

Petitioners Solaris Oilfield Site Services Operating, LLC &
Solaris Oilfield Site Services Personnel, LLC
Hearing Presentation

IPR2024-01179 (U.S. Patent No. 11,780,689)

Outline of Arguments

- I. Overview of the '689 Patent**
- II. Summary of the Grounds & Disputes**
- III. POSITA Definition and Petitioners' Experts**
- IV. Rationale to Combine Waldner & Dynatek (all grounds)**
- V. Auld: POSITA would combine with Waldner (Ground 3 / 3A; claims 12 & 25)**
- VI. McIver: Discloses articulated lift arm that POSITA would combine with Waldner (Ground 4 / 4A; claim 13)**
- VII. "Conveyor support frame" (Grounds 1 / 1A & 2 / 2A; dep. claim 6 & 7)**
- VIII. Secondary Considerations**

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- VIII. Secondary Considerations

'689 Patent: Earliest Filing Date

US011780689B1

(12) **United States Patent**

Brenden et al.

(10) **Patent No.: US 11,780,689 B1**

(45) **Date of Patent:** *Oct. 10, 2023

(54) **AGGREGATE TRANSFERRING SYSTEM**

(71) Applicants: **Jason Brenden**, Elk Point, SD (US);

Tyler Desmitz, Vermillion, SD (US)

(72) Inventors: **Jason Brenden**, Elk Point, SD (US);

Tyler Desmitz, Vermillion, SD (US)

(73) Assignee: **Masaba, Inc.**, Vermillion, SD (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(d) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: 17/988,854

(22) Filed: Nov. 17, 2022

Related U.S. Application Data

(63) Continuation of application No. 17/550,073, filed on Dec. 14, 2021.

(60) Provisional application No. 63/223,124, filed on Jul. 19, 2021.

(51) **Int. Cl.**

B65G 67/08 (2006.01)

(51) **U.S. Cl.**

CPC ——— **B65G 67/08** (2013.01); **B65G 2201/042** (2013.01)

(58) **Field of Classification Search**

CPC ——— **B65G 2201/042**; **B65G 67/08**

See application file for complete search history.

(56) **References Cited**

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(Continued)

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(57)

ABSTRACT

An aggregate transferring apparatus for elevating aggregate may include a base assembly with a base frame, an inboard structure on the base frame, and a base conveyor on the base frame positioned to receive aggregate from a vehicle positioned on the inboard structure. The apparatus may also include an aggregate elevating assembly with a deployable frame mounted on the base frame and being movable between storage and deploy positions, and an elevating conveyor for receiving aggregate from the base conveyor and conveying the aggregate upwardly on the deployable frame. The apparatus may further include a conveyor extension assembly for conveying aggregate horizontally outward from the elevating assembly. The extension assembly may include an extension conveyor movable between lowered and raised positions and being articulated with an inboard and outboard segments.

25 Claims, 20 Drawing Sheets

Solaris Oilfield, Ex. 1001, p. 1
Solaris Oilfield v. Masaba, IPR2024-011179

(10) Patent No.:	US 11,780,689 B1
(45) Date of Patent:	*Oct. 10, 2023

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All asserted references pre-date
July 19, 2021

'689 Patent: Overview of Independent Claims

All independent claims include:

- **"a base assembly..."**
 - Claims 1-17 and claims 18-25 claim the base assembly differently
- **"an aggregate elevating assembly ..."** with deployable frame + elevating conveyor
- **"a conveyor extension assembly"** with articulated (pivotal) inboard and outboard segment

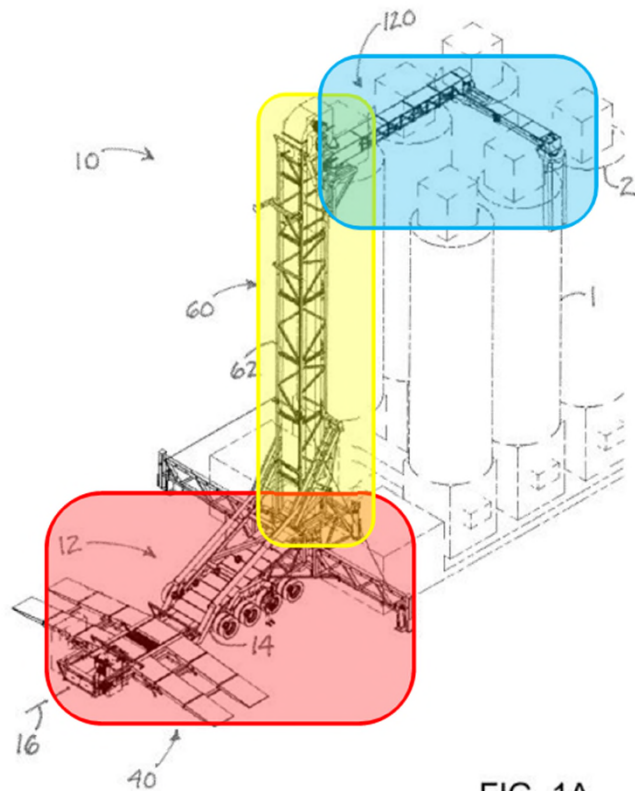


FIG. 1A

Paper 1 (Petition) at 11-13; Ex. 1001 ('689 Patent) at Fig. 1A & 16:14 – 24:65.

'689 Patent: Overview of Independent Claims

Each independent claim adds different features:

- Inboard and outboard segments are "pivotable at the [inboard / outboard] pivot about a substantially vertical axis" (claims 1 & 22)
- Inboard and outboard segments are "pivotable with respect to each other in a substantially horizontal plane" (claim 18)
- Outboard pivot of the extension conveyor is "configured to permit transfer of aggregate from the inboard segment to the outboard segment" (claim 16 & 23)
- Aggregate elevating assembly includes a trailer structure comprising a "landing leg" and "a kingpin ... directed in a same direction" as the landing leg (claims 12 & 25)
- Aggregate elevating assembly includes a frame deployment assembly that comprises "at least one lift arm structure being articulated between opposite first and second ends of the arm structure" (claim 13)

Ex. 1001 ('689 Patent) at 16:14 – 24:65.

'689 Patent: Overview of Dependent Claims

Dependent claims argued separately

- Extension conveyor “being oriented substantially perpendicular to the deployable frame” in the raised position (claim 4)
- Conveyor extension assembly includes a moveable “conveyor support frame supporting the segments of the extension conveyor on the aggregate elevating assembly” and “extension conveyor lift structure acting on the conveyor support frame” (claim 6)

Ex. 1001 ('689 Patent) at 16:14 – 24:65.

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Summary of the Grounds: '689 Patent

Ground	Type	Summary
1	§103	Claims 1-2, 4-11, 16-20, and 22-24 are rendered obvious by <i>Waldner</i> in view of <i>Dynatek</i>
1A	§103	Claims 1-2, 4-11, 16-20, and 22-24 are rendered obvious by <i>Waldner</i> in view of <i>Dynatek</i> and <i>Sleeman</i>
2	§103	Claims 6-7 are rendered obvious by <i>Waldner</i> in view of <i>Dynatek</i> and <i>Pham</i>
2A	§103	Claims 6-7 are rendered obvious by <i>Waldner</i> in view of <i>Dynatek</i> , <i>Sleeman</i> , and <i>Pham</i>
3	§103	Claims 3, 12, 21, and 25 are rendered obvious by <i>Waldner</i> in view of <i>Dynatek</i> and <i>Auld</i>
3A	§103	Claims 3, 12, 21, and 25 are rendered obvious by <i>Waldner</i> in view of <i>Dynatek</i> , <i>Sleeman</i> , and <i>Auld</i>
4	§103	Claims 13-15 are rendered obvious by <i>Waldner</i> in view of <i>Dynatek</i> , and <i>McIver</i>
4A	§103	Claims 13-15 are rendered obvious by <i>Waldner</i> in view of <i>Dynatek</i> , <i>Sleeman</i> , and <i>McIver</i>

* References in red were not of record in prosecution

Paper 1 (Petition) at 5 & 14-23.

Waldner or Sleeman

- Base assembly, aggregate elevating assembly, and 2-segment telescoping chute

Dynatek

- 2-segment articulated belt conveyor system

Auld

- Portable silo with landing leg and kingpin

McIver

- Articulated lift arm structure

Pham

- Extension conveyor with support frame

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* *Waldner* was primary reference in prosecution; issued independent claims were allowable dependent claims.

Paper 1 (Petition) at 5, 13, & 14-23

Patent Owner Does Not Dispute:

- References qualify as prior art
- *Waldner* discloses base + aggregate elevating assemblies*
- *Dynatek* discloses extension conveyor with inboard + outboard pivot

Patent Owner Disputes:

- Rationale to combine *Waldner* + *Dynatek*
- *Auld*: analogous art + rationale to combine
- *McIver*: disclosure + rationale to combine
- Dependent claims 4 and 6
- *Waldner*’s disclosure of “conveyor”

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- V. Auld: POSITA would combine with Waldner (Ground 3 / 3A; claims 12 & 25)
- VI. McIver: Discloses articulated lift arm that POSITA would combine with Waldner (Ground 4 / 4A; claim 13)
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Person of Skill in the Art (POSITA) Definitions

Petitioners		Patent Owner	
Degree in mechanical, electrical , petroleum, or civil engineering		Degree in mechanical, petroleum, or civil engineering	Degree in electrical or other engineering fields
at least 2 years of experience working in an industry or field that involves handling of particulate materials		at least 2 years of experience directly related to engineering equipment for conveying and storing aggregate material	at least 4-6 years of hands-on experience specifically related to engineering aggregate handling equipment

Paper 1 (Petition) at 14; Paper 13 (Resp.) at 25.

'689 Patent: Methods of Using the Apparatus

Ex. 1001 ('689 Patent) at pages 29-30; see also Paper 20 (Reply) at 2.

‘689 Patent: Methods of Using the Apparatus

Another aspect of the disclosure is a method of setting up an apparatus, such as an apparatus of the type of the aggregate transferring apparatus 10 of the disclosure, may include providing an apparatus which may have a base

example, for elements for which the initiation or termination of operation of the elements in a sequential manner is desirable or necessary, the controller 172 may be programmed to initiate or terminate the operation in the sequence in response to a single input or command from the operator. Further, means 172 may retain information by or position, for example, the relative outboard 136 segment corresponding to the location may be stored in memory to recall the position of the elements from the memory in order for the operator to order for the apparatus 10 to the location suitable to display of the array from the operator.

Another aspect of the apparatus, such as an aggregate transferring apparatus, may include providing an assembly including a base and an unloader structure including a deployable including at least one lift arm structure, a conveyor extension assembly including an extension conveyor with an inboard segment, an outboard segment, and a chute, and a control assembly. The method may include identifying an area of ground surface for deployment of the apparatus, and that may include determining that the area of ground surface is substantially level and is suitably compacted for bearing the weight of the apparatus. The identification of the area of ground surface may also include determining that a space about the area of ground surface is clear of obstructions for deploying elements of the apparatus such as, for example, the outrigger structure of the base assembly and the deployable frame of the aggregate elevating assembly.

The method may also include positioning the apparatus 10 on the area of ground surface, which may involve towing the apparatus to the area of ground surface by a towing vehicle, such as a semi-tractor. The method may further include connecting a power source to the apparatus 10 to provide power to the control assembly 170 and the various elements of the control assembly. Such power source may be an electrical power source, and may involve the connection of an electrical power cord between the controller assembly 170 and an electrical power source.

Another aspect of the method may include removing the apparatus 10 from a travel configuration, or a configuration of the apparatus suitable for transporting the apparatus on

gear and disconnecting the apparatus from the power source after extending the landing gear. Removing the apparatus from the travel configuration may also include extending the lift actuator 116 acting on the lift arm structure to permit the base assembly to contact the area of ground surface.

A further aspect of the method may include deploying the aggregate elevating assembly 60, which may involve rotating the deployable frame 62 upwardly into the deployment position of the frame 62, which may be performed while

tional condition. In embodiments in which the ramps include multiple portions, the pivoting of the ramps may include pivoting the ramp portions of each ramp to the position corresponding to the operational condition.

A further aspect of the method may include deploying the aggregate elevating assembly 60, which may include pivoting the deployable frame 62 upwardly into the position of the frame 62, which may be performed while maintaining the inboard 130 and outboard 132 segments of the extension conveyor 122 in a substantially horizontal orientation as the deployable frame rotates into position. The deployment of the elevating assembly may further include engaging lock pins to secure the frame 62 in the deploy position, and attaching cables to the frame 62 and the outrigger structure such that the wires extend from the outrigger arms of the frame 62 at locations spaced upwardly from the base of the frame 62. In some implementations, the wires may be utilized to tension the guy wires.

Yet another aspect of the disclosure is a method of operating an apparatus, such as an apparatus of the aggregate transferring apparatus 10 of the disclosure. The method may include positioning the chute 164 of a side to which the aggregate is to be moved and extending the chute so that the spout 166 of the chute moves into proximity of the port 2 of the silo, such as

Solaris Oilfield, Ex. 1001, p. 29
Solaris Oilfield v. Masaba, IPR2024-01179

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15 positioning the spout of the chute in the port. The method may further include positioning an aggregate transporting vehicle on the unloader structure 40, which may involve moving a gate of the aggregate transporting vehicle into a position above the grate 48 of the unloader structure. The method may also include initiating operation of the extension conveyor 122, the elevating conveyor 80, and the base conveyor 50, and may involve first initiating operation of the extension conveyor, then second initiating operation of the elevating conveyor, and then third initiating operation of the base conveyor.

Another aspect of the method of operating the apparatus may include unloading aggregate from the aggregate transporting vehicle into the unloader structure 40, and moving the unloaded aggregate along the base conveyor 50 to the elevating conveyor 80, and along the elevating conveyor 80 to the extension conveyor 122, and along the extension conveyor 122 to the chute 164 of the extension conveyor. The method of operating the apparatus may also include periodically or occasionally relocating the chute 164 to the

16 of the foregoing disclosure, and all equivalent relationships to those illustrated in the drawings and described in the specification are intended to be encompassed by the present disclosure. Therefore, the foregoing is considered as illustrative only of the principles of the disclosure. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the disclosed subject matter to the exact construction and operation shown and described, and accordingly, all suitable modifications and equivalents may be resorted to that fall within the scope of the claims.

We claim:
1. An aggregate transferring apparatus for elevating and transferring aggregate, the apparatus comprising:
a base assembly for receiving aggregate to be conveyed by the transferring apparatus, the base assembly comprising:
a base frame being elongated along a longitudinal axis and having a leading end and a trailing end;

"approximately," when used to modify another term, means "for the most part" or "being largely but not wholly or completely that which is specified" by the modified term. It should also be appreciated from the foregoing description that, except when mutually exclusive, the features of the

an elevating conveyor configured to receive aggregate from the base conveyor and convey the aggregate upwardly from the base assembly toward the free end of the deployable frame; and
a conveyor extension assembly for conveying aggregate

Yet another aspect of the disclosure is a method of operating an apparatus, such as an apparatus of the type of the aggregate transferring apparatus 10 of the disclosure. The method may include positioning the chute 164 over the

incase variations in size, function, shape, form, structure and manner of operation, assembly and use, are deemed readily apparent and obvious to one skilled in the art in light

wherein the extension conveyor is pivotally connected to the inlet and outlet with an inboard segment and an outboard segment, the inboard segment being pivot-

Solaris Oilfield, Ex. 1001, p. 30
Solaris Oilfield v. Masaba, IPR2024-01179

Ex. 1001 ('689 Patent) at 13:35-39, 14:46-50 & 61-65; see also Paper 20 (Reply) at 2; Ex. 1110 (Supp. Durham Decl.) ¶¶15-17.

'689 Patent: Field of Use

Field

The present disclosure relates to material handling apparatus and more particularly pertains to a new aggregate transferring system for receiving aggregate from a vehicle and elevating the aggregate to a higher vertical level for deposit into, for example, a silo.

In one aspect, the disclosure relates to an aggregate transferring apparatus 10 for transferring aggregate, as will be illustratively described. The apparatus 10 is suitable for performing the transfer of aggregate from one location to another, such as, for example, from a vehicle carrying the aggregate to a silo 1 for storing the aggregate. Illustratively, the aggregate transferring apparatus 10 may be utilized for transferring an aggregate such as sand, and in some implementations the sand may be of the type utilized in the process of hydraulic fracturing in connection with subterranean petroleum drilling. The vehicle may comprise a truck

Ex. 1001 ('689 Patent) at 1:14-18, 4:7-18; see also Paper 1 (Petition) at 11; Paper 20 (Reply) at 2; Ex. 1110 (Supp. Durham Decl.) ¶¶16-18.

