

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SOLARIS OILFIELD SITE SERVICES OPERATING, LLC, and SOLARIS
OILFIELD SITE SERVICES PERSONNEL, LLC,

Petitioners

v.

MASABA, INC.,

Patent Owner

Case No. IPR2024-01179

Patent 11,780,689

**PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 11,780,689**

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LIST OF EXHIBITS

Exhibit #	Description
EX1001	U.S. Patent No. 11,780,689 to Brenden et al. (“the ’689 Patent”)
EX1002	CV of Petitioners’ Expert
EX1003	Expert Declaration of Petitioners’ Expert
EX1004	U.S. Patent No. 9,663,303 to Waldner et al. (“ <i>Waldner</i> ”)
EX1005	<u>Belt Conveyor-based Loading Systems</u> , https://web.archive.org/web/20160819111857/http://mcschroeder.com/wp-content/uploads/2012/09/Product-Spec-Sheet-Belt-EconoLoader.pdf (August. 19, 2016) (“ <i>Dynatek</i> ”)
EX1006	U.S. Patent No. 11,691,831 to Sleeman et al. (“ <i>Sleeman</i> ”)
EX1007	U.S. Patent No. 3,938,673 to L. F. Perry, Jr. (“ <i>Perry</i> ”)
EX1008	U.S. Patent No. 10,633,174 to Pham et al. (“ <i>Pham</i> ”)
EX1009	U.S. Patent No. 3,090,501 to John A. Auld (“ <i>Auld</i> ”)
EX1010	U.S. Patent No. 10,577,198 to Henry Friesen (“ <i>Friesen</i> ”)
EX1011	U.S. Patent No. 8,926,252 to McIver et al. (“ <i>McIver</i> ”)
EX1012	File History of ’689 Patent
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EX1014	Affidavit of Nathaniel E. Frank-White regarding <i>Dynatek</i>
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EX1020	U.S. Patent Application Publication 2016/0258267 by Mark Payne et al. entitled “Well Fracturing Systems with Electrical Motors and Methods of Use” (“Payne”)
EX1021	U.S. Department of Labor, OSHA, “Worker Exposure to Silica during Hydraulic Fracturing”, available at: https://www.osha.gov/sites/default/files/publications/hydraulic_frac_hazard_alert.pdf
EX1022	U.S. Patent Application Publication 2019/0016536 by David Campbell et al. entitled “Proppant Conveyor Systems and Methods of Use” (“Campbell”)
EX1023	U.S. Patent No. 10,399,785 by Jonathan David Fike entitled “Compact Portable Conveyor” (“Fike”)
EX1024	U.S. Patent No. 3,998,436 by Albert Allen <i>et. al.</i> entitled “Mobile Concrete Batch Plant” (“Allen”)
EX1025	U.S. Patent No. 9,428,348 by Gary Teichrob <i>et. al.</i> entitled “Mobile Material Handling and Metering System” (“Teichrob”)
EX1026	U.S. Patent No. 10,053,308 by Corl Towes <i>et. al.</i> entitled “Portable Drive-Over Conveyor for Unloading Trucks” (“Toews”).
EX1027	U.S. Patent Application Publication 2012/0241290 by Brent J. Gausman et al. entitled “Portable Low Profile Drive-Over Truck Dump Conveyor System” (“Gausman”)
EX1028	U.S. Patent Application Publication 2021/0354910 by Sandor Weaver Grimes et al. entitled “Proppant Supply System” (“Grimes”)
EX1029	<u>EconoLoader Air Slide Conveyor Design</u> , https://web.archive.org/web/20160819062313/http://mcschroeder.com/wp-content/uploads/2012/09/Product-Spec-Sheet-Air-Slide-

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EX1032	U.S. Patent No. 7,090,066 by Jason R. Kirsch entitled “Unloading System for Particulate Material” (“Kirsch”).
EX1033	Kania, L., et al. (2012). “A Catalogue Capacity of Slewing Bearings”. <i>Mechanism and Machine Theory</i> , 58, (29-45). https://doi.org/10.1016/j.mechmachtheory.2012.07.012
EX1034	Slewing bearings, https://web.archive.org/web/20200402104046/https://www.skf.com/group/products/slewing-bearings
EX1035	U.S. Department of Labor, OSHA, “Hydraulic Fracturing and Flowback Hazards Other than Respirable Silica” (OSHA 3763-12 2014) (“OSHA 3763”), available at: https://www.osha.gov/sites/default/files/publications/OSHA3763.pdf

I. MANDATORY NOTICES UNDER 37 C.F.R. §42.8(A)(1)

A. Real Party-in-Interest under 37 C.F.R. §42.8(b)(1)

The real parties-in-interest in this *inter partes* review (“IPR”) are Solaris Oilfield Site Services Operating, LLC, Solaris Oilfield Site Services Personnel, LLC (“Petitioners”). The real parties-in-interest further may include one or more of the following entities: Solaris Oilfield Infrastructure, Inc.; Solaris Oilfield Infrastructure, LLC; Solaris Oilfield Early Property, LLC; Solaris Logistics, LLC; Solaris Oilfield Technologies LLC; Solaris Transportation LLC; Yorktown Energy Partners X, L.P.; William A. Zartler; Solaris Energy Capital, LLC; THRC Holdings, LP; BlackRock Inc.; The Vanguard Group LLC; and Dimensional Fund Advisors LP. No other parties exercised or could have exercised control over this Petition; no other parties funded or directed this Petition. *See* Office Patent Trial Practice Guide, 77 Fed. Reg. 48759-60.

B. Related Matters under 37 C.F.R. §42.8(b)(2)

Masaba, Inc. (“Patent Owner”) has asserted U.S. Patent No. 11,780,689 (the “’689 Patent”) against Petitioners in a co-pending litigation, *Masaba, Inc. v. Solaris Oilfield Infrastructure, Inc.*, Case No. 2-23-cv-00236 (D. Wyo. Dec. 14, 2023). The Original Complaint in that litigation asserting the ’689 Patent against Petitioners’ parent company was filed on December 14, 2023, and an amended Complaint asserting the ’689 Patent against Petitioners was filed on June 14, 2024.

C. Lead and Back-Up Counsel Under 37 C.F.R. §42.8(b)(3)

Petitioners provide the following designation of counsel.

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D. Service Information under 37 C.F.R. §42.8(b)(4)

A copy of this entire Petition, including all Exhibits, are being served by EXPRESS MAIL, costs prepaid, to the address of the attorney or agent of record at the USPTO:

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Power of Attorney is filed concurrently herewith under 37 C.F.R. § 42.10(b).

II. FEES

The Office is authorized to charge fees that become due to Deposit Account No. 02-0384 and any additional fees due.

III. REQUIREMENTS UNDER 37 C.F.R. §42.104

A. Certification of Grounds for Standing

Petitioners certify that the '689 Patent is eligible for IPR and that Petitioners are not barred or estopped from requesting IPR of the '689 Patent.

B. Priority Date

The application that issued as the '689 Patent was filed on November 17, 2022. EX1001. It claims priority to Application No. 17/550,073, which was filed on December 14, 2021. That application claims priority to Provisional Application No. 63/223,124, which was filed on July 19, 2021. Petitioners assume for purposes of

this Petition, without conceding, that the '689 Patent is entitled to a priority date of July 19, 2021.

C. Prior Art

Exhibit 1004—U.S. Patent No. 9,663,303 to Waldner et al. (“*Waldner*”) was filed on Oct. 16, 2014 and issued on May 30, 2017. *Waldner* qualifies as prior art under at least 35 U.S.C. §102(a)(1) and (2).

Exhibit 1005— EconoLoader™ – Belt Conveyor Design (“*Dynatek*”) was available online by August 19, 2016, as explained in the affidavit of Nathaniel Frank-White. EX1014;¹ *see also* EX1003, ¶80-85. Thus, *Dynatek* qualifies as prior art under at least §102(a)(1).

