I disagree, as reflected in the following chart:

Fiorido Element [Function]	‘121 Element [Function]
Shaft 29 [drives sowing disk 13]	Shaft 27 [drives nothing; helps withstand axial load produced by disc on seal]
Driving disk 31 [supports 32, 33 to “connect” shaft and disk through 32, 33]	Flanging 30 [does not connect shaft and disk; attaches shaft to plate 31]
Centering dowel 32 [engages center hole in disk to center disk on shaft]	Drive element 32 [no centering function; couples to and rotates plate]
Drive pin 33 [engages offset hole in disk to apply torque and drive disk in rotation]	Plate 31 [does not drive disc; part of shaft that “can” bear on disc]

42. Fiorido does not suggest to a POSA that its structure of shaft 29, driving disk 31, centering dowel 32, and driving pin 33 performs the function of constraining the axial movement of the sowing disk when vacuum is applied to absorb some of the forces that would otherwise be applied to the seal. The driving disk and sowing disk are not necessarily rigidly attached nor does the face of one necessarily touch or contact the face of the other so that the driving disk and sowing disk do not

necessarily transfer any axial load whatsoever. Remember, too, that the hub of Amazone is recessed slightly to avoid any contact between the surface of the hub and the surface of the sowing disk (i.e., there is a gap between the hub and the sowing disk when those components are assembled). Therefore, neither the Fiorido nor Amazone structures, individually or combined, achieve the claimed function.

43. Precision misidentifies the “way” in which the structure of Amazone as modified by Fiorido would achieve its function as “a rotatable rigid structure (Fiorido disk 31 in combination with shaft 29) located in the movable portion of the housing . . . and taking up some of the load by transferring that load to a fixture.” Reply, 29. As taught by Fiorido, the shaft is “rotatable” when combined with the hub 27, bearings 28, and cog-wheel 30, all of which should be included as part of the way in which the function would be achieved. Moreover, at least the cog-wheel should be understood as located on a fixed housing to engage another toothed mechanism and transmit motion. Further, because the hub of Amazone is fixed in the stationary cover, the hub is neither “rotatable” nor “supported rotatably in the movable portion.” Neither the Fiorido nor Amazone structures, individually or combined, function in a way substantially similar to the claimed function.

44. The modification proposed by Precision of the Amazone hub with the disclosure of Fiorido would not necessarily achieve substantially the same “result” (elongating the life of the seal) as the claimed TBE. Neither Fiorido nor Amazone

discloses anything about that result. Regardless, Precision does not even argue that the modified structure would achieve at least one of the results (easy retrofitting via streamlined operations) conferred by the claimed invention.

45. Precision's reply to Maschio's evidence of long-felt need is based on a misunderstanding of Maschio's position. Precision states, "Maschio argues there was a long-felt need for the invention because in prior art meters" two characteristics (numbered (1) and (2) and directed to complex replacement) existed. Reply, 32. But (1) and (2) are not long-known characteristics of the prior art; rather, they are two of the problems first recognized and solved by the '121 patent (and neither recognized nor solved by the prior art). Maschio identified the long-felt need as the need for an improvement that addresses the "problem with abrasion of the seal by the sowing disc and consequent seal wear in seed drills, which reduces the effective service life of the seal and requires periodic replacement of the seal." Thus, the improvement long needed in the art includes reducing seal wear -- while streamlining replacement when required. That need was long unmet, despite the well-known thrust-bearing element located on the fixed portion of the housing, because the well-known solution was imperfect, creating the problems with complex replacement first recognized and solved by the '121 patent. Despite the industry's long-felt need for improvement and the existence of the references cited by Precision, the industry was unable, until the claimed invention, to pinpoint the source of the subset of problems and to improve

the art. A nexus clearly exists between the claimed invention and the long-felt need to reduce seal wear while streamlining replacement.

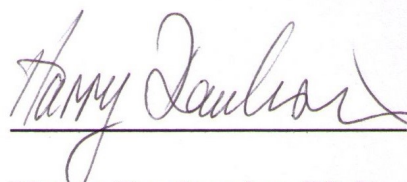
VII. CONCLUSION

46. This Declaration represents the opinions that I have formed up to date based on the material currently available to me. I reserve the right to revise, supplement, and/or amend my opinions stated in this Declaration based on new information that becomes available to me and on my continuing analysis of the materials available to me.

47. I declare that all statements made herein of my knowledge are true, and that all statements made on information and belief are believed to be true, and that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine, imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

DATED:

11/20/2024

A handwritten signature in cursive script, appearing to read "Harry Dankowicz", written over a horizontal line.

Harry Dankowicz, Ph.D.