Dr. Durham is a POSITA Under Any Definition

- B.S., Electrical Engineering, 1992
- Masters of Engineering and Technology Management, 1997
- Ph.D., Engineering Management, 2004

- Coursework included statics, fluid dynamics, instrumentation, and multidisciplinary design course
- 20+ years hands-on experience with mechanical & electrical systems in hydraulic fracturing and drilling in oilfield
 - Includes building / designing / engineering / investigating mechanical aspects of various hydraulic fracturing and completions equipment
 - Includes work with conveyor systems for aggregates in fracturing
- Oversaw physical construction of solar driven vehicle, participated in design review for mechanical group

Ex. 1003 (Durham Decl.) ¶¶ 5-15; Ex. 1110 (Supp. Durham Decl.) ¶¶ 19-20; see also Paper 20 (Reply) at 2-3.

Mr. Smith's Declaration Is Proper

Reply evidence must be responsive to arguments either “raised in the patent owner's response brief” or “originally raised in [the] petition.”

- *Apple Inc. v. Andrea Elecs. Corp.*, 949 F.3d 697, 705–06 (Fed. Cir. 2020).
- Mr. Smith's declaration is based on same arguments and evidence in the Petition
 - Same grounds: obvious to combine Dynatek's articulated conveyor with Waldner
 - Same rationales: increase Waldner's reach, range of motion, and discharge rate
- Mr. Smith's declaration is responsive to Patent Owner's response
 - Patent Owner asserted new definition of POSITA requiring experience “directly related to engineering” aggregate handling equipment
 - Patent Owner asserted new claim constructions of “conveyor” and claim 6
 - Patent Owner asserted alternative modifications of the prior art

Mr. Smith's Declaration Is Proper

New experts are permitted to respond to Patent Owner's new definition of a POSITA.

Infineum USA LP v. Chevron Oronite Co. LLC, No. 2020-1333, 2022 WL 31476783 (Fed. Cir. Aug. 8, 2022)*

- Petitioner's POSITA definition: has experience "formulating and/or testing" engine oil
- Patent owner's POSITA definition: has experience "directly formulating" engine oil
- Petitioner presented new expert with reply
- Rejected "categorical" prohibition on new expert's testimony
- New expert's testimony "was proper rebuttal" to patent owner's assertions that POSITA would pursue alternative formulations to the proposed combination

* *IPR2018-00922*. See also *Paper 33 (Judgment and Final Written Decision dated Nov. 6, 2019)*, at 9-13.

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Ways of Combining Waldner and Dynatek

- POSITAs would have **applied** Dynatek's **teachings** of articulated / pivoting extension and belt conveyors to Waldner's telescoping chute

OR

- POSITAs would have **physically substituted** Dynatek's Econoloader for Waldner's telescoping chute

Rationales to Combine Waldner and Dynatek

1

Increase the reach and range of motion of Waldner’s chute

2

Increase discharge rate of Waldner’s chute

3

Enhance mechanical control of Waldner’s chute

Paper 1 (Petition) at 25-28; see also Ex. 1003 (Durham Decl.) ¶¶115-119.

#1: Increase Reach / Range of Motion

Petition: Waldner's discharge chute's range of motion is limited by chute angle

Waldner states that the movement of its discharge chute 242 allows the operator to “adjust the point of final discharge of granular or particulate material from the system *without having to move the trailer*” and the chute to discharge “to various positions in 3D space.” EX1004, 15:14-21 & 25:66; EX1003, ¶115. However, in *Waldner*, movement of particles through the discharge chute is controlled by gravity and the angle of the chute. EX1003, ¶115. *Waldner's* mechanism for adjusting the discharge chute's position also may be limited its precision and range of motion. *Id.* A POSITA building *Waldner's* system would

Paper 1 (Petition) at 25-26; see also Ex. 1003 (Durham Decl.) ¶115.

#1: Increase Reach / Range of Motion

Dr. Durham: Waldner's discharge chute's reach is limited by its angle and discharge rate

Q. What is the limit of Waldner's precision in adjusting the chute's position?

A. What I'm trying to convey there is because it's using gravity and you're using gravity to control rate, then that puts a limit on how you can orient the -- the discharge chute. You're limited to a certain, at least a certain range of angles to get the rate you require, and you have to combine that with the horizontal movement to get somewhere in the neighborhood of the -- or somewhere above the silo. So that -- that limits the precision you control either rate or position because they're interrelated in position.

Q. So you're referring to the fact that the chute of Waldner has to be angled as applying a limitation on its orientation; is that correct?

A. Correct. Yeah. Yes, sir. ... **Having to go further, the angle has to be flatter to get that distance, get your orientation correct** and that's going to limit the amount -- the rate that you can deliver at or at least how you can control that rate. And it's true when it's closer too. It's going to change the rate. And so the rating position are interconnected and that limits your -- limits something. Limits one of the two. ... **If I want a certain rate, that limits how -- where I can put it.** If I want a certain location, that limits the rates.

Ex. 2003 (Durham Depo. 3/26/2025) at 75:24 – 77:14; see also Paper 20 (Reply) at 5.

#1: Increase Reach / Range of Motion

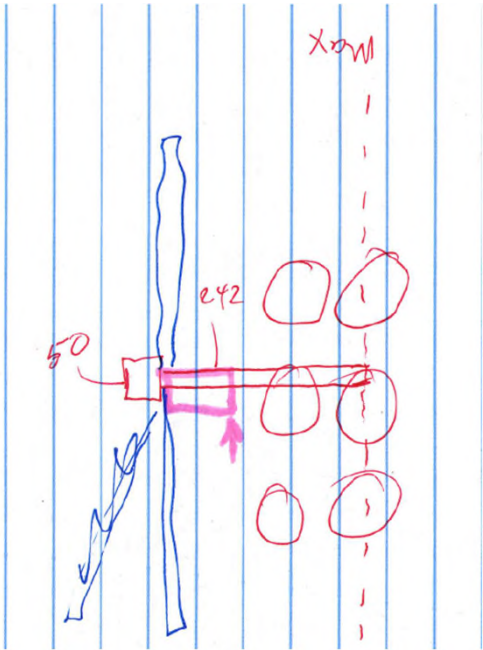
Mr Anderson: gravity fed chute cannot reach silos farther away if downward angle is steeper to increase discharge rate

Q. If I want to increase the rate of flow down that chute, I would need to increase the slope -- the downward slope of the chute. Would you agree with that?

A. Yeah. That would be one way to do it or are you talking about dynamically or in the design stage?

Q. If I were to decrease -- if I were to increase that downward slope, would you agree that the outlet would not reach the maximum lateral distance that I've marked with a dashed line? Would you agree with that?

A. In the hypothetical configuration you have here, it would not.

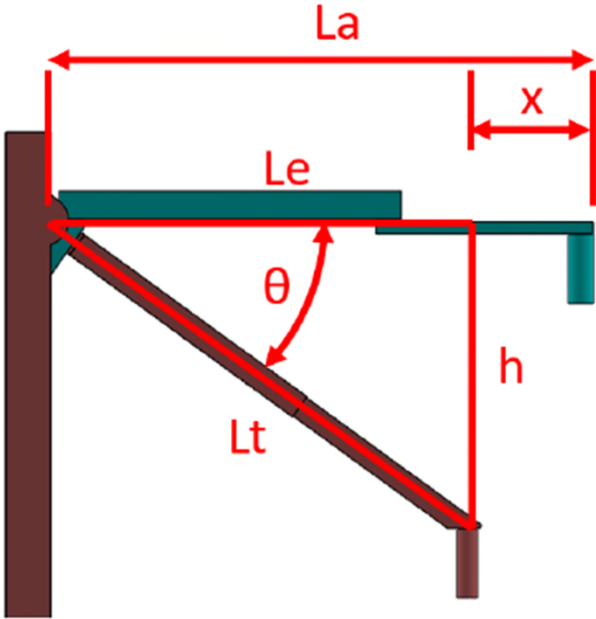


Ex. 1113 (Anderson Depo.) 164:9 – 165:3; Ex. 1039; see also Paper 20 (Reply) at 6.

#1: Increase Reach / Range of Motion

Dr. Durham & Mr. Smith: pivotable conveyor segments increase reach & range of motion as compared to a chute

that location was about 50 feet.²⁶ To reach that lateral distance at an appropriate angle θ , a telescoping chute would need to be about 10 feet longer than an articulated belt conveyor, and attached at the top of a bucket elevator that is about 33 feet taller. Stated another way, if the articulating belt conveyor has a reach of 50 feet (which is approximately the length that would have been required to reach to the farthest silo outlet in Solaris’ six-pack²⁷) a telescoping chute of equal length as compared to the articulating conveyor would need to be attached at the top of a bucket elevator approximately 28 feet taller, and that telescoping chute would have approximately 8.5 feet less reach than an articulating belt conveyor of the same length, and would not be able to reach the furthest silos.



Ex. 1111 (Smith Decl.) ¶¶ 42, 54-58; see also Ex. 1110 (Durham Supp. Decl.) ¶¶ 29-33; Paper 20 (Reply) at 8.

#1: Increase Reach / Range of Motion

Petition & Dr. Durham: pivotable conveyor segments increase reach & range of motion of the discharge point as compared to telescoping sections

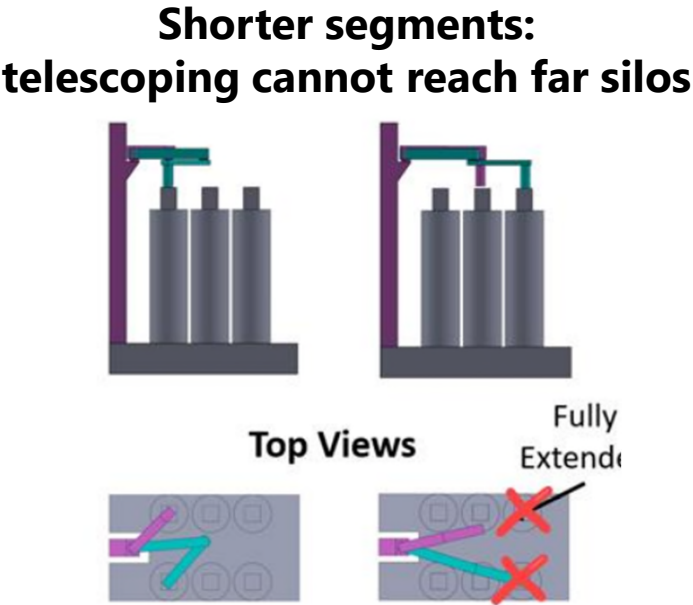
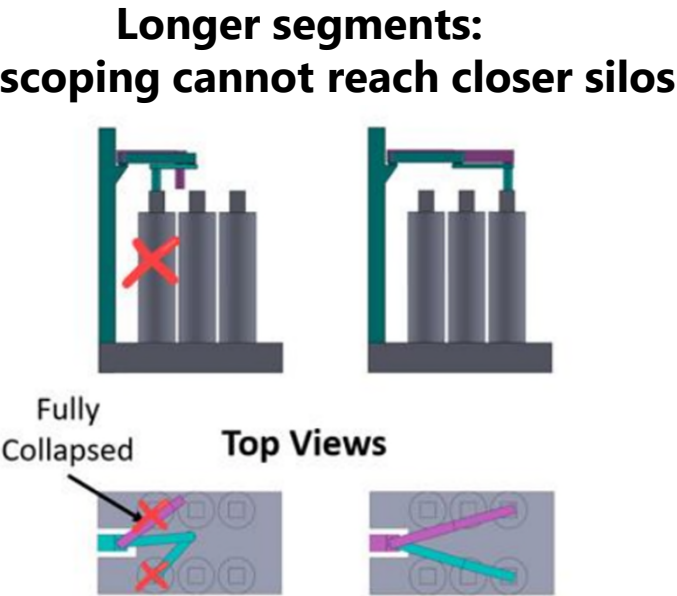
Alternatively, a POSITA would have deemed it obvious to modify *Waldner's* system based on *Dynatek's* teachings by (1) adding belt conveyors to the discharge chute, (2) coupling the distal and proximate portions of the discharge chute to each other (and optionally the proximate portion of the chute to the bucket elevator) with slewing bearing-based pivots, and/or (3) incorporating a loading spout at the distal end of the discharge chute. EX1003, ¶116-118, 185. A POSITA would have motivated to make these modifications to *Waldner's* system to (1) increase its discharge rates, (2) enhance its horizontal range of motion and reach, and control thereof, and (3) enhance control of dust and discharge direction. EX1003, ¶118-119; EX1021. A POSITA would have had a reasonable expectation of success in

Further, the combination uses a known technique of 2 pivotal sections from *Dynatek* instead of *Waldner's* telescoping sections to increase range of motion of the discharge point, and using controllable conveyor belts of *Dynatek* instead of the discharge chute of *Waldner* to improve control of delivery and discharge of the particulate matter. In *Waldner*, movement of particles through the discharge chute is controlled only by gravity and the angle of the chute. In *Dynatek*, the additional control of the speed of the conveyor allows for better control and discharge rates.

Paper 1 (Petition) at 27-28; Ex. 1003 (Durham Decl.) ¶118.

#1: Increase Reach / Range of Motion

Dr. Durham & Mr. Smith: examples of how pivotable conveyor segments reach discharge points closer AND farther away



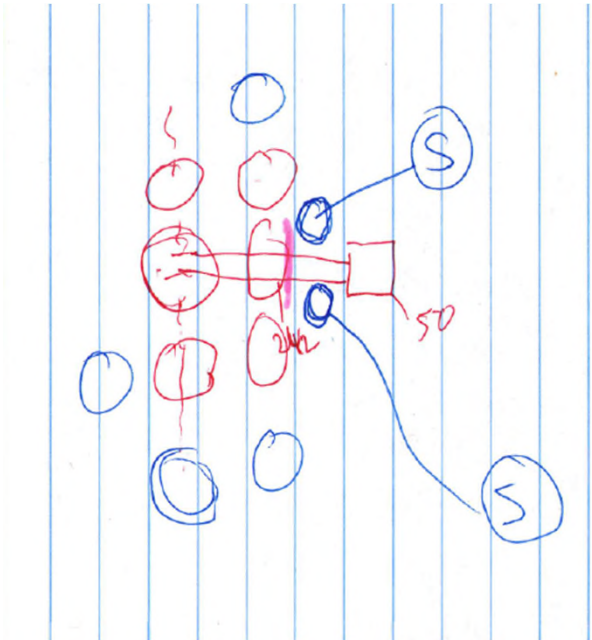
Ex. 1110 (Durham Supp Decl.) ¶¶ 23-24; Ex. 1111 (Smith Decl.) ¶¶ 44-47; see also Paper 20 (Reply) at 6.

#1: Increase Reach / Range of Motion

Mr. Anderson: system with telescoping chute must be rebuilt to reach silos closer to or farther from the bucket elevator

Q. In order to hit the silos that I've drawn in blue, you would have to effectively redesign the system, rebuild components of the system?

A. Yeah. You'd have to perhaps make a larger chute, depending on the actual numbers involved. Perhaps make a larger chute. Perhaps make a longer chute that telescopes longer. Perhaps raise it in order to get a steeper angle to ensure that the material flow rate was met.



Ex. 1113 (Anderson Depo.) 331:5-15; Ex. 1041; see also Paper 20 (Reply) at 6; Ex. 1113, 186:1 – 187:21.

#2: Increase Discharge Rate

Petition: discharge rate through Waldner's chute is limited by its angle

Waldner states that the movement of its discharge chute 242 allows the operator to “adjust the point of final discharge of granular or particulate material from the system *without having to move the trailer*” and the chute to discharge “to various positions in 3D space.” EX1004, 15:14-21 & 25:66; EX1003, ¶115. However, in *Waldner*, movement of particles through the discharge chute is controlled by gravity and the angle of the chute. EX1003, ¶115. *Waldner's* mechanism for adjusting the discharge chute's position also may be limited its precision and range of motion. *Id.* A POSITA building *Waldner's* system would have looked to known conveyor systems that achieve similar objectives, *e.g.*, to optimize its design and/or to potentially incorporate commercially-available components to enhance control and/or particle movement rates. *Id.*, ¶66-73, 115.

Paper 1 (Petition) at 25-26; see also *id.* at 27-28.

#2: Increase Discharge Rate

Dr. Durham: conveyor belts increase / control discharge rate of the chute without changing downward angle

117. As discussed above regarding how a POSITA would have found *Dynatek*, the *Dynatek* landing page on the M.C Schroeder Website showed several styles of *Econoloader*, including Air Slide, Auger, Belt and Drag versions. A POSITA would have been motivated to look at the “Belt Econoloader” first when looking for improvements to *Waldner’s* apparatus, as *Waldner* already teaches the use of belt conveyors. Further, a belt conveyor would be more advantageous in its ability to control speed of discharge¹²⁷ as opposed to gravity based systems such as an “Air Slide” system, which are designed primarily for use with fine powders that have been “fluidized”, rather than larger particles such as sand.¹²⁸ Other systems such as “auger” or “drag conveyor” would be useful for handling proppant type aggregate and a belt conveyor would at least be obvious to try, as only three operations were available to choose from.¹²⁹

Further, the combination uses a known technique of 2 pivotal sections from *Dynatek* instead of *Waldner’s* telescoping sections to increase range of motion of the discharge point, and using controllable conveyor belts of *Dynatek* instead of the discharge chute of *Waldner* to improve control of delivery and discharge of the particulate matter. In *Waldner*, movement of particles through the discharge chute is controlled only by gravity and the angle of the chute. In *Dynatek*, the additional control of the speed of the conveyor allows for better control and discharge rates.