Exhibit 1006—U.S. Patent No. 11,691,831 to Sleeman et al. (“*Sleeman*”) was filed on Jul. 6, 2021 and issued on July 4, 2023. *Sleeman* qualifies as prior art under at least §102(a)(2).

Exhibit 1008—U.S. Patent No. 10,633,174 to Pham et al. (“*Pham*”) was filed on Aug. 1, 2014 and issued on April 28, 2020. *Pham* qualifies as prior art under at least §102(a)(1) and (2).

Exhibit 1009—U.S. Patent No. 3,090,501 to John Auld (“*Auld*”) was filed on

¹ EX1014 includes EX1005 in Exhibit B. Citations to EX1005 incorporate by reference the corresponding disclosure of EX1014.

Mar. 23, 1959 and issued on May 21, 1963. *Auld* qualifies as prior art under at least §102(a)(1) and (2).

Exhibit 1011—U.S. Patent No. 8,926,252 to McIver et al. (“*McIver*”) was filed on Oct. 23, 2012 and issued on January 6, 2015. *McIver* qualifies as prior art under at least §102(a)(1) and (2).

D. Identification of Challenge & Statement of Precise Relief Requested

Petitioners request IPR of Claims 1-25 based on the following grounds, and that Claims 1-25 be cancelled under 35 U.S.C. §318(b).

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>

E. Institution is Proper under §314(a)

The factors in *General Plastic Industrial Co., Ltd. v. Canon Kabushiki Kaisha*, IPR2016-01357, Paper 19 (P.T.A.B. Sept. 6, 2017) favor institution. This is

the first and only petition challenging the '689 Patent.

The factors in *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 at 6 (P.T.A.B. Mar. 20, 2020) (“*Fintiv*”) (precedential) also favor institution. Regarding *Fintiv* Factor 6, the merits of this petition are compelling and outweigh any inefficiencies of parallel litigation. *Id.* at 14-15. Factors 2 and 3 also strongly favor institution. The parallel litigation is just beginning; no trial date or other schedule is set, and the Court has not set any scheduling conference. The Fed. R. Civ. P. 26(f) conference has not been scheduled, discovery has not started, and no claim construction activities or disclosure of infringement or invalidity contentions have occurred. Regarding Factor 4, given the early stage of the parallel litigation, it would be premature to conclude that the issues raised in this proceeding will overlap with those in the district court. Regarding Factor 1, no party in the district court has requested a stay, and the Board does not speculate on how a court will treat such motions. *See, e.g., VMware, Inc. v. Intell. Ventures I LLC*, IPR2020-00859, Paper 13, ID, at 12 (P.T.A.B. Nov. 5, 2020) (informative). Finally, since Petitioners and Patent Owner are all parties to the parallel litigation, Factor 5 is, at worst, neutral and does not support discretionary denial. *Cisco Sys., Inc. v. Ramot at Tel Aviv Univ. Ltd.*, IPR2020-00122, Paper 15, ID, at 10 (P.T.A.B. May 15, 2020) (APJ Crumbley, dissenting).

If Patent Owner raises §314(a) arguments in a Preliminary Response,

Petitioners respectfully request the opportunity to reply before institution to address any update in the district court schedule and whether a *Sand Revolution* stipulation would be appropriate.

F. Institution is Proper Under §325(d) and *Advanced Bionics*.

The Board should not deny institution under §325(d) under the *Becton* factors (*Becton, Dickinson & Co. v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8 (PTAB Dec. 15, 2017)) and the two-step framework established in *Advanced Bionics LLC v. MED-EL Elektromedizinische Gerate GmbH*, IPR2019-01469, Paper 6 (PTAB Feb. 13, 2020) (precedential).

Under *Advanced Bionics*, the Board must first decide whether the same or substantially the same art or argument were presented to the Office during the '689 Patent's prosecution (*Becton* factors (a), (b), and (d)). If the Board finds that prong is satisfied, the Board must determine whether “petitioner has demonstrated that the Office erred on a manner material to the patentability of the challenged claims” (*Becton* factors (c), (e), and (f)).

1. *Advanced Bionics Step One*

This Petition does not present similar or substantially the same prior art or arguments. *Waldner* and *McIver* are the only references asserted in the Grounds that were reviewed by the Examiner—all other asserted prior art references were not disclosed or reviewed during the '689 Patent's prosecution. Most of the Petition's

grounds do not rely on *Waldner* for the claim limitations that the Examiner found to be lacking in *Waldner*. In addition to the new prior art, the Office will also have the declaration of Petitioners' Expert, which the Examiner didn't have. This declaration will bring new evidence to the Office's attention which was not considered or reviewed during the '689 Patent's prosecution.

Moreover, combining a secondary reference that was not previously considered by the Examiner with a primary reference that was considered by the Examiner favors institution. *Oticon Med. v. Cochlear Limited*, IPR2019-00975, at 18–20; *Qualcomm Inc. v. Monterey Rsch. LLC*, IPR2021-00120, Paper 17 at 18–19 (June 8, 2021). All of the grounds in this Petition combine *Waldner* with prior art that was not considered during prosecution or disclosed in an IDS. Therefore, the combinations of the asserted art have not been previously considered by the Examiner. This further favors institution because the asserted combinations of prior art references render the claimed invention obvious.

Furthermore, the new asserted art is not cumulative of prior art presented to the Examiner during prosecution. “A reference is cumulative when it ‘teaches no more than what a reasonable examiner would consider to be taught by the prior art already before the PTO.’” *Regeneron Pharms. Inc. v. Merus N.V.*, 864 F.3d 1343, 1350 (Fed. Cir. 2017); see *Oticon Med. v. Cochlear Limited*, IPR2019-00975, Paper 15 at 18–20 (PTAB Oct. 16, 2019) (secondary reference not cumulative of primary

reference because the structure and purpose of grooves were different).

For example, *Dynatek* discloses an articulated loader having two conveying arms that are pivotable with respect to each other about a vertical axis and in a manner to allow transfer of aggregate from one arm to the other. *Compare* EX1005, pg2 (Figs. 1-2), *with* EX1012. *Pham* discloses a mobile oilfield material transfer unit having a supporting frame for an extended conveyor and a mechanism operable to move the supporting frame. *Compare* EX1008, Fig. 19, *with* EX1012. *Auld* discloses a transportable apparatus having a raised landing leg and kingpin oriented in the same direction. *Compare* EX1009, Fig. 1, *with* EX1012. None of these features were disclosed in the prior art of record. Therefore, at least *Dynatek*, *Pham*, and *Auld* are not cumulative.

Because the combinations including *Dynatek*, *Pham*, and *Auld* were never presented to or considered by the Examiner, and because at least *Dynatek*, *Pham*, and *Auld* are not cumulative of prior art that the Examiner considered, this Petition is not presenting same or substantially similar arguments considered during prosecution. Therefore, the Petition should be granted.

2. Advanced Bionics Step Two

Even if it were found that the asserted art presents the same or substantially similar arguments already considered, the Office erred in failing to consider *Dynatek*, *Pham*, *Auld*, and *Sleeman* in a manner “material to the patentability” of the

‘689 Patent’s claims. In *Oticon*, the petition was granted because the secondary reference was not considered by the Examiner, and a reasonable examiner would have considered it. *Id.* A reasonable Examiner should have viewed *Dynatek*, *Pham*, *Auld*, and *Sleeman* prior to granting the ‘689 Patent because they teach the ‘689 Patent claims’ elements. Combinations of *Waldner* with *Dynatek*, *Pham*, *Auld*, and/or *Sleeman* render the ‘689 Patent obvious, which materially affects the claims’ patentability. Therefore, the Office erred in failing to consider *Dynatek*, *Pham*, *Auld*, and *Sleeman* in combination with *Waldner*.

Additionally, although *Waldner* and *McIver* were of record in the ‘689 Patent, it is not clear that the Examiner substantively considered their full disclosures relative to the ‘689 Patent’s claims. *McIver* was cited by the applicant but not discussed during prosecution at all. Nor did the Examiner cite any specific portion of *Waldner* relating to the claimed “conveyor extension assembly.” *Waldner*’s disclosure of it may not have been apparent without reviewing the later figures and their descriptions. *See* EX1004 (compare Figure 1 with Figures 15 & 22A-22D). Therefore, the Examiner likely failed to appreciate *Waldner*’s teaching of the “conveyor extension assembly” as claimed.

Therefore, the Office should not deny institution under §325(d).

IV. OVERVIEW OF THE '689 Patent

A. Summary of Subject Matter

The '689 Patent describes an apparatus for receiving aggregate (*e.g.*, sand utilized in hydraulic fracturing of oil and gas wells) from a vehicle and elevating the aggregate for deposit into a silo. EX1001, 1:14-18. The claimed apparatus has three main sub-assemblies (highlighted in Fig. 1A below):

- a base assembly for receiving aggregate (red),
- an aggregate elevating assembly mounted on the base assembly and having an elevating conveyor (yellow), and
- a conveyor extension assembly at the top of the elevating assembly with pivotable segments to discharge the aggregate (blue).

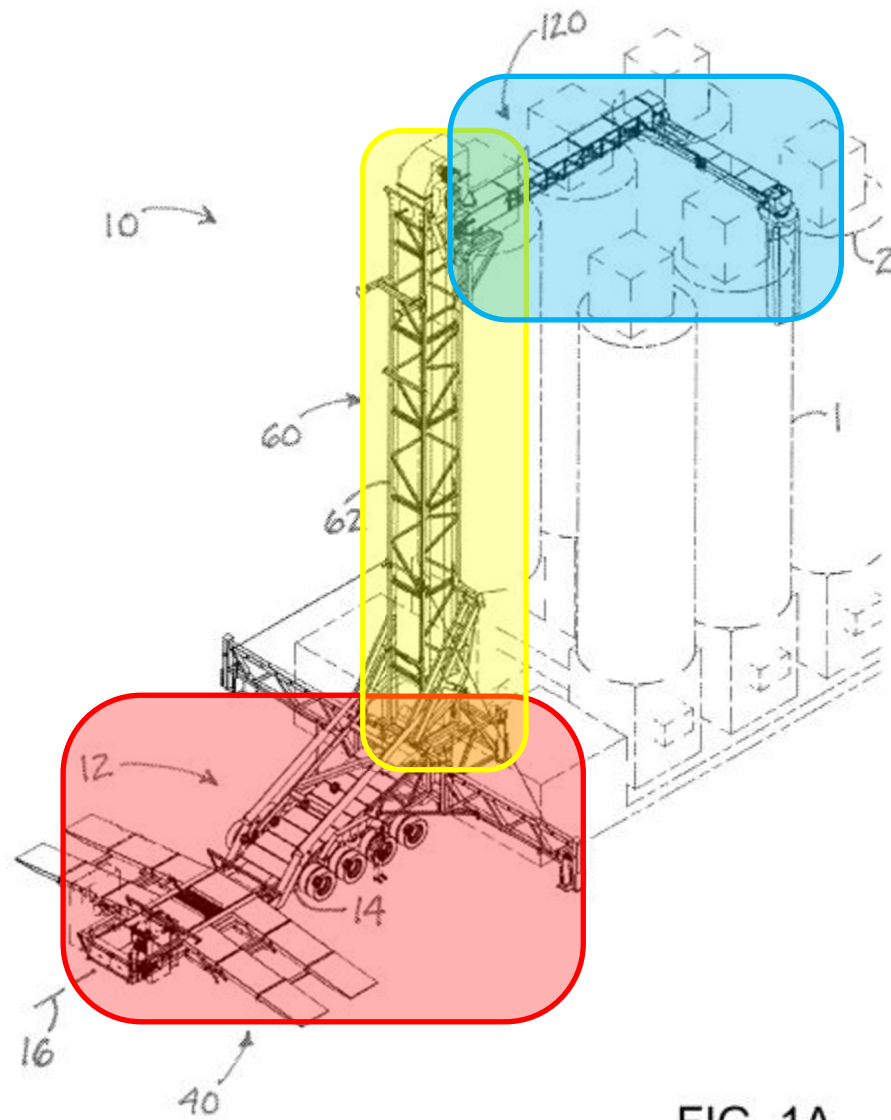


FIG. 1A

Id., 1:25-2:6 and FIG. 1A (annotated).

Each of the '689 Patent's claims specifies details of these sub-assemblies or adds additional components. The '689 Patent claims various combinations of known elements for constructing such a system to reach predictable results; these elements and predictable results would have been known by a POSITA by the '689 Patent's priority date. EX1003, ¶¶39-40; *see also* EX1001, Claims 1-25. Examples of known

elements claimed by the '689 Patent include the sub-assemblies noted above as well as conveyors having pivotable segments, support frames, trailer structures (*e.g.*, kingpins and support legs) for transporting such equipment, and lift arms and actuators for deploying such equipment, among others. EX1003, ¶¶43-44, 58-79.

B. Claim Listing

Claim 1 is representative of the '689 Patent's claims and is reproduced in Ground 1 below. All claims are listed in EX1013.

C. Relevant Prosecution History

The application that issued as the '689 Patent was filed on November 17, 2022. EX1001. Its prosecution was short. *See generally* EX1012. In the only rejections over prior art, the Examiner rejected claims 1-3, 8-9, 12, 15-18, 20, 21, and 24 over *Waldner* in view of U.S. Patent Application Publication No. 2016/0280467 to Herman. *Id.*, 92. Claim 14 was rejected over *Waldner* in view of Herman and U.S. Patent Application Publication No. 2020/0140202 to Grose. *Id.*, 94. Herman and Grose are not relied upon in this Petition.

In response, Applicant rewrote claims 4, 5, 10, 11, 19, 22, 23, and 25 in independent form (which issued as claims 12, 13, 1, 16, 18, 22, 23, and 25 of the '689 Patent, respectively). *Id.*, 65-81. In a final office action, the Examiner maintained double-patenting rejections from the prior office action. *Id.*, 41-43. The Examiner issued a Notice of Allowance on August 21, 2023 without reasons for allowance.

Id., 10-14.

D. Level of Ordinary Skill in the Art

As of the '689 Patent's earliest priority date, a person of ordinary skill in the art ("POSITA") would have a degree in mechanical, electrical, petroleum, or civil engineering and with at least two years' experience working in an industry or field that involves handling of particulate materials, which may include operations in the oil and gas industry that involve the handling of such materials. EX1003, ¶41. This definition is approximate, and more education may substitute for industry experience or vice versa. *Id.*