BELT WIDTH (INCHES)	TROUGH DEGREES	CROSS-SECTION AREA (Sq. Ft.)	CONVEYING RATES in Short Tons Per Hour Density of 100 Pounds Per Cubic Foot Assumed							
			BELT SPEED in Feet Per Minute							
			50	100	150	200	250	300	350	400
18	20	0.161	24	48	72	96	120	145	169	193
18	35	0.205	31	61	92	123	154	185	215	246
18	45	0.226	34	68	102	135	169	203	237	271
24	20	0.321	48	96	144	193	241	289	337	385
24	35	0.406	61	122	183	244	305	365	426	487
24	45	0.440	66	132	198	264	330	396	462	528

Ex. 1003 (Durham Decl.) ¶¶ 117-118.

#2: Increase Discharge Rate

Dr. Durham: conveyor belts increase / control discharge rate of the chute regardless of its position or angle

Q. Is there a difference in the discharge rates between the Waldner and DYNETEK systems?

A. There would be.

Q. How do you know that?

A. By the mechanics of the system because Waldner's controlled only by gravity. In certain positions, it would have only certain discharge rates, and DYNETEK, you control the rate regardless of its position, so there would be differences.

Q. Do you know what the discharge rate of Waldner is?

A. It would depend, again, on the density of the material and the gravity and the friction coefficient of the chute, probably one or two other things as well. But, no, I don't have a precise number on that. That's not in Waldner. The point is, the control. You can control the rate differently and DYNETEK teaches that.

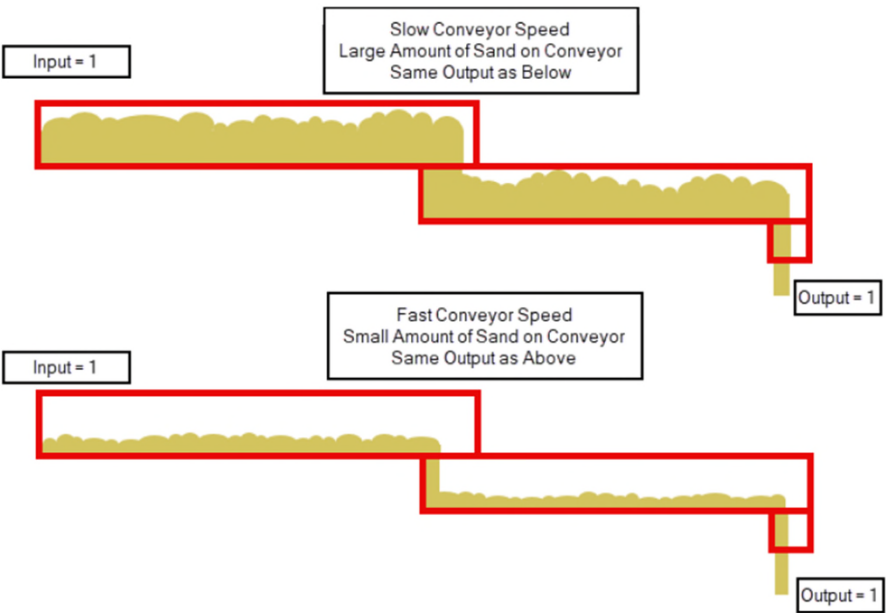
Ex. 2003 (Durham Depo. 3/26/2025) 86:3-19; see also Paper 20 (Reply) at 10.

[RESERVED]

#2: Increase Discharge Rate

Dr. Durham & Mr. Smith: increased discharge speed / rate of extension conveyor reduces weight

68. Assuming a larger input rate, a POSITA would still have been motivated to ensure that the discharge rate from Waldner’s discharge chute is faster than upstream components of the system. Mr. Anderson asserts that “a POSITA would not be motivated to replace [the discharge chute] with something faster,”³⁷ but Mr. Anderson did not consider the effects of the material weight on the discharge chute. A POSITA would have further wanted to minimize the weight of the discharge chute of *Waldner* and its contents, including the weight of the sand being carried on the chute. As sand piles up on the upper conveyor, that would increase the overall weight and the stress on the system. This is illustrated below. Therefore, a POSITA would have been motivated to increase the discharge rate from the discharge chute, for example, by using a motorized conveyor even if that would not increase the discharge rate of the overall system.



Ex. 1111 (Smith Decl.) ¶68; see also Ex. 1110 (Supp. Durham Decl.) ¶42; see also Paper 20 (Reply) at 11.

#3: Enhance Mechanical Control

Petition: articulated motion would provide multiple points to control chute’s horizontal position

However, in *Waldner*, movement of particles through the discharge chute is controlled by gravity and the angle of the chute. EX1003, ¶115. *Waldner’s* mechanism for adjusting the discharge chute’s position also may be limited its precision and range of motion. *Id.* A POSITA building *Waldner’s* system would

rail car, truck, or barge” and loading rates). *Dynatek* also teaches that *EconoLoader’s* articulated motion provides a wide range of rotation and reach, and its retractable loading spouts increase vertical travel and enhance dust recovery. EX1005, 2; EX1003, ¶116.

Based on these teachings, a POSITA would have been motivated to substitute *Dynatek’s* *EconoLoader* for *Waldner’s* discharge chute, *e.g.*, to maximize the system’s range of motion and reach, optimize dust control, enhance mechanical control, and/or increase discharge rates. EX1003, ¶117-118; EX1021; *Agrizap, Inc.*

#3: Enhance Mechanical Control

Mr. Anderson: Waldner provides only one control point for chute's horizontal position

Q. About halfway through that paragraph, you state that: "Dr. Durham's discussion of enhanced mechanical control." You interpreted that potentially as referring to the number of control points. Do you see that?

A. Mm-hmm.

Q. Okay. And you stated that: "Waldner's discharge chute contains three points of control."

* * * *

Q. So in the discharge chute of Waldner, if I want to adjust its position right to left as we were talking about in the plane that you can see in Exhibit 1039, the only place where I can make that pivot occur is at the first of those pivot points that we talked about, correct?

A. That would be the vertical pivot point, yes.

Q. That's the only one of those three where it can move in that direction?

A. Yeah.

Ex. 1113 (Anderson Depo.) 192:19 – 195:7; see also Paper 20 (Reply) at 9; Ex. 1110 (Supp. Durham Decl.) ¶¶ 38-39.

Patent Owner's Attacks Ignore the Law

Even if considered, these new arguments fail on the merits. Taking the last of the newly alleged motivations first, Solaris has not shown why the weight on Waldner's chute would have been problematic. A system like Waldner's is designed to handle the weight expected. (Ex. 2041, 56:20-24.) Solaris appears to argue that

With respect to the remaining three new motivations, Solaris's Petition never showed (1) why there is a problem with the force required to move Waldner's chute, (2) why POSITAs would want Waldner to have more reach without changing a discharge rate or (3) why POSITAs would want Waldner's chute to have a higher discharge rate independent of its angle. Indeed, Smith admitted that Waldner "would work just fine" for its designed purposes. (Ex. 2041, 31:13-32:4.) Masaba agrees that the shallower the angle of Waldner's chute, the slower the speed at which aggregate will move along the chute, but there is no evidence that speed would have been a problem—and the Petition does not propose any concrete applications for which Waldner's configuration might be a problem.

Patent owner "argues that '[petitioner] has never shown a motivation to modify [the prior art, because [petitioner] has never shown that those working in the art perceived a problem with nearer-first ordering.' ... [Petitioner] argues that **it does not need to show that there was a known problem with the prior art system** in order to articulate the required rational underpinning for the proposed combination. **We agree.** ... The Court in *KSR* described many potential rationales that could make a modification or combination of prior art references obvious to a skilled artisan. ... For the technique's use to be obvious, **the skilled artisan need only be able to recognize, based on her background knowledge, its potential to improve the device and be able to apply the technique.**"

Unwired Planet, LLC v. Google Inc.,
841 F.3d 995, 1002-04 (Fed. Cir. 2016) (citing *KSR*)

Paper 33 (Sur-Reply) at 11-12.

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"[W]e have repeatedly held that an implicit **motivation to combine exists** not only when a suggestion may be gleaned from the prior art as a whole, but when the "improvement" is technology-independent and **the combination of references results in a product or process that is more desirable, for example because it is stronger, cheaper, cleaner, faster, lighter, smaller, more durable, or more efficient.**

Because **the desire to enhance commercial opportunities by improving a product or process is universal — and even common-sensical** — we have held that there exists in these situations a motivation to combine prior art references even absent any hint of suggestion in the references themselves."

DyStar Textilfarben GmbH & Co. v. CH Patrick Co.,
464 F. 3d 1356,1368 (Fed. Cir. 2006)

Patent Owner's Attacks Ignore the Law

horizontal rotation, but he could not provide any reason why *Waldner's* range of rotation was insufficient. (Ex. 2003, 77:19-78:19.) There is no need in *Waldner*, for example, to fill silos *behind* the bucket elevator. (Ex. 2004, ¶¶41, 43.) And even if a need *did* exist for greater “reach,” a POSITA could easily accomplish this by merely increasing the length of *Waldner's* chute and, if necessary, increasing the height of the bucket elevator (while keeping everything at a transportable height/length). (*Id.*)

Even if a POSITA were somehow motivated to “increase discharge rates” in *Waldner*, a POSITA would not look to *Dynatek* as a solution. Instead, a POSITA would merely increase the diameter of *Waldner's* chute. (Ex. 2004, ¶46.) A POSITA

“The prior art's **mere disclosure of more than one alternative does not constitute a teaching away from any of these alternatives** because such disclosure does not criticize, discredit, or otherwise discourage the solution claimed in the '198 application.”

“[O]ur case law does not require that a particular combination must be the preferred, or the most desirable, combination described in the prior art in order to provide motivation for the current invention.”

In re Fulton, 391 F. 3d 1195, 1200-01
(Fed. Cir. 2004)

Paper 13 (Response) at 31 & 33; see also Paper 20 (Reply) at 8 & 11.

Patent Owner's Alternative Solutions Have Drawbacks

57. By setting the length of both systems (L_t and L_a) to equal 1 the geometric relationships are revealed. If L_t & $L_a = 1$ then $h = 0.559$ and $x = 0.171$. This means for every foot of horizontal length, the telescoping chute will need to increase in height .559 feet to maintain the same exit height and will have .171 feet less reach than an articulating belt conveyor of the same overall length. For example, I understand from the Declaration of Mr. Jeremy Weinstein of Solaris that the lateral distance from the location where the bucket elevator would be deployed to the outlet of the silo in Solaris' preexisting six-pack silo arrangement that is farthest away from

that location was about 50 feet.²⁶ To reach that lateral distance at an appropriate angle θ , a telescoping chute would need to be about 10 feet longer than an articulated belt conveyor, and attached at the top of a bucket elevator that is about 33 feet taller. Stated another way, if the articulating belt conveyor has a reach of 50 feet (which is approximately the length that would have been required to reach to the farthest silo outlet in Solaris' six-pack²⁷) a telescoping chute of equal length as compared to the articulating conveyor would need to be attached at the top of a bucket elevator approximately 28 feet taller, and that telescoping chute would have approximately 8.5 feet less reach than an articulating belt conveyor of the same length, and would not be able to reach the furthest silos.

Ex. 1111 (Smith Decl.) ¶¶ 42, 54-58; see also Ex. 1110 (Durham Supp. Decl.) ¶¶ 29-33; Paper 20 (Reply) at 8.

Patent Owner's Alternative Solutions Have Drawbacks

Taller bucket elevator would:

- Increase length of system when collapsed, making it more difficult to maneuver, store, and permit for transport
- Increase weight of the system, requiring stronger axles and more fuel for transport
- Increased leverage force to deploy, requiring more powerful lift arms
- Still be limited to filling silos for which the system was designed

Longer / wider discharge chute would:

- Be heavier and harder to manipulate
- Still depend on downward angle to control discharge rate
- Still be limited to filling silos for which the system was designed

Paper 20 (Reply) at 8-9; Ex. 1111 (Smith Decl.) ¶¶ 63-64; Ex. 1110 (Durham Supp. Decl.) ¶¶ 27 & 34; Ex. 1113 (Anderson Depo.) 190:4-191:10.

Physical Substitution: Patent Owner's Attacks Involve Routine Modifications

Patent Owner's problems with substitution:

- 1. Conveyor belt mistracking
 - Dynatek doesn't disclose levelling mechanisms
 - Dynatek doesn't disclose how to mount conveyor
- 2. Increased transport height, requiring increased road permitting
- 3. Increased weight of extension conveyor
- 4. Higher wind loads

"But we do not ignore the modifications that one skilled in the art would make to a device borrowed from the prior art. *Optivus Tech., Inc. v. Ion Beam Applications, S.A.*, 469 F.3d 978, 989-90 (Fed. Cir. 2006). One skilled in the art would size the components from [secondary reference] appropriately for [the primary reference's] application, therefore producing an embodiment meeting [the patent] claims."

In re ICON Health & Fitness, Inc.,
496 F.3d 1374, 1382 (Fed. Cir. 2007)

Paper 33 (Sur-Reply) at 9; see Paper 20 (Reply) at 12-15.

Physical Substitution: Patent Owner's Attacks Involve Design Tradeoffs

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 - Dynatek doesn't disclose levelling mechanisms
 - Dynatek doesn't disclose how to mount conveyor
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- 4. Higher wind loads

"[I]t is a commonplace fact that design decisions entail making **tradeoffs among multiple objectives**. *Allied Erecting and Dismantling Co. v. Genesis Attachments, LLC*, 825 F.3d 1373, 1381 (Fed. Cir. 2016) ('A given course of action often has simultaneous advantages and disadvantages, and this **does not necessarily obviate motivation to combine**.')."

Corephotonics, Ltd. v. Apple Inc.,
No. 2020-1961, 2021 WL 4944471, at *6 (Fed. Cir. Oct. 25, 2021)

Paper 33 (Sur-Reply) at 9; see Paper 20 (Reply) at 12-15.

Physical Substitution: Belt Mistracking

Patent Owner:

also Ex. 2041, 13:19-15:21.) Masaba agrees that *Waldner* describes tilt sensors and support legs for leveling its base and keeping its bucket elevator vertical, but *Waldner* discloses nothing for keeping its chute side-to-side level (because there is no need to do so). (Ex. 2004, ¶58; Ex. 2003, 104:19-105:12; Ex. 2041, 62:22-64:10.) Likewise, *Dynatek* discloses nothing for ensuring its belt conveyors are side-to-side level after folding and unfolding (because *Dynatek* does not fold/unfold). (Ex. 2004,

¶14.) Although Solaris’s experts argue that a base leveling system was known, neither expert identifies in the prior art a belt-conveyor mounting system or lock pins like the ‘689 Patent’s. (See Ex. 1110, ¶¶44-46; Ex. 1111, ¶¶70-76.) Anderson’s testimony on these points stands un rebutted.

Mr. Smith:

71. By 2021, a POSITA would have recognized that a conveyor mistracking is not unlike getting a flat tire in a car. You do not expect to get a flat tire every time you drive, but if you drive enough, you expect to get a flat tire at some point. Additionally, when you get a flat tire, it is typically a common fix that the tire repair shop can take care of in short order. Similarly, conveyors that are not perfectly level side to side are used regularly, and while they do sometimes result in mistracking, in my experience, those instances are the exception. And when they do happen, known methods can be employed to fix the issue.

- | | |
|-------------------------|--------------------------------------|
| • Belt tensioning | • Running from idle end |
| • Sensors | • Tight, square frame |
| • Edge guide wearstrips | • Frequent inspections / maintenance |
| • Levelling systems | |

Physical Substitution: Transportable Height

Patent Owner:

greater height with that spout. (Ex. 2004, ¶61.) Solaris's experts challenge some of Anderson's assumptions, but neither proposes any way of accommodating Dynatek's belt conveyors *and* loading spout without using what Anderson testified was the '689 Patent's "creative and unique way to fold the...conveyors." (Ex. 2004, ¶40.) This configuration is shown below, followed by diagrams from Solaris's experts attempting to show how such a configuration would be implemented with Waldner:

Significantly, Solaris can point to *nothing* in Waldner, Dynatek, or *any* prior art reference showing this configuration. (See Ex. 2040, 86:16-87:14, 101:19-102:3.)

All Solaris has is the conclusory testimony of its experts.

Mr. Smith:

81. A POSITA would have been able to position the EconoLoader's arms as shown above simply using the pivoting functionality described in Dynatek that is already present in the EconoLoader. As shown above, this would not increase the height of Waldner as the outlet port 60 is positioned above the upright conveyor section and the articulated upper conveyor could fit in approximately the same vertical space as the outlet port 60.

Paper 33 (Sur-Reply) at 7-8; Ex. 1111 (Smith Decl.) ¶¶ 80-81; see also Ex. 1110 (Supp. Durham Decl) ¶52.