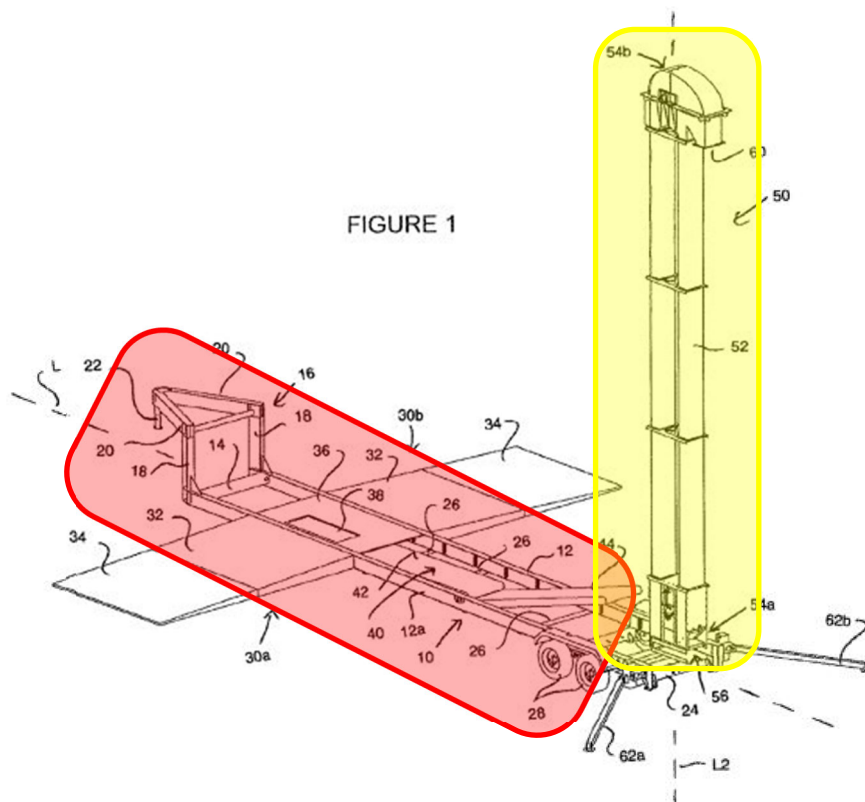
V. SUMMARY OF PRIOR ART

As explained by Petitioners' expert, the subject matter of the '689 Patent's claims was well known before its priority date. EX1003, ¶18, 39-40, 47. In addition to a POSITA's background knowledge on the subject matter of the '689 Patent, the following prior art demonstrates that an aggregate transferring apparatus within the '689 Patent claims would have been well-known and obvious to a POSITA. *Id.*, ¶45-47, 57.

A. *Waldner* (EX1004)

Waldner relates to a portable system for conveying particulate material (*e.g.*, proppant used in fracturing of oil and gas wells) from a vehicle to an elevated inlet of a storage container. EX1004, 1:14-20 & 12:4-12. *Waldner*'s system is actuable

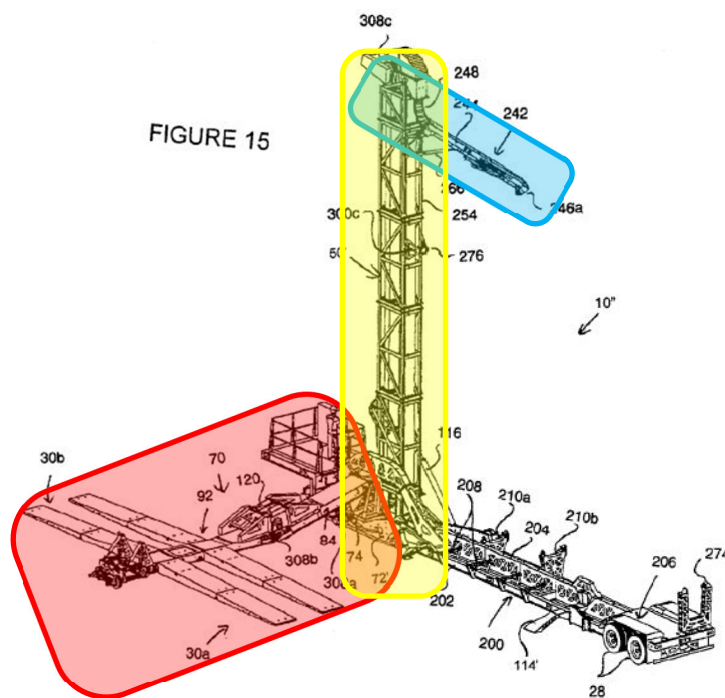
between operational and transport configurations, and “provides an all-in-one solution for emptying of particulate or granular material from a bottom-unload vehicle”. *Id.*, 11:61-12:1. It conveys material vertically to an elevated location using an on-board bucket conveyor (yellow below), which is fed by a built in intermediate conveyor (red below) that automatically moves the material from beneath the transport vehicle to the bucket conveyor,” embodiments of which are depicted in Figures 1, 12, and 15. *Id.*



EX1004, Fig. 1 (annotated).

In Figure 1, the trailer includes a frame 10 having belt conveyor 42 running therethrough. *Id.*, Fig. 1. Ramp assemblies 30a, 30b provide an opening 38 for

aggregate to be deposited into and on conveyor belt 42. *Id.* Bucket elevator 50 is pivotable about an end of frame 10 and is raised relative to frame 10 when in an operational configuration. *Id.* The bucket conveyor in the bucket elevator receives aggregate from conveyor belt 42 and transports it upwards towards the outlet port 60. *Id.* “[F]rom the outlet port 60, the granular material is fed into the storage bin or tank that is to be filled with the granular material, for example via a discharge chute if provided.” *Id.*, 16:47-50. Discharge chute member 242 (blue below) is depicted in Figures 15 & 22A-22D.



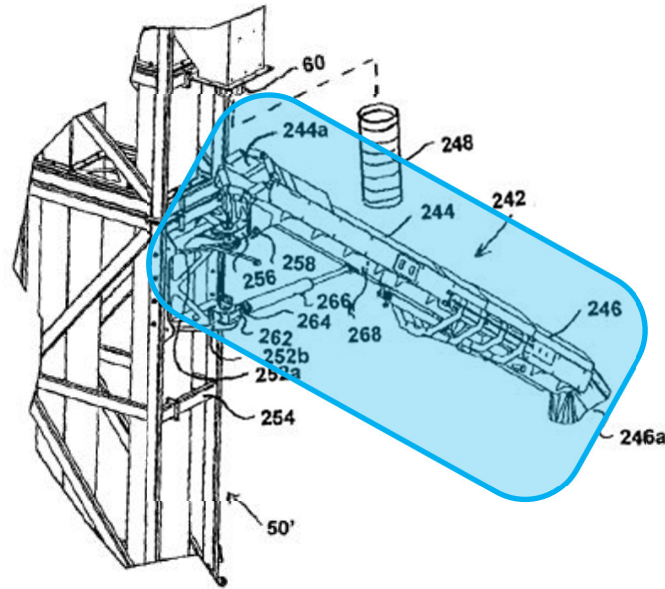


FIGURE 22A

EX1004, Figs. 15 & 22A (annotated).

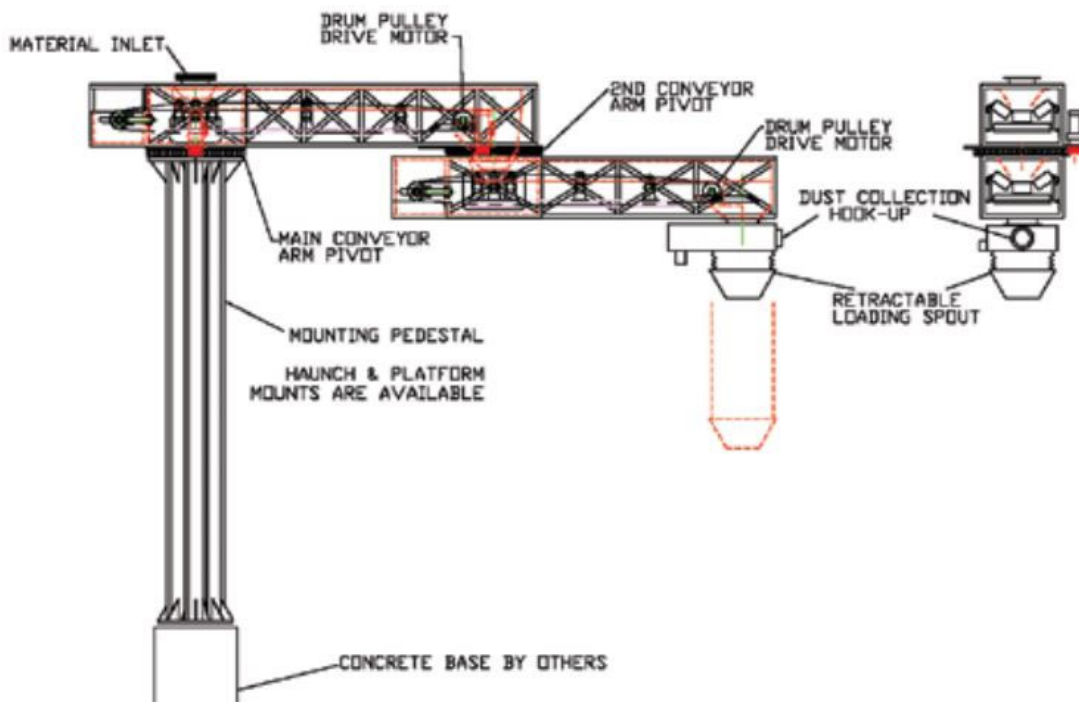
Discharge chute 242 includes proximal section 244 and distal section 246 slidably coupled together. *Id.*, Fig. 22A; 25:7-13. Discharge chute 242 can be raised, lowered, and swung horizontally relative to bucket elevator 50. *Id.*, 26:20-63.

B. Dynatek (EX1005)

Dynatek is a published product specification sheet relating to the belt-based EconoLoader system manufactured by DYNATEK Articulated Loading Systems, a Division of D & D Products, Inc. EX1005, 2-3.² *Dynatek* describes that that system

² EX1014 shows that EX1005 was available from Dynatek's website along with additional documentation relating to the EconoLoader systems before the '689 Patent's priority date. A POSITA would have reviewed that additional

is an articulated belt-based conveyor system for loading bulk granular material (*e.g.*, sand, gravel, and minerals) into vehicles or containers. EX1005, 2. The articulated loader is capable of controlling a discharge position for loading applications using two conveying arms, as shown below. *Id.*



EX1005, pg2 (Fig. 2).

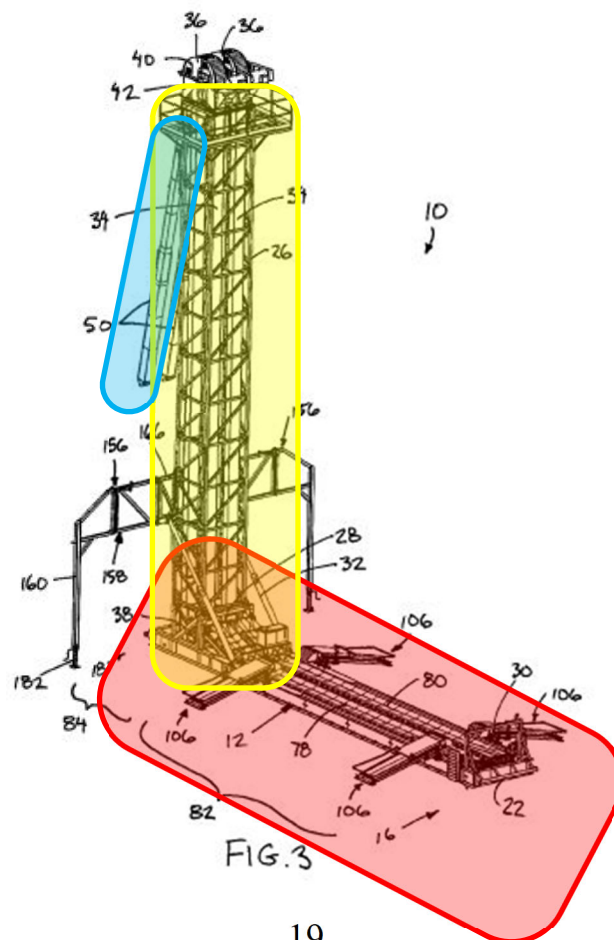
There is a pivot connection between a first arm and the mounting pedestal, and a slewing bearing-based pivot connection between the first arm and the second arm. *Id.* Each conveying arm has its own conveyor belt and is capable of moving

documentation in considering how to use EX1005's systems and teachings. EX1003, ¶80-85, 117.

horizontally with respect to the other. *Id.*, 2. *Dynatek* was not of record during the '689 Patent's prosecution.

C. Sleeman (EX1006)

Sleeman relates to a portable conveyor system as shown in Figure 3 below “for receiving particulate material discharged from the bottom discharge gate of a transport vehicle and for conveying the particulate material to downstream equipment such as an upright silo or other suitable storage container, typically at an elevated location such as the intake opening of the upright silo or storage container.” EX1006, 16:28-36.

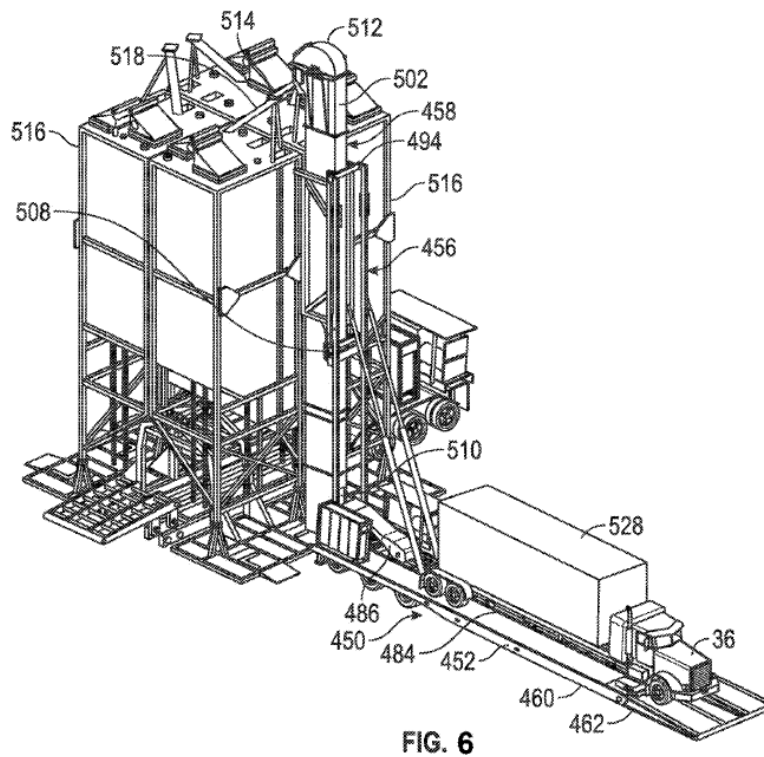


EX1006, Fig. 3.

In *Sleeman*'s conveyor system 10, base frame 12 (red above) has two main conveyors 78, 80 that transport material to bucket elevators 34 housed in the main frame 26 (yellow above). *Id.*, Fig. 3, 1:9-13. The transported material is transported vertically and discharged out through spouts 50 (blue above). *Id.*, Fig. 3, 18:29-50, 19:9-11. As shown in Figure 32, "each discharge spout 50 includes a first duct 52 and a second duct 54 which are coupled to one another in a telescoping configuration . . ." *Id.*, 19:11-13. *Sleeman* also discloses a series of actuators, shafts, and gears that are used to pivot the discharge spouts relative to main frame 26 and move them to desired positions. *Id.*, 19:25–20:13. *Sleeman* was not of record during the '689 Patent's prosecution.

D. *Pham* (EX1008)

Pham relates to a mobile oilfield material transfer unit that can transition between a horizontal, transportable position and a vertical, operational position. EX1008, 5:46-47, 5:54-6:4. Once the mast assembly 456 is raised, material may be transported vertically up through the first conveyor assembly 458 to be discharged to one or more silos.