Physical Substitution: Transportable Height

Patent Owner:

greater height with that spout. (Ex. 2004, ¶61.) Solaris’s experts challenge some of Anderson’s assumptions, but neither proposes any way of accommodating *Dynatek*’s belt conveyors *and* loading spout without using what Anderson testified was the ’689 Patent’s “creative and unique way to fold the...conveyors.” (Ex. 2004, ¶40.) This configuration is shown below, followed by diagrams from Solaris’s experts attempting to show how such a configuration would be implemented with *Waldner*:

Significantly, Solaris can point to *nothing* in *Waldner*, *Dynatek*, or *any* prior art reference showing this configuration. (See Ex. 2040, 86:16-87:14, 101:19-102:3.) All Solaris has is the conclusory testimony of its experts.

Mr. Smith:

86. Finally, even if using the *Dynatek* EconoLoader would result in a system that is as tall as what Mr. Anderson theorizes (unlikely), a POSITA still would have deemed the alleged invention in the ’689 Patent claims obvious. First, a POSITA would have understood how to make basic adjustments to the dimensions of the *Dynatek* system to meet any limitations on the transportable height on the system. These types of adjustments were and are commonplace for mechanical engineers designing this type of equipment, and those changes would not necessarily require substantially redesigning the components to make the system just a few feet shorter. If a POSITA would have reconfigured the bucket elevator of *Waldner* by increasing its height⁶² or reconfigured the discharge chute of *Waldner* to increase its diameter,⁶³ as Mr. Anderson suggests, a POSITA certainly would have understood how to make these basic adjustments.

Paper 33 (Sur-Reply) at 7-8; Ex. 1111 (Smith Decl.) ¶86; see also Ex. 1110 (Supp. Durham Decl) ¶50.

Physical Substitution: Transportable Height

Patent Owner:

Solaris's experts agree that transportability was an important consideration (Ex. 1111, ¶¶59-60) and that a feature requiring too much permitting would have disincentivized POSITAs (Ex. 2040, 46:14-21, 88:8-18). POSITAs would have wanted a height below 14 feet and preferably below 13.5 feet. (Ex. 2004, ¶61; Ex. 1111, ¶62.) Solaris wanted the same. (Ex. 1112, ¶13; Ex. 1104, §2.2; Ex. 2042, 62:21-65:19.)

Mr. Smith:

87. Even using the height of the arrangement calculated by Mr. Anderson, a POSITA would not have expected that such a system would be impossible or prohibitively difficult to transport. In heavy industries, it was (and still is) typical for equipment suppliers and operators to have to obtain permits to transport oversized equipment on certain roadways, and to plan transport routes that will accommodate the larger than standard size. In particular, known silos that the *Waldner* system might have been used to fill were often as tall as 80 feet,^{64,65} and so *Waldner's* bucket elevator for filling them would necessarily already exceed most state highway regulations for trailer length (53 ft) without a special permit. Since *Waldner's* system would already require permits due to the height of its bucket elevator (*i.e.*, the length in the transport configuration), a POSITA would not have been dissuaded from using the *Dynatek* conveyor simply because its height also may require special permits or routes.

Paper 33 (Sur-Reply) at 7; Ex. 1111 (Smith Decl.) ¶87; see also Ex. 1110 (Supp. Durham Decl) ¶54.

Physical Substitution: Weight & Wind Loads

Patent Owner:

The second difficulty with substituting *Dynatek's* conveyor for *Waldner's* chute would arise from attempting to use *Waldner's* mounting system to handle the weight of *Dynatek's* conveyors.⁵ *Dynatek's* conveyors would be much larger and heavier than a *Waldner*-type chute with comparable capacity. (Ex. 2004, ¶60.) A POSITA would have recognized that a more complex mounting system than *Waldner's* would be required to handle the higher weight and anticipated wind loads, particularly given the mistracking issues addressed above. (*Id.*) For example, a POSITA would be concerned that such a large weight extending from *Waldner's* bucket elevator frame would tend to rotate the bucket elevator out of vertical and result in mistracking of the *Dynatek* belt conveyors. (*Id.*) A POSITA would not have had a reasonable expectation of success in addressing those issues using *Waldner's* mounting system. (*Id.*)

Mr. Anderson:

Q. If there were a situation where the customer was uncomfortable with using it at the wind speed or if the winds in a particular situation exceeded what was appropriate, what would be the typical -- what would be the typical solution in the field at that point?

A. You would probably fold it down and get it back down to the ground before you experience such winds. Only one way to do it.

Q. And these mobile systems, they are designed to be folded down, correct?

A. Yes.

Paper 13 (Response) at 37; Ex. 1113 (Anderson Depo) 208:4 – 209:7; see also Paper 20 (Reply) at 14 n.9.

“Real World” Evidence: Skepticism of Bucket Elevators

There are several problems with these assertions. First, in the real world, the skepticism that Solaris expressed about bucket elevators—which Solaris attributed to the entire industry—would have steered a POSITA away from *Waldner* as a starting point in the first place, because *Waldner* uses a bucket elevator. Second, for the reasons explained below, none of the “motivations” proffered by Solaris withstands scrutiny. (Ex. 2004, ¶¶36-51.)³

“[G]eneric industry skepticism cannot, standing alone, preclude a finding of motivation to combine.”

“Although [Patent Owner] suggests that the Board may consider generic industry skepticism in a motivation-to-combine analysis to ‘place [itself] in the minds of’ skilled artisans, it offers no case law to suggest that the Board can rely on generic industry skepticism to find a lack of motivation to combine. **And while *specific evidence of industry skepticism related to a specific combination of references might contribute to finding a lack of motivation to combine, that's not what we have here.***”

Auris Health, Inc. v. Intuitive Surgical Operations, Inc.,
32 F.4th 1154, 1159 (2022)

Paper 13 (Response) at 30; see also Paper 20 (Reply) at 5 & 25.

“Real World” Evidence: Skepticism of Bucket Elevators

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Prior Bucket Elevator Systems:

- Waldner (Ex. 1004)
- Sleeman (Ex. 1006)
- Pham (Ex. 1008)
- Campbell (Ex. 1022)
- Grimes / NOV (Ex. 1028, 1036)
- Foresite (Ex. 1038, 1039)

Paper 13 (Response) at 30; see also Ex. 1003 (Durham Decl.) ¶¶ 67 & 69; Paper 1 (Petition) at 13 & 28; Paper 20 (Reply) at 5 n.3.

“Real World” Evidence: Skepticism of Bucket Elevators

Solaris’ alleged “skepticism”:

19. I understand that Dan Brinkman and Mike Stanton both stated that Solaris representatives stated that bucket elevators did not have a good reputation in the oil field. However, we were not skeptical of the functionality of bucket elevators because we knew of other companies like ForeSite, Schlumberger, and NOV who were successfully using bucket elevator systems to fill silos at frac sites. We only believed that bucket elevators require more maintenance and were known not to dissipate heat well. But we also knew that, generally speaking, bucket elevators could transfer sand at a much faster rate as compared to most pneumatic systems.

“But it is a commonplace fact that design decisions entail making **tradeoffs among multiple objectives**. *Allied Erecting and Dismantling Co. v. Genesis Attachments, LLC*, 825 F.3d 1373, 1381 (Fed. Cir. 2016) (‘A given course of action often has simultaneous advantages and disadvantages, and this does not necessarily obviate motivation to combine.’).”

Corephotonics, Ltd. v. Apple Inc., No. 2020-1961, 2021 WL 4944471, at *6 (Fed. Cir. Oct. 25, 2021)

Ex. 1112 (Weinstein Decl.) ¶19; see Paper 20 (Reply) at 5 & 14.

“Real World” Evidence: ‘689 Inventors Applied Dynatek’s Teachings

From: Jason Brenden <jason.brenden@masabainc.com>
Sent: Tuesday, January 19, 2021 2:50 PM
To: Jeremy Weinstein; Scott Lambert
Cc: aaron.sudbeck@masabainc.com; daniel.brinkman@masabainc.com; tyler.dewitt@masabainc.com; andrew.wells@masabainc.com
Subject: Solaris - Bucket Elevator Concept - Loading Areas
Attachments: Possible Loading Areas & Orientations - Top View.pdf; EconoLoader_BELT Design Data Sheet.pdf

Jeremy,
Per our phone call this morning, please see attached PDF files. One PDF shows a few possible loading positions/orientations of the bucket elevator. There are several other positions/orientations; I only place a few orientations to give you an idea of the flexibility at the work site. There is still only one position and orientation while loading over the gen-set side. NOTE: Please keep in mind that we plan on adding outriggers to our machine that are not shown in the attached PDF.
The other PDF is just a reference brochure to give you an idea as to how we can have such range of motion and positions. Basically, we are looking to put something like the EconoLoader at the top of the bucket elevator and make it long enough to reach all six silos without modifying the silo ports.
We are still working on the design, so everything is subject to change. I’m sure unforeseen obstacles will pop up as things develop and force a compromises. As always, please feel free to contact me with any questions, comments, and concerns. Thank you,

Ex. 1120 at 1; see also Paper 20 (Reply) at 1 & 12.

Would a POSITA Use a Conveyor Like Dynatek's with a Bucket Elevator?

NO

- Mr. Travis Anderson

YES

- Dr. Robert Durham
- Mr. David Smith
- Mr. Jeremy Weinstein
- Mr. Jason Brenden ('689 inventor)

Ex. 2004 (Anderson Decl.); Ex. 1003 (Durham Decl.) ¶¶111-121; Ex. 1111 (Smith Decl.) ¶¶40, 66, 69; Ex. 1112 (Weinstein Decl.) ¶¶9-10; Ex. 1120.

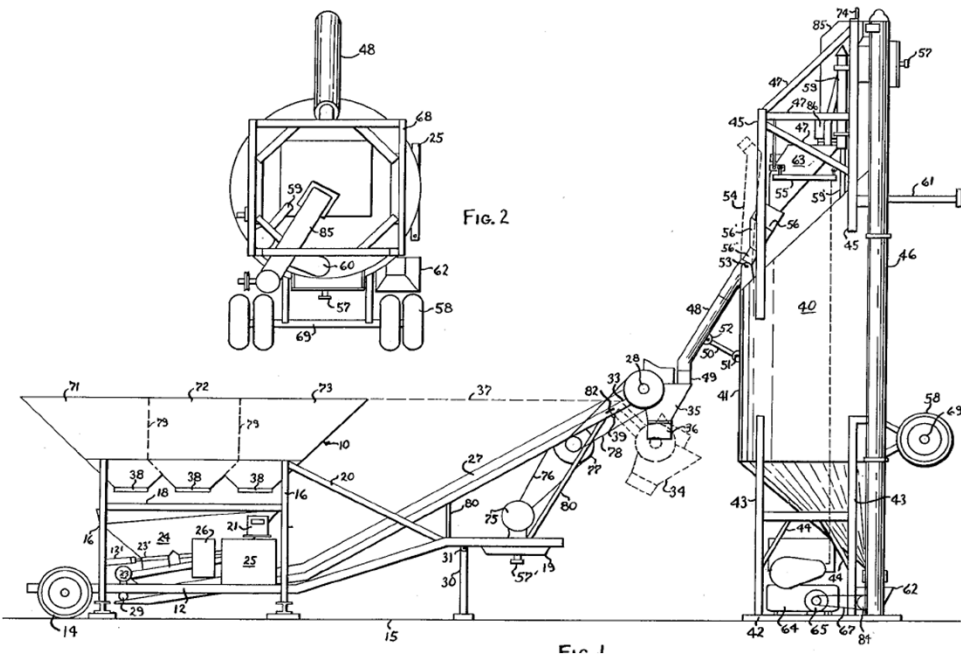
Outline of Arguments

- I. Overview of the '689 Patent
- II. Summary of the Grounds & Disputes
- III. POSITA Definition and Petitioners' Experts
- IV. Rationale to Combine Waldner & Dynatek (all grounds)
- V. Auld: POSITA would combine with Waldner (Ground 3 / 3A; claims 12 & 25)**
- VI. McIver: Discloses articulated lift arm that POSITA would combine with Waldner (Ground 4 / 4A; claim 13)
- VII. "Conveyor support frame" (Grounds 1 / 1A & 2 / 2A; dep. claim 6 & 7)
- VIII. Secondary Considerations

Auld

This invention relates to concrete batching plants and, more particularly, to portable batching plants having a primary object of loading the proper amount of each type of aggregate and cement and other materials into a transit mixer truck or stationary mixer in a convenient and rapid manner.

mizing the size of the machine. The cement batching plant is so constructed that it can be upended to the operating position and lowered to a horizontal position for travel without removing the road wheels therefrom, thereby minimizing the time and effort needed in setting up the machine.



Ex. 1009 (Auld) 1:8-13 & 1:69-2:2 & Figs. 1 & 2; see also Paper 1 (Petition) at 21-22 & 80.

Auld Is Analogous Art

1. *Rationale for Combining Waldner, Dynatek, and Auld*

Auld is analogous art to *Waldner* and *Dynatek* and to the '689 Patent. Like the '689 Patent, *Waldner*, and *Dynatek*, *Auld* discloses a portable system used for handling and storage of aggregate material (*i.e.*, concrete or cement). EX1009, 1:8-13; EX1003, ¶60-63 & 314-315. *Auld* also discloses storing such materials in a vertically oriented silo and a means of raising and lowering the transported component, EX1009, 4:30-44, 5:3-4, which would have been relevant to the problem that the '689 Patent purports to solve. EX1003, ¶314-316.

Paper 1 (Petition) at 80-81; see also Paper 20 (Reply) at 20.

Patent Owner Improperly Distinguishes “Aggregate” from Dry Cement

Patent Owner:

That same conclusion applies here. Although *Auld* involves using gravel, it is gravel (and other ingredients) used in mixing concrete. *Auld*'s title is “Cement Mixing Plant.” In contrast, the '689 Patent's title is “Aggregate Transferring System.” The fields of “transferring aggregate” and “cement mixing” are not the same.

Mr. Anderson:

Q. Okay. What are the other parts of the criteria for a particulate being an aggregate versus not?

* * *

Q. Okay. So the criteria that we have gone through are the source and then the things that they're used for?

A. Yeah.

Q. Is there any other criteria that you can think of?

A. The definition for aggregate is not really set in stone, no pun intended, but generally the industry sees aggregate materials as rock and gravel and sand. So those things -- those are examples of what an aggregate are.

Paper 33 (Sur-Reply) at 18; Ex. 1113 (Anderson Depo.) 113:13-114:15; see also Paper 20 (Reply) at 20.

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Mr. Brinkman:

Q. Okay. The powder portion of the cement, would you consider that aggregate or just the crushed stone that's contained within it?

A. Yes.

Q. Okay. When it's all mixed together and it's wet, would you consider that to be aggregate?

A. Honestly, I've never thought of -- of calling, you know, mixed and formed it's like asking is ice water or is water ice, right?

Paper 33 (Sur-Reply) at 18; Ex. 1114 (Brinkman Depo.) at 160:15-161:2; see also Paper 20 (Reply) at 20.

Mr. Anderson: Cement Experience Relevant to Aggregate

Q. Do you have any experience with systems for handling aggregate outside of the oil and gas industry?

A. Yes.

Q. Okay. What is that?

A. So in the San Antonio area, we have a lot of limestone mines, and a lot of that equipment, the conveyors, hoppers, bins, things like that, were part -- we made those through the APPCO line.

Q. And the limestone mines, for what purposes was the limestone that was taken out of those mines used? I mean what sort of industries did that support?

A. ... The limestone is used not only for its whole product and being crushed into smaller product for various things, road

base and things like that, but it also supplied some of the cement manufacturing plants where they would take the limestone and grind it and use it to create cement.

Q. Were there different teams dedicated to those different product lines in terms of the engineering aspects?

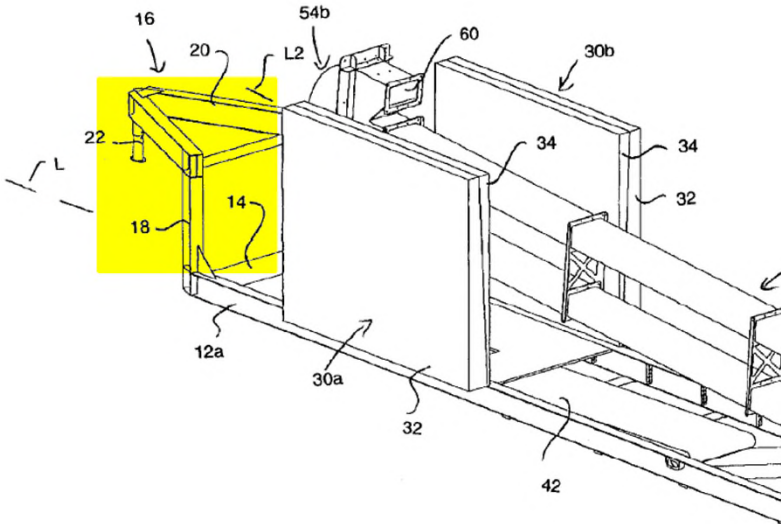
A. No.