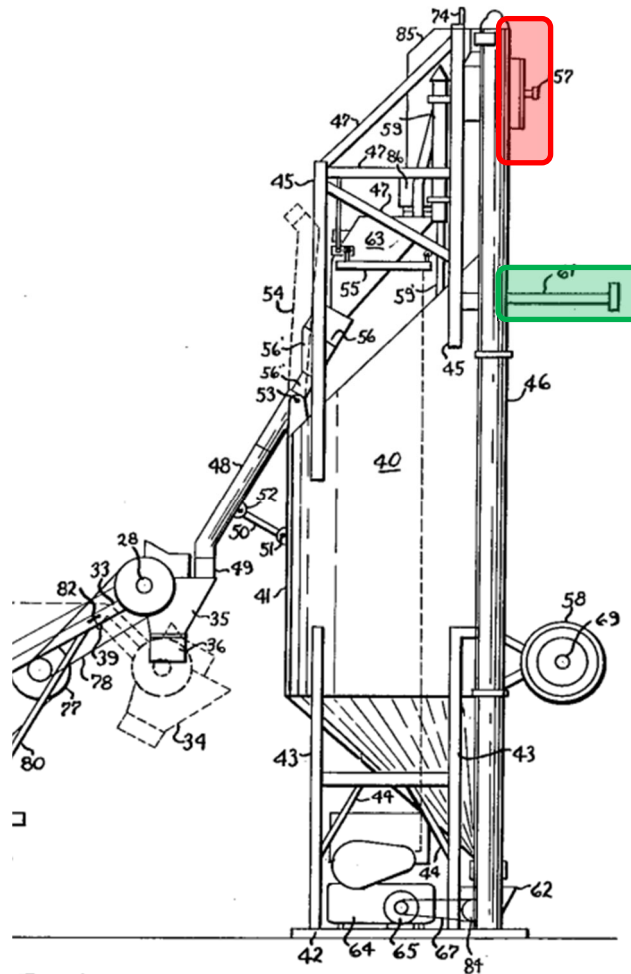


Id., Fig. 6, 9:30-62. *Pham* further discloses a support frame and articulation mechanism used to support and position the extended conveyor arrangement. *Id.*, 14:10-29, Fig. 19. *Pham* was not of record during the '689 Patent's prosecution.

E. *Auld* (EX1009)

Auld relates to a portable cement batching plant 40 configurable in a horizontal position, in which the plant is towable via a truck, and a vertical position, in which a silo 41 of the plant is operational. EX1009, Fig. 1-2; 3:2-9; 1:69-2:2. To facilitate towing, king pin 57 (red below) is attached to the cement batching plant 40. *Id.*, 4:63-67. Further *Auld* describes a “pivoted parking stand 61” in green below that “is swingably attached to the silo 41 ... to hold the silo 41 temporarily in [a]

stored position when the truck is moved away from under the king pin 57.” *Id.*, 4:74-5:3.

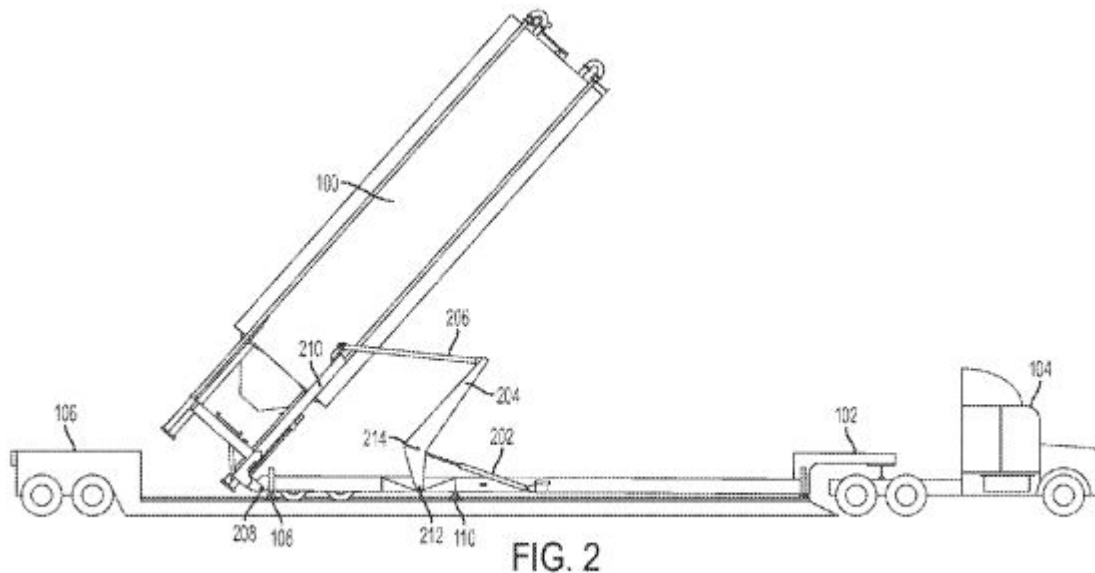


EX1009, Fig. 1 (annotated, cropped).

As shown, in the vertical position, king pin 57 and parking stand 61 are at an elevated location on the silo 41. *Id.*, Fig. 1. *Auld* was not of record during the '689 Patent's prosecution.

F. *McIver* (EX1011)

McIver relates to “self-erecting silo storage systems for use in the oil and natural gas mining and drilling industries.” EX1011, 1:13-15. *McIver* discloses an actuation system for erecting a silo from a trailer once transported to a designated location.



EX1011, Fig. 2.

Actuator 202 moves rocker arm 204, which causes silo 100 to rotate about pin 208. *Id.* *McIver* further discloses a set of linkages disposed on each side of trailer 102, where each set of linkages includes a rocker arm. *Id.*, Fig. 7, 9:37-44. *McIver* was cited by applicant in an Information Disclosure Statement during the '689 Patent's prosecution (EX1012, 53), but was not substantively discussed.

VI. CLAIM CONSTRUCTION

In this Petition, Petitioners apply the ordinary and customary meanings of the claim terms.³ Express constructions are not required in this proceeding because the prior art invalidates the claims under any plausible construction, including the alternate constructions below.

To the extent that Patent Owner asserts or the Board finds that the “unloader structure ... to receive aggregate from a vehicle at least partially positioned over the base frame” of claims 1, 12-13, and 16 must be construed under 35 U.S.C. §112(f), Petitioners submit that it is properly construed as follows:

- Function: receiving aggregate
- Corresponding structure: (i) a pair of ramps mounted across a base frame, and (ii) an opening positioned between the pair of ramps; or equivalent structures. EX1001, 6:32-35, 6:59-64.

To the extent that Patent Owner asserts or the Board finds that the “trailer structure configured to permit the apparatus to be towed across a ground surface...” of claims 3 and 21 must be construed under 35 U.S.C. §112(f), Petitioners submit that it is properly construed as follows:

³ Petitioners reserve all rights to challenge claims under §112 and/or seek additional claim constructions of terms in other proceedings.

- Function: permit the apparatus to be towed across a ground surface
- Corresponding structure: a kingpin mounted on the deployable frame toward its free end; or equivalent structures. EX1001, 7:43-62.

VII. ASSERTED GROUNDS OF INVALIDITY

A. Ground 1: Claims 1-2, 4-11, 16-20, and 22-24 are rendered obvious by *Waldner* in view of *Dynatek*

1. *Rationale for Combining Waldner and Dynatek*

The '689 Patent relates to the field of handling aggregate material such as sand, including for use in oilfield operations. EX1001, 4:13-17. *Waldner* and *Dynatek* are directed to systems for conveying sand and other similar aggregate material using conveyors, *e.g.*, belt conveyors, including for use in oilfield operations. As such, both *Waldner* and *Dynatek* are analogous art to each other and to the '689 Patent. EX1003, ¶111, 58; EX1004, Abstract; EX1005, pg2; EX1003, ¶111-112; EX1021, 2. Alternatively, the '689 Patent is concerned with the problem of designing a conveyor system to transfer aggregate material to an elevated location such as the inlet of a storage silo. EX1001, 3:54-58; EX1003, ¶111. *Waldner* and *Dynatek* teach conveyor systems for transferring such material to elevated locations. EX1004, 2:36-41; EX1005, pg2; EX1003, ¶111, 58; EX1021, 2.