Q. The same teams of engineers worked on engineering the proppant equipment as well as the limestone equipment?

A. Right. Small team.

Waldner: Express Motivation to Consider Other Hitches

At a first end of the trailer frame 10, a cross-beam 14 perpendicularly interconnects the two longitudinal beams 12 and a gooseneck structure 16 features a pair of uprights 18 standing vertically upward from the longitudinal beams 12, from which a pair of converging beams 20 extend forwardly from the uprights away from the remainder of the trailer in the longitudinal direction. A hitch coupler 22 is mounted to the converging beams 18 where their forward ends meet in a central vertical plane of the trailer that contains the longitudinal axis L. The trailer is thus equipped to form a gooseneck connection to a suitable towing vehicle in a conventional manner Other hitch types may alternatively be employed.



Ex. 1004 (Waldner) 12:22-34 & Fig. 5; see also Paper 1 (Petition) at 81.

Kingpins Were “Standard” Hitch Types for Heavy Loads

Dr. Durham:

322. A POSITA would have had a reasonable expectation of success in the combination as both couplers, a hitch coupler and kingpin, were well known and commonly used devices applicable across a broad selection of towing applications. Both are simple mechanical devices, used to engage with another component for towing. There is no indication that *Auld's* kingpin 57 would be difficult to use or incompatible with Waldner system. Waldner already teaches a hitch coupler 22

Mr. Anderson:

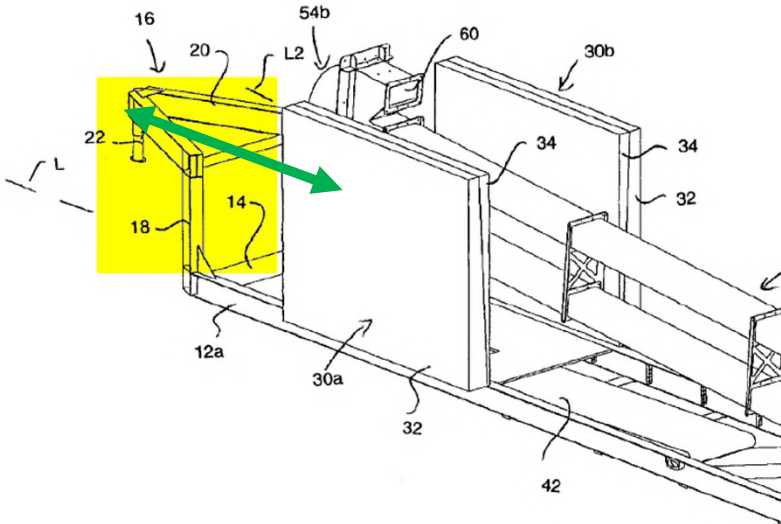
Q. Are you aware of any benefits of a kingpin or fifth wheel connection over a gooseneck connection?

A. The kingpin/fifth wheel connections are usually for the higher loads. You see it on semitrucks. That's the standard as you see driving down is a kingpin or fifth wheel connection. The lighter weights, the gooseneck connections are not as robust. They don't have -- the reason is the fifth wheel connection has a plate that allows that load to be spread across that plate more evenly so the less wear. But as far as it being ultimately a single-point connection, they're both the same.

Ex. 1003 (Durham Decl.) ¶322; Ex. 1113 (Anderson Depo.) 250:14-251:6; see also Paper 1 (Petition) at 81; Paper 20 (Reply) at 21.

POSITAs Would Attach Kingpin to Bucket Elevator Frame to Reduce Trailer Length

320. A POSITA would have recognized the advantages of replacing the “hitch coupler” 22 of *Waldner* with the king pin 57 of *Auld*, connected directly to *Waldner's* elevator 50, and would have been motivated to gain those advantages, including a reduction in frame material and a reduction in overall length of the trailer. A POSITA would have also recognized that the same vehicle could be used for transport of the modified *Waldner/Dynatek/Auld* trailer by simply replacing the ball of a gooseneck connection with the fifth wheel of the kingpin connection. This would have resulted in a distribution of load more evenly across the bed of the transport vehicle (truck). This combination is simply the substitution of one known component (*Auld's* kingpin 57) for another (hitch coupler 22 of *Waldner*) to obtain predictable results (reduction in frame material and shorten overall length).



Ex. 1003 (Durham Decl.) ¶320; Ex. 1004 (Waldner) at Fig. 5 (annotated above); see also Paper 1 (Petition) at 81.

Patent Owner's Attacks on Auld Ignore the Law

Nothing in the prior art submitted with the Petition suggests such a radical change. Solaris says that POSITAs would have thought of this modification in order to “reduce the framing material” for the trailer. (Reply, 21.) But nowhere does *Auld* teach that the purpose of its configuration was to “reduce the framing material” needed for a trailer. Nowhere does the Petition point to such a teaching in the prior art. Solaris only points to the conclusory testimony of its hired-gun electrical engineer. (Reply, 21.)

“The obviousness analysis cannot be confined by a formalistic conception of the words teaching, suggestion, and motivation, or by overemphasis on the importance of published articles and the explicit content of issued patents.’ *KSR*, 550 U.S. at 419, 127 S.Ct. 1727. **Any motivation to combine references, whether articulated in the references themselves or supported by evidence of the knowledge of a skilled artisan**, is sufficient to combine those references to arrive at the claimed process.”

Outdry Techs. Corp. v. Geox S.p.A.,
859 F.3d 1364, 1370–71 (Fed. Cir. 2017)

Patent Owner's Attacks on Auld Ignore the Law

is done to the other. But here, there are substantial differences between the silo 41 in Auld and the elevator 50 in Waldner. First, a silo is not a bucket elevator and performs a storage function which is different from the transferring function of a bucket elevator. Therefore, Auld does not show a king pin attached to a bucket elevator or anything like it; instead, it shows a king pin attached to a silo. Second, in *Auld*, the entirety of the silo 41 (including wheels 58) is turned upright and lifted into position by the use of a crane. (*Auld*, 5:3-4). In contrast, the bucket elevator 50 (and the bucket elevator 50') in *Waldner* is rotated upward by hydraulic cylinders coupled between a trailer frame and the housing of the bucket elevator while the wheels 28 of Waldner's trailer remain on the ground. (*Waldner*, 15:22-35, 19:25-34, 24:66-25:2.) The king pin in Auld is not attached to a structure that rotates upwards relative to wheels resting on the ground. Instead, it is attached to a structure that is attached to wheels and whose entirety is turned upright and lifted into position.

"Common sense teaches, however, that **familiar items may have obvious uses beyond their primary purposes**, and in many cases a person of ordinary skill will be able to fit the teachings of multiple patents together like pieces of a puzzle. Regardless of [reference's] primary purpose, the design provided an obvious example of an adjustable pedal with a fixed pivot point; and the prior art was replete with patents indicating that a fixed pivot point was an ideal mount for a sensor. **The idea that a designer hoping to make an adjustable electronic pedal would ignore [a reference] because [it] was designed to solve [a different problem] makes little sense. A person of ordinary skill is also a person of ordinary creativity, not an automaton.**"

KSR Int'l Co. v. Teleflex Inc.,
550 U.S. 398 (2007)

Ex. 2004 (Anderson Dec.) ¶146; see also Paper 20 (Reply) at 21-22.

Patent Owner’s Attacks on Auld Ignore the Law

Solaris relies heavily on *Waldner*’s express suggestion that “[o]ther hitch types may alternatively be employed.” (Reply, 21 (citing Ex. 1004, 12:28-34).) But the issue is not one of swapping a kingpin for the gooseneck connection on *Waldner*’s trailer. Rather, the issue is whether it would have been obvious to **chop the front off *Waldner*’s trailer** (including its gooseneck connection) and to **put a kingpin on *Waldner*’s bucket elevator**. That is more than “employ[ing]” an “[o]ther hitch type[.]”

“But we do not ignore the modifications that one skilled in the art would make to a device borrowed from the prior art. *Optivus Tech., Inc. v. Ion Beam Applications, S.A.*, 469 F.3d 978, 989-90 (Fed. Cir. 2006). One skilled in the art would size the components from [secondary reference] appropriately for [the primary reference’s] application, therefore producing an embodiment meeting [the patent] claims.”

In re ICON Health & Fitness, Inc.,
496 F.3d 1374, 1382 (Fed. Cir. 2007)

Paper 33 (Sur-Reply) at 18-19; see also Paper 20 (Reply) at 21-22.

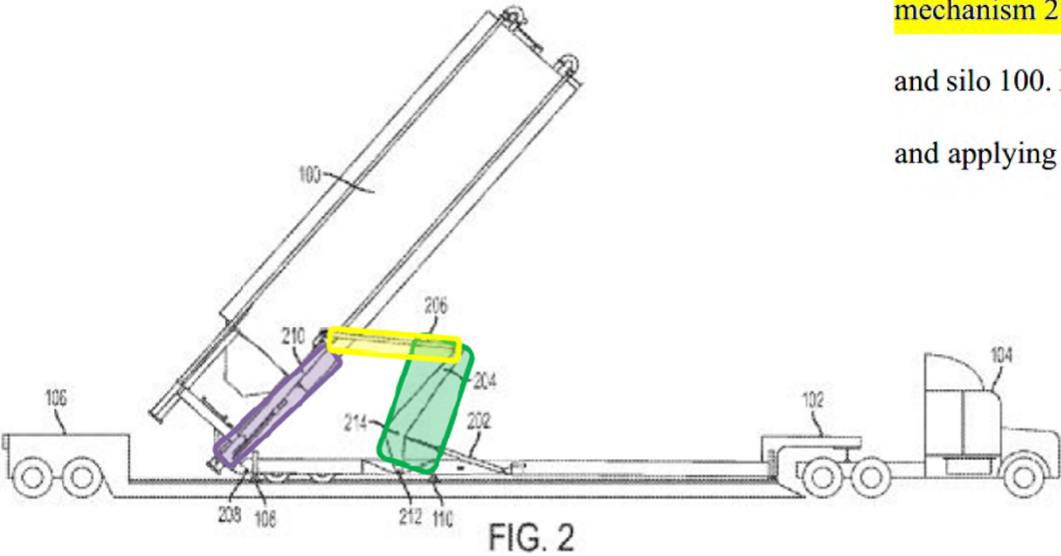
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McIver Discloses Claim 13[I]

13[I]: **at least one lift arm structure** mounted on the base frame and the deployable frame and **forming a linkage** between the base frame and the deployable frame, the at least one lift arm structure being articulated between opposite first and second ends of the arm structure

A POSITA would have understood that rocker arm 204, arm 206, and flipper mechanism 210 provide a lift arm structure that forms a linkage between trailer 102 and silo 100. EX1003, ¶393-394. *McIver* further discloses actuator 202 connected to and applying a force between the ends of rocker arm 204. EX1011, 8:63-9:13, Fig.

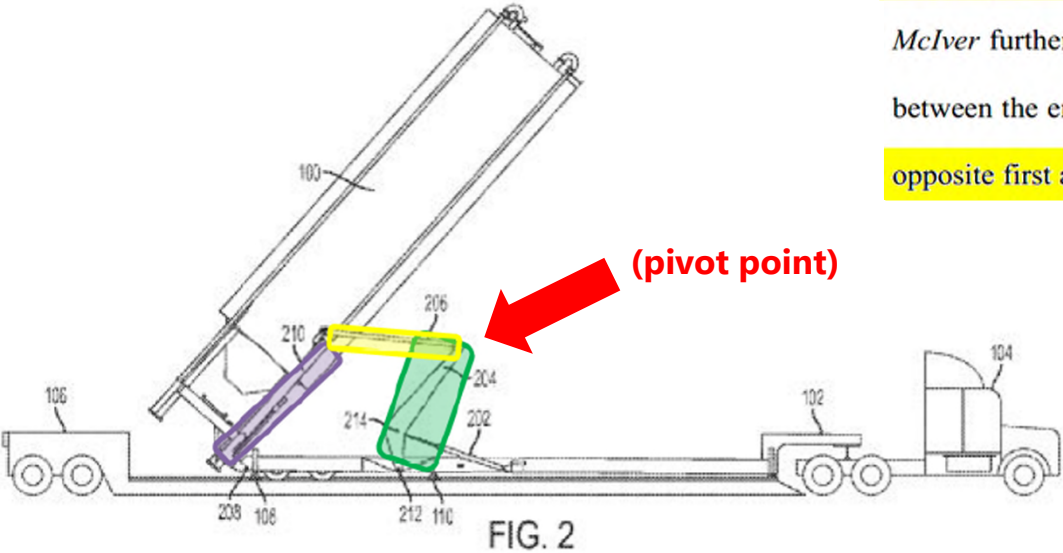


Paper 1 (Petition) at 95; Ex. 1011 (McIver) at Fig. 2.

McIver Discloses Claim 13[I]

13[I]: **at least one lift arm structure** mounted on the base frame and the deployable frame and **forming a linkage** between the base frame and the deployable frame, the at least one lift arm structure **being articulated between opposite first and second ends of the arm structure**

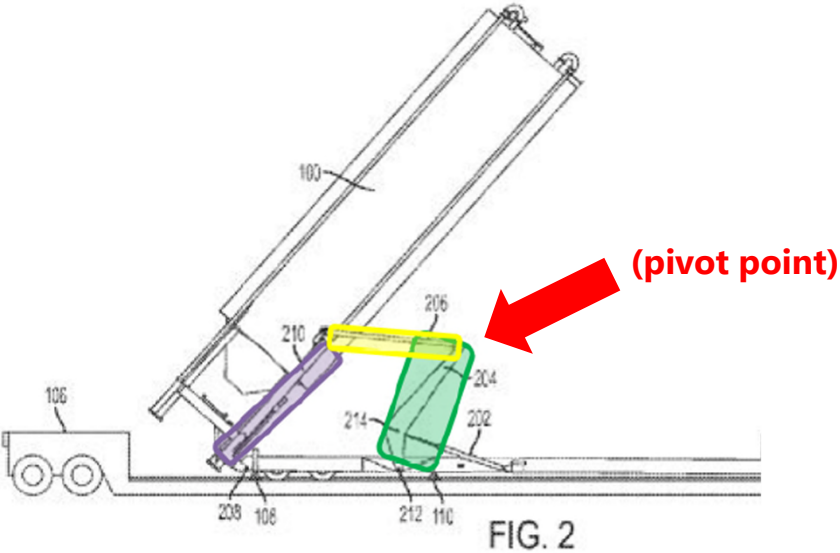
394. A POSITA would have understood that the rocker arm 204, arm 206, and flipper mechanism 210 form a linkage between the trailer 102 and the silo 100. McIver further discloses the actuator 202 being connected to and applying a force between the ends of the rocker arm 204 and that rocker arm is articulated between opposite first and second ends of the arm structure. It would have been obvious for



Ex. 1003 (Durham Decl.) ¶394; see also Ex. 1110 (Supp. Durham Decl.) ¶¶70 & 72.

Mr. Anderson Agrees that McIver Discloses Claim 13[l]

13[l]: **at least one lift arm structure** mounted on the base frame and the deployable frame and forming a linkage between the base frame and the deployable frame, the at least one lift arm structure **being articulated between opposite first and second ends of the arm structure**



Q. [Discussing claim 13(l)] ... I think your definition of "articulated" was two connected parts that move relative to one another, and I'm just asking if a pivoting relative to one another counts as that moving.

A. I think I understand what you're asking. These link arms are moving relative to one another as they articulate, these arms that make up this lift arm structure.

Q. [Discussing McIver] And 204 is connected to 206?

A. Yeah. The rocker arm 204 is connected to 206 on one end and the other end of 206 is connected to the silo.

Q. Where 204 is connected to 206, that's another pivot point?

A. Yes, ma'am.

Ex. 1113 (Anderson Depo) 264:15-265:6 & 267:16-22; see also Ex. 2004 (Anderson Decl.) ¶175; Paper 20 (Reply) at 22-23.

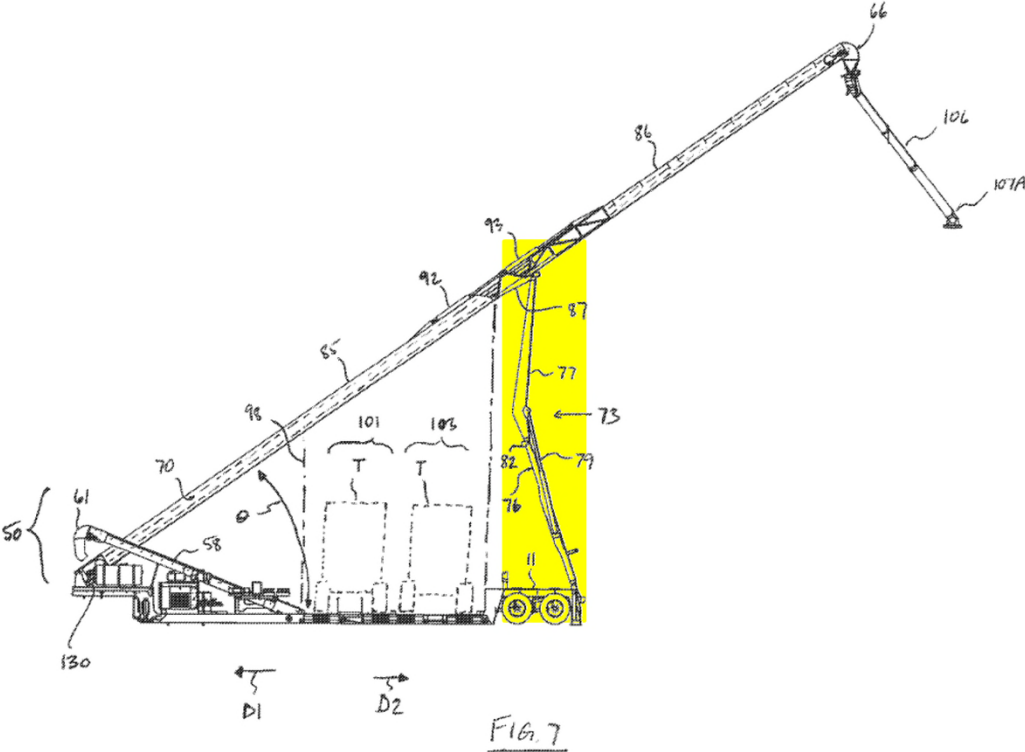
Rationale to Combine Waldner & McIver: Friesen

(12) **United States Patent Friesen**

(54) **PORTABLE DRIVE-OVER CONVEYOR FOR DISCHARGING PARTICULATE MATERIAL AT A HEIGHT SUITABLE FOR FILLING A SILO**

upwardly and downwardly about this connection. Furthermore, a hydraulically actuated scissor-style linkage 73 located at the rear end of the trailer is arranged and operable to effect raising and lowering of the second conveyor assembly between the stored and operating positions.

The scissor linkage 73 is generally of a conventional arrangement comprising a pair of pivotally connected arms 76, 77, each on either side of the conveyor, between which a hydraulic cylinder 79 actuator is connected inwardly of their pivotal interconnection at 82 so that the arms can move from a folded position in which one effectively overlies the other to an extended position in which the arms are effectively vertically stacked one on top of the other. The cylinder



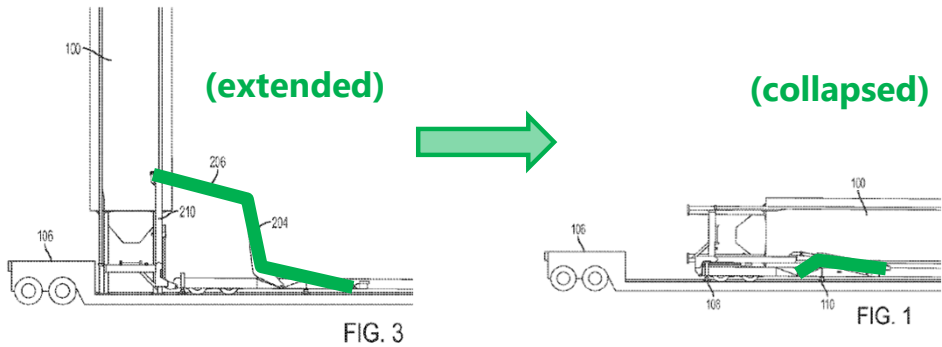
Ex. 1010 (Friesen) 10:61 – 11:6 & Fig. 7; see Paper 1 (Petition) at 92; Ex. 1003 (Durham Decl.) ¶¶376-377.

Rationale to Combine: Increase Range of Motion & Compactness

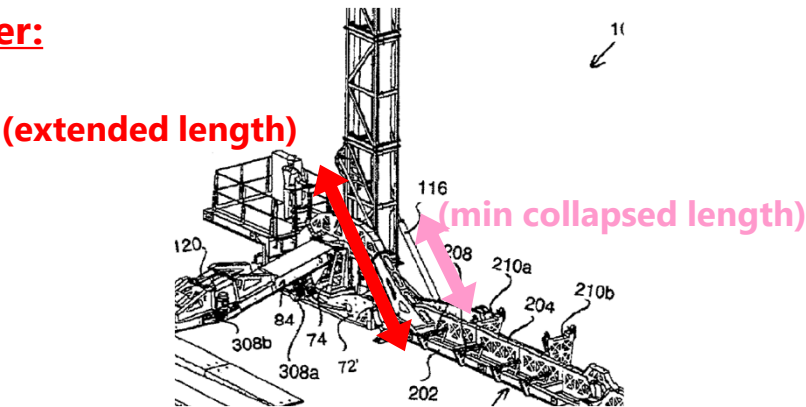
Fig. 2. A POSITA would have recognized that *McIver’s* actuator 202 and arms 204, 206 is more compact and has a longer range of motion than *Waldner’s* cylinders 116 (see EX1011 Figs. 1-2), and so would have been motivated to replace *Waldner’s* cylinders with *McIver’s* actuator 202 and arms 204, 206, or modify *Waldner’s* cylinders to connect to an arm structure forming a linkage between the trailer frame and bucket elevator to provide those advantages. EX1003, ¶372-373. Although

373. A POSITA would have recognized that the rocker arm mechanism of *McIver* would increase range of motion of the system without extending the length of the cylinder 202, and would increase compactness when in the folded / lowered configuration, and would have been motivated to include the rocker arm mechanism in the system of *Waldner/Dynatek* to take advantage of these benefits. This

McIver:



Waldner:



Paper 1 (Petition) at 92; Ex. 1003 (Durham Decl.) ¶ 373; Ex. 1011 (McIver) Figs. 1 & 3 (annotated); Ex. 1004 (Waldner) Fig. 15 (annotated).

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- VIII. Secondary Considerations

Construction of Claim 6

"a conveyor support frame supporting the segments of the extension conveyor on the aggregate elevating assembly...."

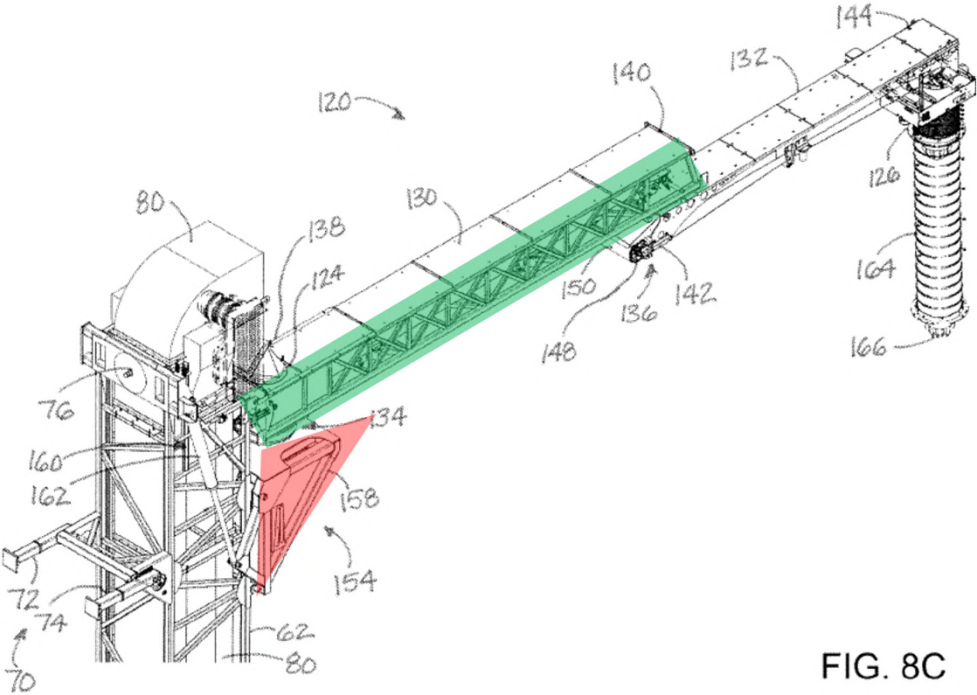


FIG. 8C

Petitioners' Construction:
plain meaning

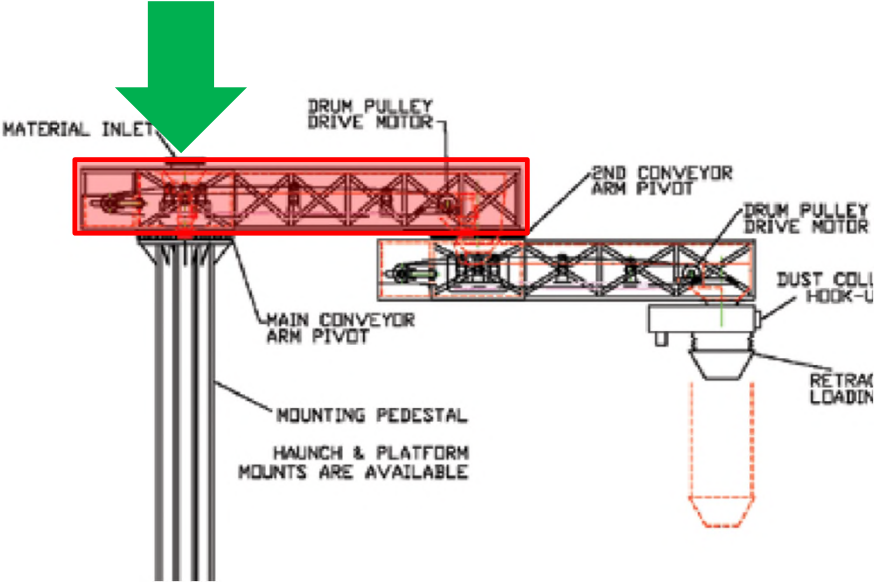
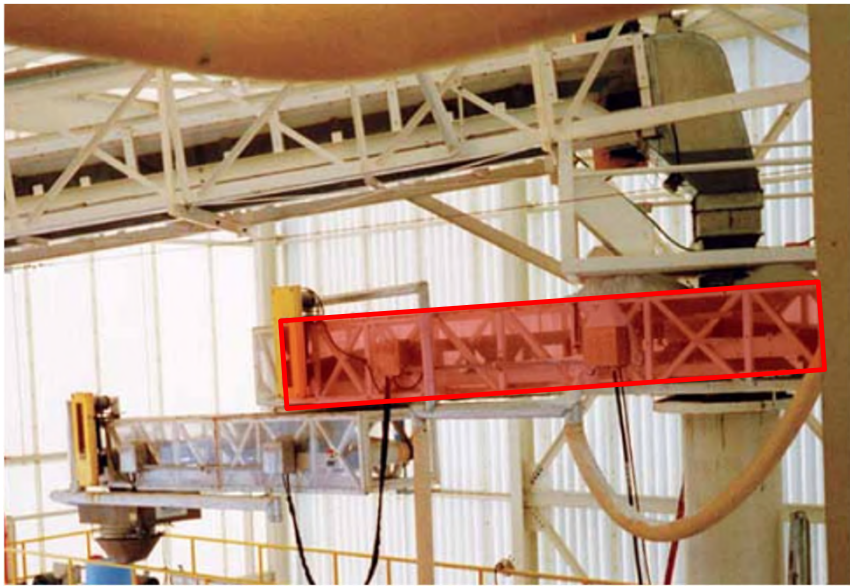
Patent Owner Construction:

- element 154 only
- NOT truss frame around the extension conveyor

Ex. 1001 ('689 Patent) at Fig 8C; see Paper 13 (Resp.) at 46-47; Paper 1 (Petition) at 24; Paper 20 (Reply) at 16-17.

Claim 6: Dynatek's Truss Frame Meets Patent Owner's Construction

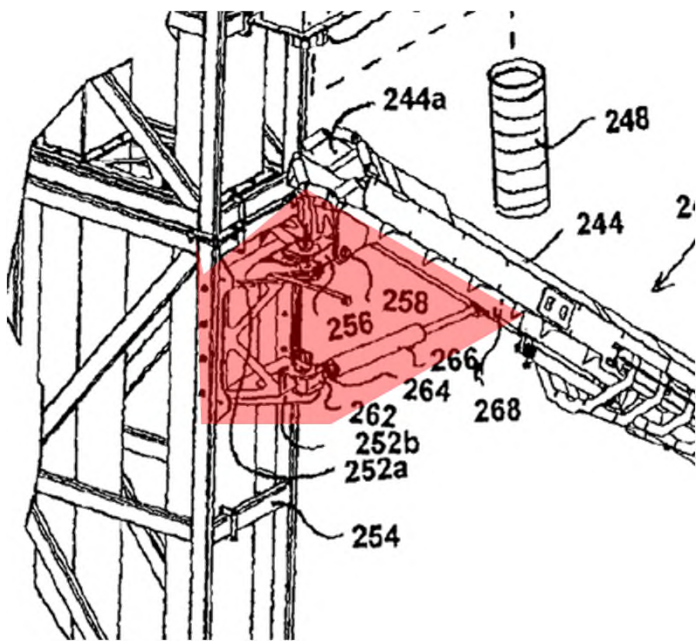
"a conveyor support frame supporting the segments of the extension conveyor on the aggregate elevating assembly...."



Ex. 1005 (Dynatek) at 1; see Ex. 1003 (Durham Decl.), ¶¶178-179; Paper 1 (Petition) at 49-50; Paper 20 (Reply) at 17.

Claim 6: Waldner Meets Patent Owner's Construction

"a conveyor support frame supporting the segments of the extension conveyor on the aggregate elevating assembly...."



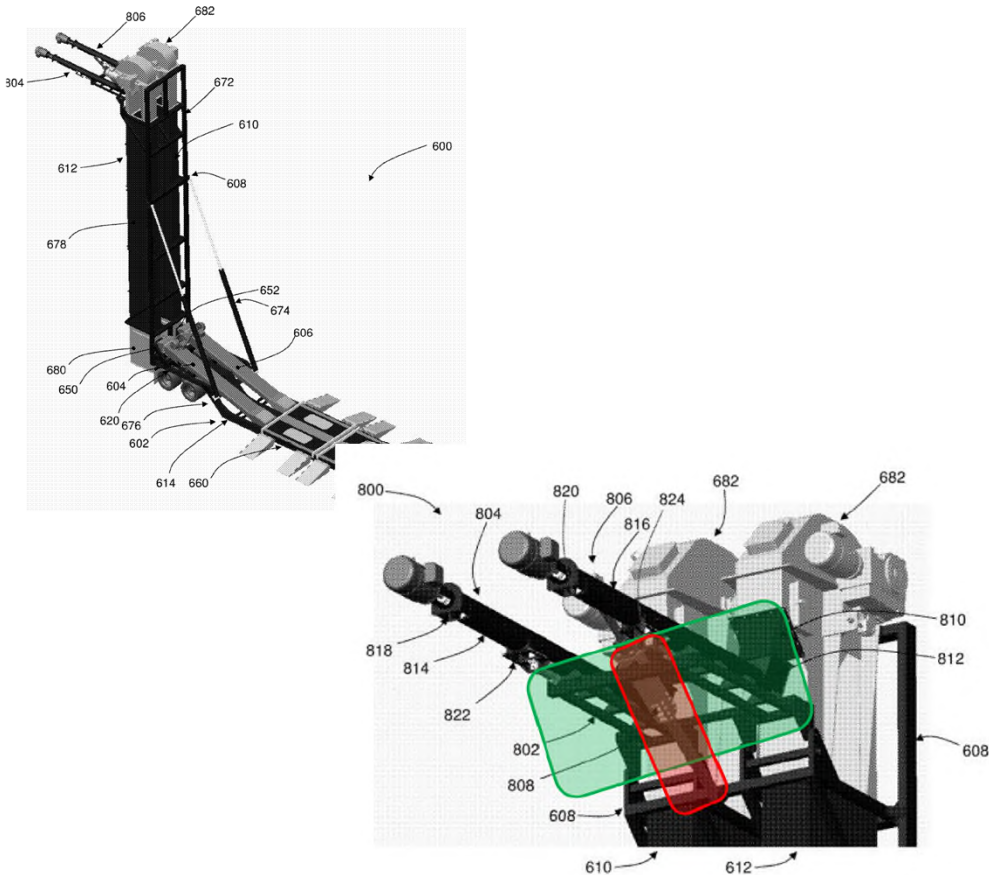
- Brackets 252a/b
- Links 256/262
- Pins 258/264

Ex. 1004 (Waldner) Fig 22A; see Ex. 1003 (Durham Decl.) ¶¶175-177; Paper 20 (Reply) at 17.

Claim 6: Pham Meets Patent Owner’s Construction (Ground 2)

See Ground 1, Claim 6[a]; EX1003, ¶303. To the extent that *Waldner* and *Dynatek* do not teach Claim 6[a], *Pham* discloses auger conveyors supported by an “articulated support frame 802.” EX1008, 14:14-15. *Pham* further discloses the support frame 802 (green below) being “movably connected with mast assembly 608” and movable by articulation mechanism 808 (red below) thus enabling support frame 802 to move to/from an operational and stowed orientation.” *Id.*, 14:15-18, 14:18-15:5; Fig. 19.