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.

Dynatek states that its EconoLoader conveyors are used for similar purposes and have similar benefits as well as improved particle discharge rates. EX1005, pg3 (“Loader Moves—Not the Transport Vehicle” and loading / conveying rates); *see also* EX1014, pg41 (describes “*reduc[ing] or eliminat[ing] the need to move* the 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.*

v. Woodstream Corp., 520 F.3d 1337, 1344 (Fed. Cir. 2008). A POSITA would have had a reasonable expectation of success in this substitution because it substitutes one known component (*Dynatek's* Econoloader) for another (*Waldner's* discharge chute) to obtain predictable results in moving aggregate material horizontally at an elevated location. EX1003, ¶119; *see KSR Int'l Co. v. Teleflex, Inc.*, 127 S. Ct. 1727, 1740 (2007). Additionally, both *Dynatek* and *Waldner* use known mechanical devices for similar purposes, and *Dynatek* teaches installation using various mounting techniques, including a “platform mount” similar to the elevated structure that supports *Waldner's* discharge chute. EX1005, 2-3; EX1003, ¶119; *see also* EX1014, pg41 (“Mounting”). Mounting a *Dynatek* Econoloader to *Waldner's* bucket elevator would be a routine engineering problem that a POSITA would have been able to solve. EX1003, ¶120-121.

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 these modifications since they would have involved using well-known components (conveyor belts, pivot joints, and spouts) to obtain predictable results in conveying particulate materials. EX1003, ¶¶66-73, 115-116; *see also* EX1010, EX1022, EX1023, EX1025, EX1026, EX1027, EX1028, EX1033 (discussing examples of components); *see also* §V.A & V.B, *supra*.

2. *Claim 1*⁴

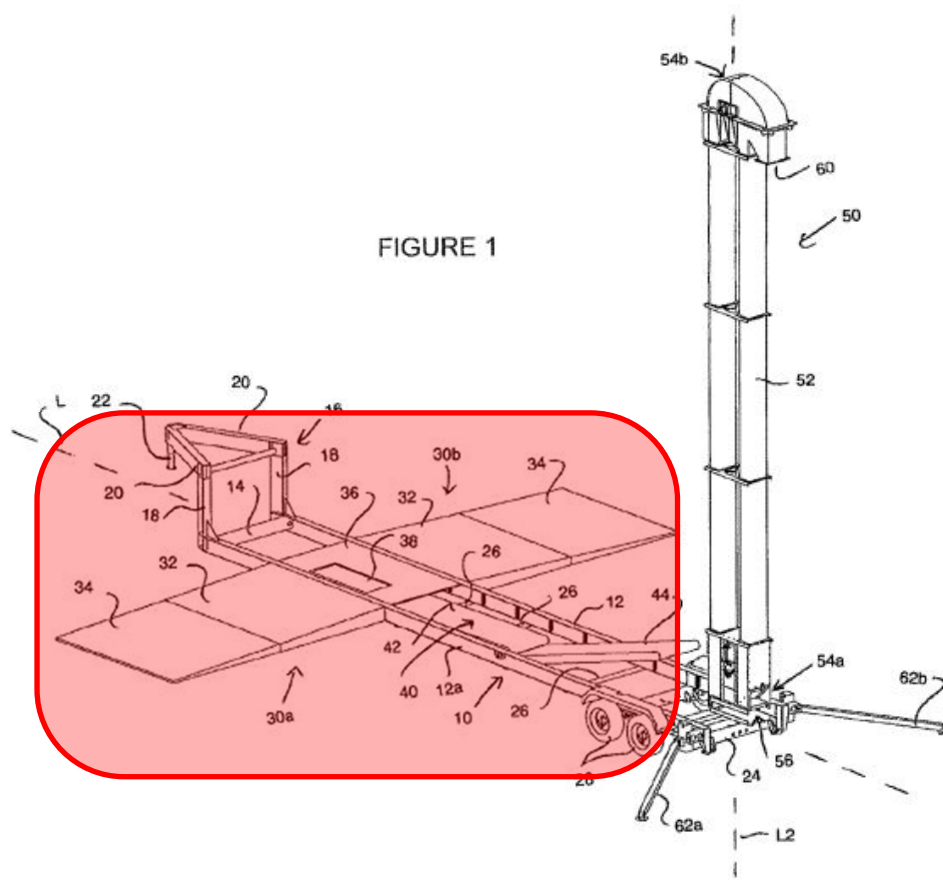
a) Claim 1[p]: “An aggregate transferring apparatus for elevating and transferring aggregate, the apparatus comprising:”

To the extent the preamble is limiting, *Waldner* discloses a “portable conveyor system for receiving particulate material from a transport vehicle and conveying the particulate material to an elevated location.” EX1004, Abstract, 1:17-20, 11:60-12:1. *Waldner* discloses the elements of its mobile conveyor system in multiple embodiments. EX1004, 10:49-11:55.

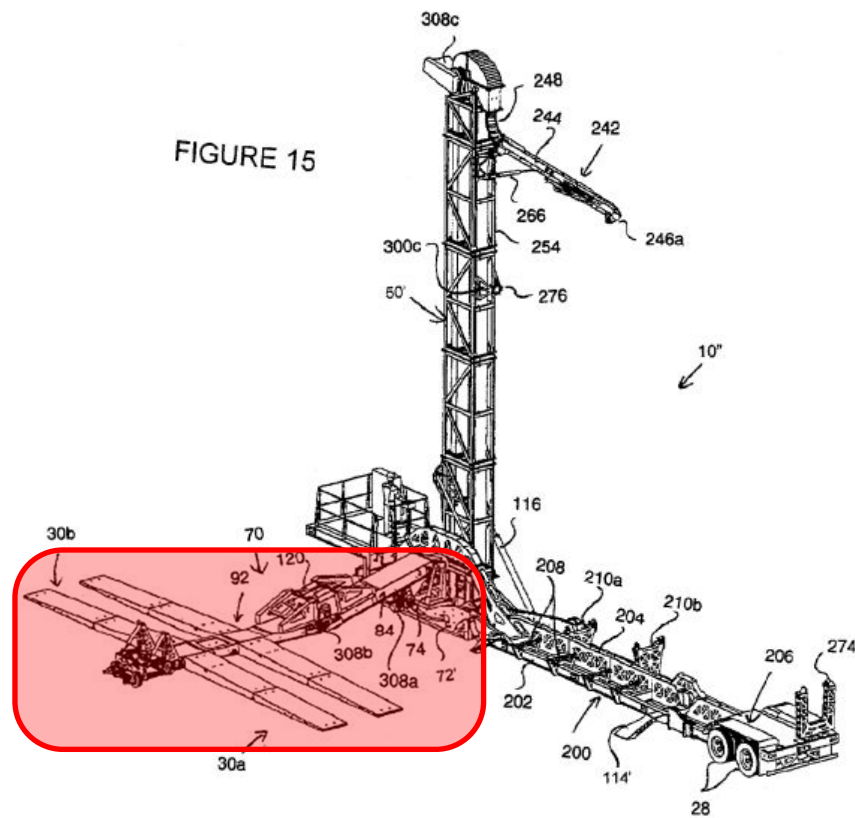
b) Claim 1[a]: “a base assembly for receiving aggregate to be conveyed by the transferring apparatus, the base assembly comprising:”

⁴ During the ‘689 Patent’s prosecution, the examiner indicated that *Waldner* disclosed Claim 1[p] and 1[a]-1[i]. *See* EX1012, 93 (referring to similar elements of claim 1 in prosecution).