¶299-300. Adding *Pham*’s moveable support frame 802 and articulation mechanism 808 to support those components of *Waldner* and *Dynatek*, or modifying *Waldner*’s system to incorporate a moveable support frame and mechanism for moving that frame relative to the bucket elevator frame per *Pham*’s teachings, would allow the modified system to be more easily convertible and transportable on *Waldner*’s trailer. *Id.*



Ex. 1008 (Pham) Figs. 9 & 19; Paper 1 (Petition) at 76-77; see also Ex. 1003 (Durham Decl.) ¶¶300-301 & 304-306.

Ground 2: Patent Owner's Attack Ignores the Law

The Petition's proffered reason for using *Pham* is to make the *Waldner/Dynatek* combination "more easily convertible and transportable on *Waldner*'s trailer." (Petition, 76, 79.) Solaris's Reply repeats that reason in different words: to "facilitate collapsing the discharge chute into the stowed position." (Reply, 19.) But the Reply provides no answer to the fact that *Waldner* already has that functionality. (POR, 54; Reply, 19.) Thus, the proffered reason to use *Pham* is not a reason at all.

"[W]e have repeatedly held that an implicit **motivation to combine exists** not only when a suggestion may be gleaned from the prior art as a whole, but when the 'improvement' is technology-independent and the combination of references results in a product or process that is more desirable, for example because it is stronger, cheaper, cleaner, faster, lighter, smaller, more durable, or more efficient. **Because the desire to enhance commercial opportunities by improving a product or process is universal — and even common-sensical** — we have held that there exists in these situations a motivation to combine prior art references even absent any hint of suggestion in the references themselves."

DyStar Textilfarben GmbH & Co. v. CH Patrick Co.,
464 F. 3d 1356,1368 (Fed. Cir 2006)

Claim 7: Extension Conveyor Lift Structure

Claim 7: "The apparatus of claim 1 wherein ***the extension conveyor lift structure*** comprises at least one extension actuator extendable to pivot the conveyor support frame away from the deployable frame and move the extension conveyor to the raised position, the at least one extension actuator being retractable to pivot the conveyor support frame toward the deployable frame and move the extension conveyor to the lowered position."

Claim 6[b]: "***an extension conveyor lift structure*** acting on the conveyor support frame for moving the extension conveyor between the lowered position and the raised position"

Claim 7: Petition Applies Waldner's Actuator 266

Petition:

c) Claim 6[b]: “an extension conveyor lift structure ...”

As explained with respect to Claim 6[a], actuators 266/270 act on the conveyor support frame to move discharge chute 242 between the lowered and raised positions. *See also* EX1003, ¶180.

b) Claim 6[a]: “a conveyor support frame...”

Waldner discloses brackets 252a, 252b disposed on the bucket elevator 50, with actuator 266 coupled to bracket 252b and discharge chute 242, and actuator 270 coupled between bucket elevator frame 254 and bracket 252a. EX1004, 25:22-23, 25:50-57, Fig. 22D. “[E]xtension of actuator 266 swings the discharge end 246a upwardly and outwardly away from the bucket elevator frame,” and actuation of actuator 270 rotates (*i.e.*, moves) a link 256 coupled to bracket 252a through a pivot pin. *Id.*, 25:30-27:19. A POSITA would have understood that brackets 252a/252b, links 256/262, and the horizontal and vertical pivot pins collectively provide a conveyor support frame that supports the extension conveyor relative to the aggregate elevating assembly and would be movable when transitioning between lowered and raised positions. EX1003, ¶175-77.

Paper 1 (Petition) at 49-50; see also Paper 20 (Reply) at 17 n.13.

Claim 7: Petition Applies Waldner’s Actuator 266

Dr. Durham:

f. Claim 7: “The apparatus of claim 1 wherein the extension conveyor lift structure comprises at least one extension

181. As discussed above regarding Claim 6, *Waldner* discloses “extension of actuator 266 swings the discharge end 246a upwardly and outwardly away from the bucket elevator frame”²⁰¹ and “collapse of actuator 266 pulls the discharge end 246a of the discharge member 242 inwardly toward the elevator frame 254, thus establishing a collapsed position of the discharge member 262 [*sic.* 242] lying generally parallel to the bracket equipped side of the elevator frame 254.”²⁰² *Waldner* discloses that actuating actuator 270 allows upper link 256 of upper mounting bracket 252a to swing “under extension and retraction of this actuator 270.”²⁰³ *Waldner* further discloses that discharge chute 242 “is movable relative to the elevator frame 254 about the vertical axis shared by the pivot pins of the two

mounting brackets, and also about the horizontal axis of the pivot pin 258 between the upper link 256 and the discharge member 242.”²⁰⁴ . A POSITA would have understood that acting upon the upper link 256 through the actuator 270 occurs through pivoting about the pivot pin in bracket 252a, and such pivoting moves upper link 256 relative to elevator frame 254. Actuators 266/270 teach the “extension actuator” claimed.

Ex. 1003 (Durham Dec.) ¶181

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- IV. Rationale to Combine Waldner & Dynatek (all grounds)**
- V. Auld: POSITA would combine with Waldner (Ground 3 / 3A; claims 12 & 25)**
- VI. McIver: Discloses articulated lift arm that POSITA would combine with Waldner (Ground 4 / 4A; claim 13)**
- VII. "Conveyor support frame" (Grounds 1 / 1A & 2 / 2A; dep. claim 6 & 7)**
- VIII. Secondary Considerations**

Patent Owner Does Not Show that Solaris’ System Practices the Claims

Solaris’s Top Fill machines are copies of Masaba’s machine and—not surprisingly—it is apparent that they both satisfy the requirements of every claim of the ’689 Patent discussed in this response. (Compare Ex. 1001, 16:14-24:63 with Exs. 2007, 2008, 2011, 2025-2030, 2005 ¶¶17-21; see also Ex. 2037 (Exhibit 9).)

Masaba presented ample evidence. Photographs of Solaris’s system as well as Solaris’s brochures, presentations, and animations clearly show that its system has all the elements of the claims at issue and is coextensive with them. (Exs. 2007, 2008, 2011, 2025-2030, 2005 ¶¶17-21 & Appx. B.) And Masaba’s infringement

“Patent Owner advises us to **view the photos** and reach our own conclusion that the surfaces show axial relief, **but we decline that invitation.** Thus, we find that Patent Owner has not demonstrated that the licensed products are co-extensive with the claimed invention. Accord *Volvo Penta of the Americas, LLC v. Brunswick Corporation*, 81 F.4th 1202, 1210–11 (Fed. Cir. 2023) (holding that the Board correctly found conclusory arguments and declaration to be insufficient to establish a nexus).”

Viking Drill & Tool, Inc. v. Wang,
IPR2023-00474, 2024 WL 3311903, at *14 (July 5, 2024)

Paper 13 (Response) at 72; Paper 33 (Sur-Reply) at 21; see Paper 20 (Reply) at 23.

Praise & Commercial Success Are Based On Features in Prior Art

Praise of Petitioners’ Top Fill System

“The Solaris top fill system enables our sand system to be compatible with belly dump trucks without losing the backup option and reliability of multiple offload points for pneumatic trucks. Belly dump trucking allows for increased sand volume per truck load and increases the number of turns per truck. Our system is not only unique in its redundancy, but can also be supported by multiple electric power sources. The result is our customers benefit from a higher truck payloads and faster unloading times, resulting in fewer trucks and drivers needed to supply well sites. And ultimately lower cost.”

Dr. Durham / Prior Art

and Solaris’ touting of that system during investor calls.² Patent Owner also acknowledges that Solaris touted the “belly dump capability” of that system (and the faster unload times that belly dumping allows) as the feature responsible for that success.³ In the same investor calls that Patent Owner cites, Solaris likewise confirmed that this feature was “one of the largest drivers” for the success of its Top Fill system.⁴ However, the ability to use belly dumping trucks to fill silos was known in the art before the ‘689 Patent. For example, that capability is clearly disclosed in several of the prior art references cited in my original Declaration, including *Waldner* (the primary reference for all grounds in this IPR) and *Sleeman*. The only

FIG. 1 shows a portable or mobile conveyor system according to one embodiment of the present invention. The system provides an all-in-one solution for emptying of particulate or granular material from a bottom-unload vehicle such as a hopper-bottom transport truck or trailer and for vertically conveying the material up to an elevated location using an on-board bucket conveyor, which is fed by

Ex. 2016 (Solaris Earnings Call) at 3:23; Ex. 1110 (Supp. Durham Decl.) ¶7; Ex. 1004 (Waldner), 11:59-67; see also Paper 20 (Reply) at 23-24.

Patent Owner Misapplies Law on Rebutting Nexus

Solaris next argues that the nexus presumption is rebutted because Solaris's praise and the Top Fill's commercial success is attributable to the system's transportability and ability to accept belly-dumped sand, features in the *Waldner* and *Sleeman* prior art. (Reply, 23-24.) But to rebut the nexus presumption, Solaris must prove that the praise and commercial success are due *solely* to those prior art features and not due to *a combination that includes* those features. *Ecolochem, Inc. v. Southern California Edison Co.*, 227 F.3d 1361, 1378 (Fed. Cir. 2000). Solaris *cannot* meet that burden because the Top Fill's ability to accept belly-dumped sand depends on its bucket elevator and articulated belt conveyor. In arguing for

Patent challenger chose patented system "because **[other systems] provided poor quality water** and constantly shuttled demineralization trucks ... to meet [] capacity requirements," and admitted that patented process "enabled it ... to regenerate its trailers on-site and **provide purer quality water** at the large volumes...."

"These statements make it clear that the commercial success of [patentee's] product was, in fact, based on two factors: the improved filtration process, and the mobility of the commercial embodiment. ... The success was due to both the mobility, undisputedly not covered by the claims, and to the improved filtration process, undisputedly covered by the claims."

Ecolochem, Inc. v. Southern Cal. Edison Co.,
227 F.3d 1361, 1378 (Fed. Cir. 2000)

Skepticism of Bucket Elevators

First, Solaris’s skepticism of bucket elevators—which Solaris attributed to the entire “oil field” industry—is probative of nonobviousness in this case. *Gillette Co. v. S.C. Johnson & Son, Inc.*, 919 F.2d 720, 726 (Fed. Cir. 1990) (explaining that an infringer’s skepticism was “relevant and persuasive evidence” of nonobviousness); *WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1335 (Fed. Cir. 2016) (“Evidence of industry skepticism weighs in favor of non-obviousness.”).

Patentee’s “arguments fail because it has not shown that its relied-on success, skepticism, adoption, or praise, etc., were a ‘direct result of the unique characteristics of the claimed invention’—in this case, were ‘attributable to the claimed combination of [prior art features], **as opposed to, for example, prior art features in isolation** or unclaimed features.’”

SynQor, Inc. v. Vicor Corp., No. 2021-2211, 2023 WL 234186, at *4 (Fed. Cir. Jan. 18, 2023)

Paper 13 (Response) at 71; see also Paper 20 (Reply) at 4-5 & 25; Ex. 1110 (Supp. Durham Decl.) ¶10.

Petitioners’ Patent Does Not Show Copying

- No analysis of Solaris’ patent claims
- No comparison of Solaris’ patent to ‘689 Patent claims
- No expert testimony about Solaris’ patent at all


US011858760B1

(12) **United States Patent**
Weinstein et al.

(10) **Patent No.:** **US 11,858,760 B1**
(45) **Date of Patent:** **Jan. 2, 2024**

(54) **SYSTEMS AND METHODS FOR FILLING A PROPPANT SILO**

(58) **Field of Classification Search**
None.
See application file for complete search history.

(71) Applicant: **SOLARIS OILFIELD SITE SERVICES OPERATING LLC,**
Houston, TX (US)

(56) **References Cited**
U.S. PATENT DOCUMENTS
9,428,348 B2* 8/2016 Teichrob B65D 88:32
10,633,174 B2* 4/2020 Pham B65D 88:54
11,691,831 B2* 7/2023 Sleeman B65G 47:58
2016/0244268 A1* 8/2016 Ritter B65G 41:008
* cited by examiner
Primary Examiner — Kavel Singh
(74) Attorney, Agent, or Firm — MH2 TECHNOLOGY LAW GROUP, LLP

(72) Inventors: **Jeremy Weinstein,** Tomball, TX (US);
Scott Lambert, The Woodlands, TX (US); **Jeffrey Martinez,** The Woodlands, TX (US)

(73) Assignee: **SOLARIS OILFIELD SITE SERVICES OPERATING LLC,**
Houston, TX (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(57) **ABSTRACT**
A system includes a base configured to be positioned on a ground. The base includes a first conveyor configured to convey a granular material. The system also includes a derrick coupled to the base. The derrick is configured to be oriented substantially horizontally when the system is in a folded state. The derrick is configured to be oriented substantially vertically when the system is in an unfolded state. The derrick includes a second conveyor configured to receive the granular material from the first conveyor and to convey the granular material. The system also includes a first arm coupled to the derrick. The first arm includes a third conveyor configured to receive the granular material from the second conveyor and to convey the granular material.

(21) Appl. No.: **18/325,391**

(22) Filed: **May 30, 2023**

(51) **Int. Cl.**
B65G 65/32 (2006.01)
B65G 41/00 (2006.01)
B65G 3/04 (2006.01)

(52) **U.S. Cl.**
CPC **B65G 65/32** (2013.01); **B65G 3/04** (2013.01); **B65G 41/002** (2013.01); **B65G 41/008** (2013.01); **B65G 2201/042** (2013.01)

19 Claims, 9 Drawing Sheets

Ex. 2031 (‘760 Patent) at 1; see Paper 20 (Reply) at 26-27; Paper 34 (Pet. Mot. to Exclude) at 1-2.

Petitioners' Top Fill Systems Do Not Show Copying

“Our case law holds that copying requires evidence of efforts to replicate a specific product, which may be demonstrated through

- internal company documents,
- direct evidence such as disassembling a patented prototype,
- photographing its features using the photograph as a blueprint to build a replica, or
- access to the patented product combined with substantial similarity to the patented product.

[Patentee] introduced no such evidence here.”

Wyers v. Master Lock Co.,
616 F. 3d 1231, 1246 (Fed. Cir. 2010)



See Paper 20 (Reply) at 26.

Patent Owner's Work Was a Commercial Failure

35. Masaba was finally ready to deliver the first unit in late August 2021—three months later than the shipment date in the purchase order and two months later than Masaba had promised at the April 6th meeting. While transporting the unit to Texas on August 24, 2021, the unit was involved in an accident just south of the Hebron Weigh Station on Highway 81 in Thayer County, Nebraska. As I later learned, an axle broke in the middle of the highway and the wheels fell off, which caused the entire unit to crash and drag along the highway. Pictures that were sent to me by Joseph Markward, a Solaris employee, showing the unit on the highway with the wheels off are reproduced below:



Ex. 1112 (Weinstein Decl.) ¶35; see Paper 20 (Reply) at 25-26.

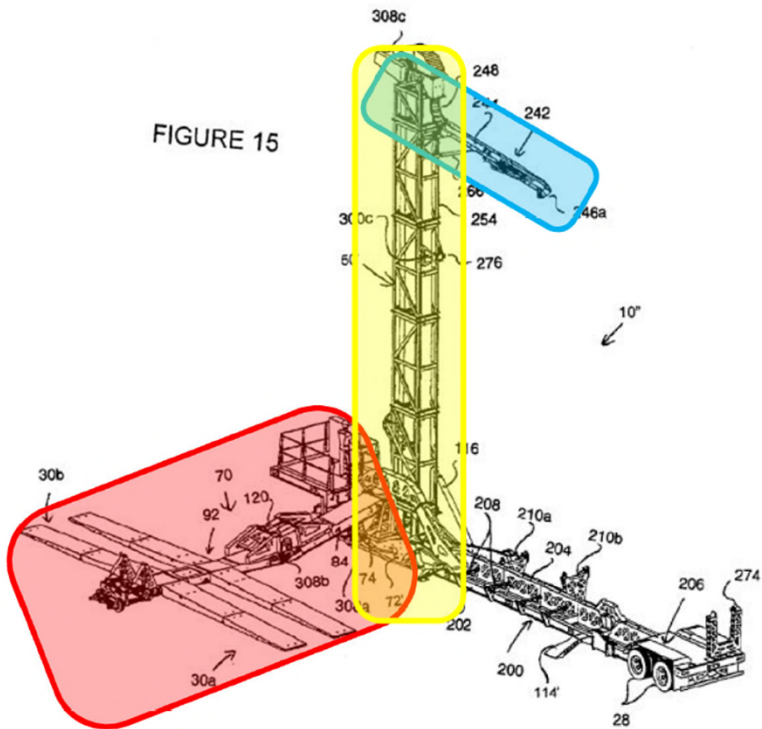


Additional Slides

IPR2024-01179 (U.S. Patent No. 11,780,689)

Waldner (Ex. 1004)

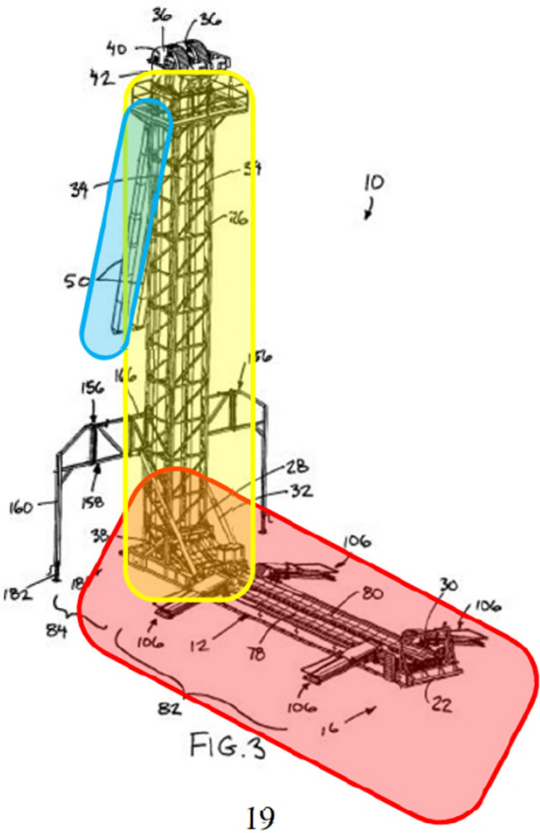
- **Trailer frame 10 with ramps 30 and belt conveyor 42**
- **Bucket elevator 50 with housing structure 52**
- **Discharge chute member 252 including proximal section 244 and distal section 246**



Paper 1 (Petition) at 14-17.

Sleeman (Ex. 1006)

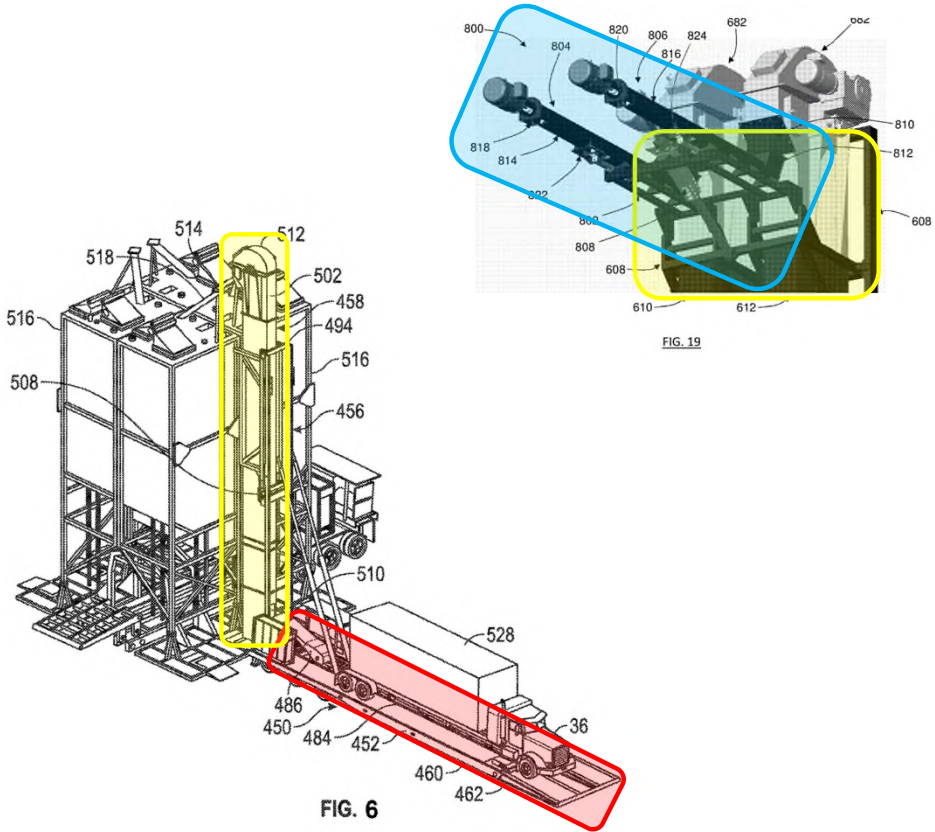
- **Base frame 12 with conveyors 78/80**
- **Bucket elevators 34 in main frame 26**
- **Discharge spouts 50 including first duct 52 and second duct 54**



Paper 1 (Petition) at 19-20.

Pham (Ex. 1008)

- **Chassis 452 and support base 460**
- **Vertical first conveyor assembly 458 with mast assembly 456 / 608**
- **Auger conveyors 804 / 806 supported by articulated support frame 802**



Paper 1 (Petition) at 20-21; see Ex. 1008 at Figs. 6 & 19 (annotated above).

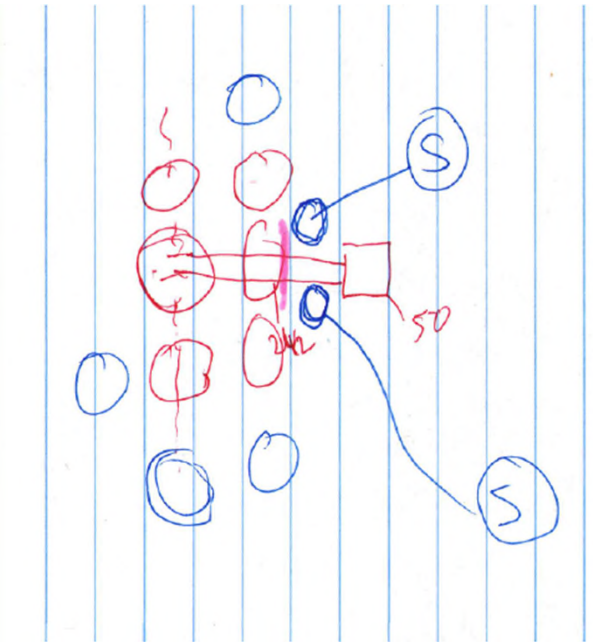
#1: Increase Reach / Range of Motion

Mr. Anderson: system with telescoping gravity fed chute cannot reach silos "S" closer to bucket elevator without making chute's downward angle steeper

Q. Okay. I'm going to add another feature that I remember. The length of the inboard -- the proximal segment of the chute 242, and it's at the pink line. So this is the shortest that the segment can become.

Q. So for the silos that I've marked with an S here, is it true that the chute of Waldner would not be able to reach these silos S?

A. Again, it's part of the whole --we're looking at these hypotheticals. It's a potential that it could depending on how much it can compress and how much distance. It may be that the chute is much steeper in which case it would be advantageous. It could pass a much greater flow rate. But it could potentially still hit those silos.



Ex. 1113 (Anderson Depo.) 331:16 – 332:11; Ex. 1041; see also Paper 20 (Reply) at 6.

“Real World” Evidence: Skepticism of Bucket Elevators

There are several problems with these assertions. First, in the real world, the skepticism that Solaris expressed about bucket elevators—which Solaris attributed to the entire industry—would have steered a POSITA away from *Waldner* as a starting point in the first place, because *Waldner* uses a bucket elevator. Second, for the reasons explained below, none of the “motivations” proffered by Solaris withstands scrutiny. (Ex. 2004, ¶¶36-51.)³

Paper 13 (Response) at 30; Ex. 1028; see also Ex. 1113 (Anderson Depo.) 39:8-42:6; Paper 20 (Reply) at 5 n.3.

(19) **United States**

(12) **Patent Application Publication**
Grimes et al.

(10) Pub. No.: US 2021/0354910 A1

(43) Pub. Date: Nov. 18, 2021

(54) **PROPPANT SUPPLY SYSTEM**

(71) Applicant: NATIONAL OILWELL VARCO, L.P.,
Houston, TX (US)

(72) Inventors: Sandor Weaver Grimes, Bryan, TX
(US); Travis Adair Anderson, Seguin,
TX (US); Clayton Thomas Martin,
Bryan, TX (US); Tiffany Louis
Matthews, Bryan, TX (US); Scott
Allen Toler, College Station, TX (US)

(21) Appl. No.: 17/250,838

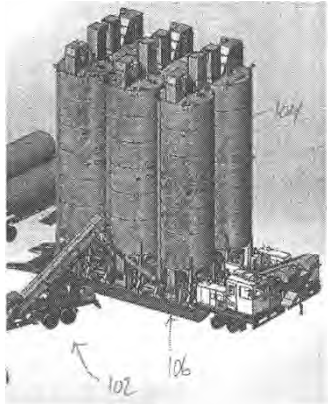
(22) PCT Filed: Sep. 13, 2019

Publication Classification

(51) Int. Cl.
B65D 88/30 (2006.01)
B65D 88/32 (2006.01)
B65G 3/04 (2006.01)

(52) U.S. CL
CPC B65D 88/30 (2013.01); B60P 1/16
(2013.01); B65G 3/04 (2013.01); B65D 88/32
(2013.01)

(57) **ABSTRACT**



(57) **ABSTRACT**

A mobile proppant delivery system may include a system for unloading proppant transport trailers, storing proppant in silos, and feeding proppant to frac operations. The system may include drive-over conveyors, swiveling distribution heads, internal silo bucket elevators, gravity feed, choke filling, and bases designed with internal conveying systems.

“Real World” Evidence: Skepticism of Bucket Elevators

There are several problems with these assertions. First, in the real world, the skepticism that Solaris expressed about bucket elevators—which Solaris attributed to the entire industry—would have steered a POSITA away from *Waldner* as a starting point in the first place, because *Waldner* uses a bucket elevator. Second, for the reasons explained below, none of the “motivations” proffered by Solaris withstands scrutiny. (Ex. 2004, ¶¶36-51.)³



Meet our Prophandler 400. Equipped with a telescopic boom, this tower belt system uses a bucket elevator to move between 6 to 8 tons of sand per minute. With a 130-foot horizontal reach and a 300-degree working radius, it outperforms and outproduces any other tower belt system in the market.

Combined with our silica dust control technology, our tower belt system creates zero dust, using a choke fill method to guarantee clean and safe air quality. Easy to use and operate, the entire system requires as few as 2 people to run to reduce on-site costs and workplace hazards.

Paper 13 (Response) at 30; Ex. 1037 & 1038; see also Paper 20 (Reply) at 5 n.3.

Construction of Claim 6: Truss Frame in the '689 Specification

"a conveyor support frame supporting the segments of the extension conveyor on the aggregate elevating assembly...."

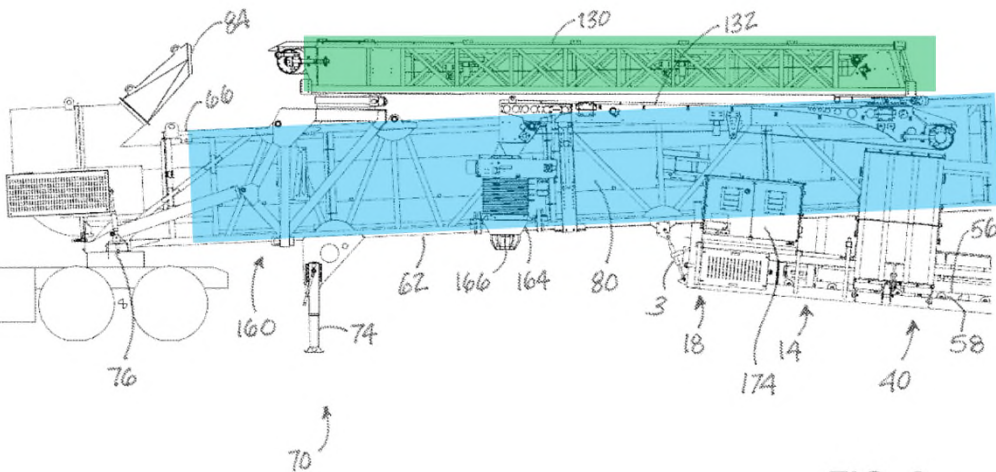


FIG. 3

of FIG. 2A and the raised position of FIG. 5D. The lowered position of the extension conveyor 122 may correspond to the transport configuration of the apparatus 10, and the raised position of the conveyor 122 may correspond to an operational configuration of the apparatus. The lowered position may be further characterized by the extension conveyor 122 being positioned adjacent to the deployable frame 62 of the aggregate elevating assembly 60, and the extension conveyor may be oriented substantially parallel to the deployable frame 62 in the lowered position. The raised

Ex. 1001 ('689 Patent) 9:50-55 & Fig. 3; see also Paper 33 (Sur-Reply) at 14.

Construction of Claim 6: : Truss Frame in the '689 Specification

"a conveyor support frame supporting the segments of the extension conveyor on the aggregate elevating assembly...."

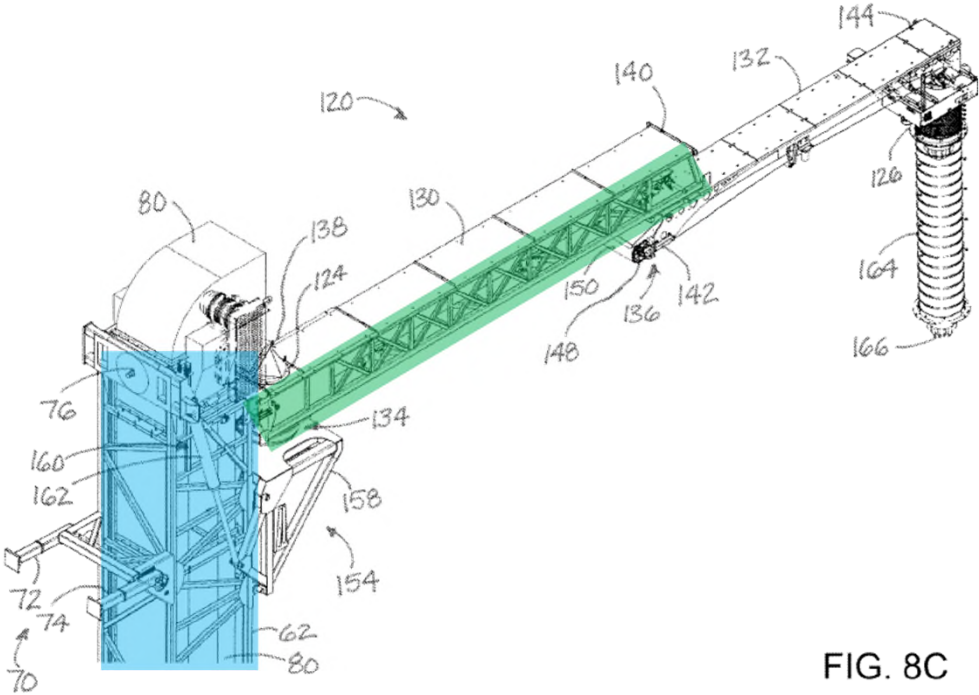


FIG. 8C

mechanism. In some embodiments, an inboard pivot actuator 135 may be configured to pivot the inboard segment 130 with respect to the deployable frame 62, and the inboard pivot actuator may act between the deployable frame and the truss frame of the inboard segment. Additionally, an outboard pivot actuator 137 may be configured to pivot the outboard segment 132 with respect to the inboard segment 130, and the outboard pivot actuator may act between the inboard and outboard segments. Illustratively, the inboard pivot actuator 135 and the outboard pivot actuator 137 may comprise, such as, for example, a slew drive mechanism which may be highly suitable for permitting transfer of aggregate from the elevating conveyor 80 to inboard segment 130 of the extension conveyor 122, and from the inboard segment to the outboard segment 132 of the extension conveyor.

Ex. 1001 ('689 Patent) 10:44-59 & Fig. 8C.

Praise / Commercial Success Are Based On Features in Prior Art

Praise of Petitioners’ Top Fill System

“The demand for the system and its functionality really is growing and has additional customer, you know, uptake. And you can look at it in two places, right? Are we adding more well sized storage or is it really driven by the volume of sand per truck? And so I think one of the features is you know we have plenty of unloading capacity through the traditional methods. But if you can increment up a truck by 10 to 15% and shortage of drivers. You're going to, you're going to lower your driver need and driver time by moving to the belly dump and ***I think that's one of the largest drivers for the what and the why of the top fill.***”

Dr. Durham / Prior Art

and Solaris’ touting of that system during investor calls.² Patent Owner also acknowledges that Solaris touted the “belly dump capability” of that system (and the faster unload times that belly dumping allows) as the feature responsible for that success.³ In the same investor calls that Patent Owner cites, Solaris likewise confirmed that this feature was “one of the largest drivers” for the success of its Top Fill system.⁴ However, the ability to use belly dumping trucks to fill silos was known in the art before the ‘689 Patent. For example, that capability is clearly disclosed in several of the prior art references cited in my original Declaration, including *Waldner* (the primary reference for all grounds in this IPR) and *Sleeman*. The only

FIG. 1 shows a portable or mobile conveyor system according to one embodiment of the present invention. The system provides an all-in-one solution for emptying of particulate or granular material from a bottom-unload vehicle such as a hopper-bottom transport truck or trailer and for vertically conveying the material up to an elevated location using an on-board bucket conveyor, which is fed by

Ex. 2012 (Solaris Earnings Call) at 27:38; Ex. 1110 (Supp. Durham Decl.) ¶7; Ex. 1004 (Waldner), 11:59-67; see also Paper 20 (Reply) at 23-24.