A POSITA would have understood that trailer frame 10, first horizontal belt conveyor 42, ramp assemblies 30a, 30b, bridging platform 36, and opening 38, or collectively the “feeder conveyor framework 70” (collectively in red below), of *Waldner* collectively receive material from a vehicle to be conveyed by the bucket conveyor. EX1004, Figs. 1, 3 & 15, 12:52-59, 13:32-55, 21:15-27, 26:64-66, 27:7-18; EX1003, ¶125-126.



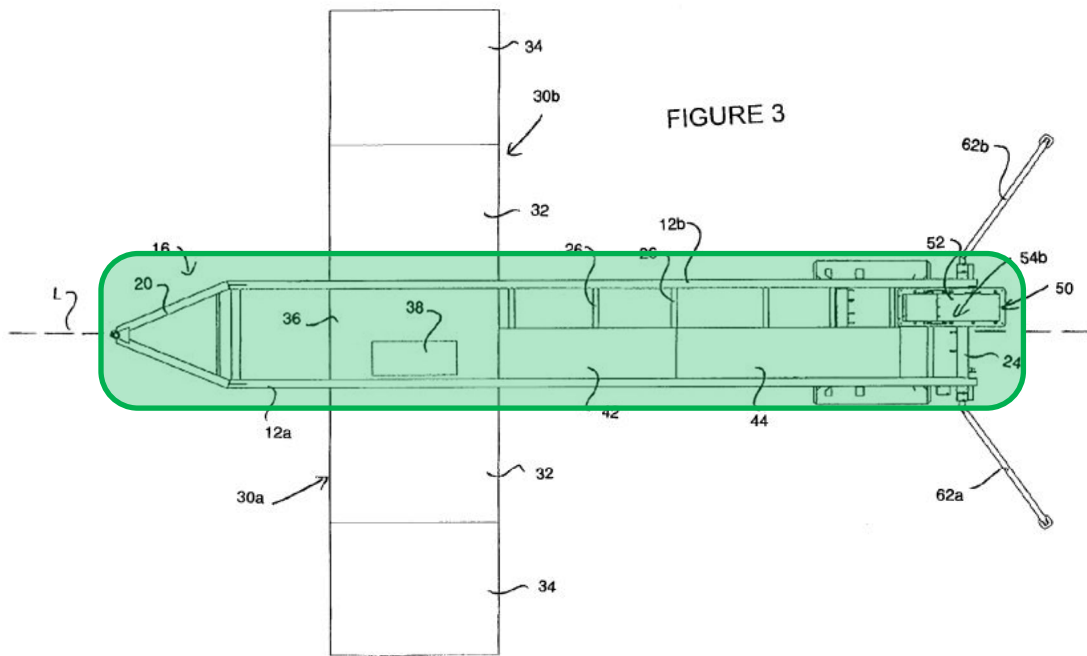
EX1004, Fig. 1 (annotated).



EX1004, Fig. 15 (annotated).

c) Claim 1[b]: “a base frame being elongated along a longitudinal axis and having a leading end and a trailing end;”

Waldner discloses trailer frame 10 (green below) “including two longitudinal side beams 12a, 12b that lie parallel to one another on opposite sides of a central longitudinal axis L of the trailer.” EX1004, 12:15-18, 12:52-59, Figs. 1&3. Frame 10 includes a first end (leading end) equipped with a trailer hitch and a second end (trailing end) “that opposes the hitch-equipped first end thereof...” *Id.*, 12:22-36, Figs. 1, 3, & 15.

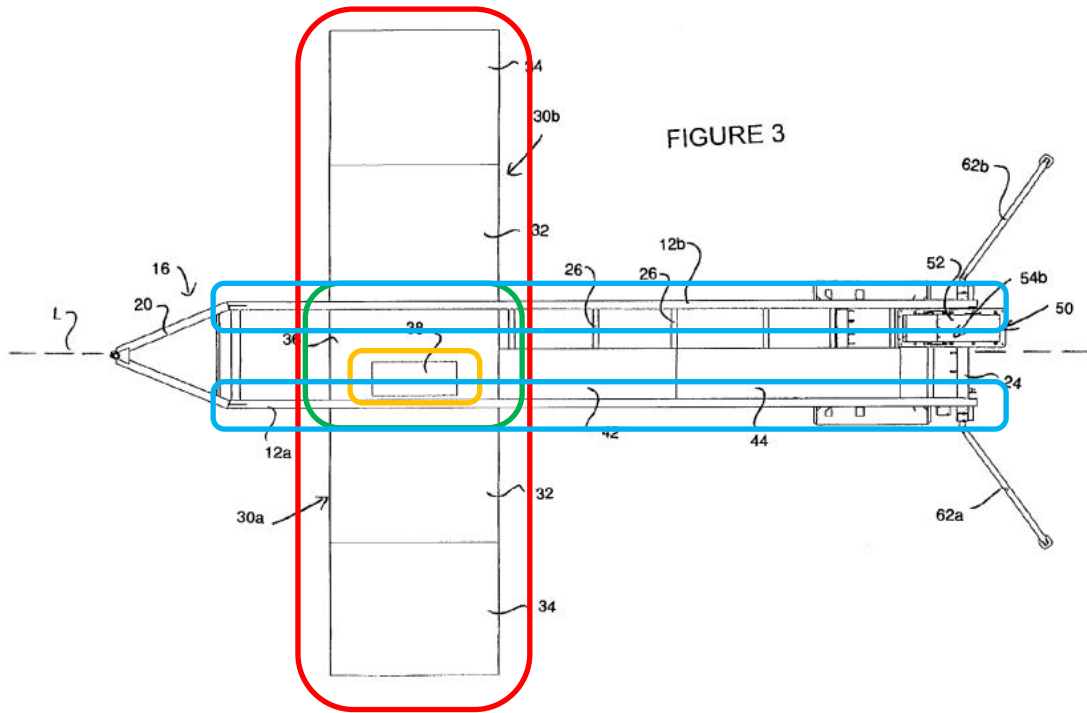


EX1004, Fig. 3 (annotated).

d) Claim 1[c]: “an unloader structure mounted on the base frame to receive aggregate from a vehicle at least partially positioned over the base frame; and”

Waldner discloses a first ramp assembly 30a and a second ramp assembly 30b (red below) connected to longitudinal side beam 12a and side beam 12b (blue below), respectively, of frame 10. *Id.*, 12:15-18, 12:52-59. A bridging platform 36 (green below) with an opening 38 (orange below) is placed on beams 12a, 12b

between ramp assemblies 30a, 30b connecting them together.⁵ *Id.*, 13:32-50; Figs. 1, 3, 15.



Id., Fig. 3 (annotated).

A “transport vehicle is driven up one of the ramps, and over the bridging platform onto the other ramp into an unloading position placing the outlet of the transport vehicle over the opening 38 of the bridging platform 36.” *Id.*, 16:18-22. “[T]he bottom outlet of the transport vehicle is opened in order to allow granular material to fall from the vehicle through this outlet, and onward through the opening

⁵ To the extent claim 1[c] requires a grate, see claim 10, *infra*.

38 in the bridging platform 36 and onto the horizontal belt conveyor 42 below.” *Id.*, 16:37-42. A POSITA would have understood that both bridging platform 36 and a vehicle disposed thereon for unloading material are positioned over the frame 10. EX1003, ¶129-133.

- e) **Claim 1[d]: “a base conveyor mounted on the base frame and extending along a longitudinal portion of the base frame between the leading and trailing ends of the base frame, a portion of the base conveyor being positioned adjacent to the unloader structure to receive aggregate from the vehicle positioned over the base frame;”**

Waldner discloses a longitudinal conveyor system 40 that includes “a first horizontal belt conveyor 42 that runs in the longitudinal direction of the trailer frame from an area beneath the bridging platform 38,” and a second inclined belt conveyor starting below one end of conveyor 42 and extending toward the second end of the trailer frame. EX1004, 13:51-60. As shown below (components in red), conveyor system 40 extends between the first end and second end of frame 10.

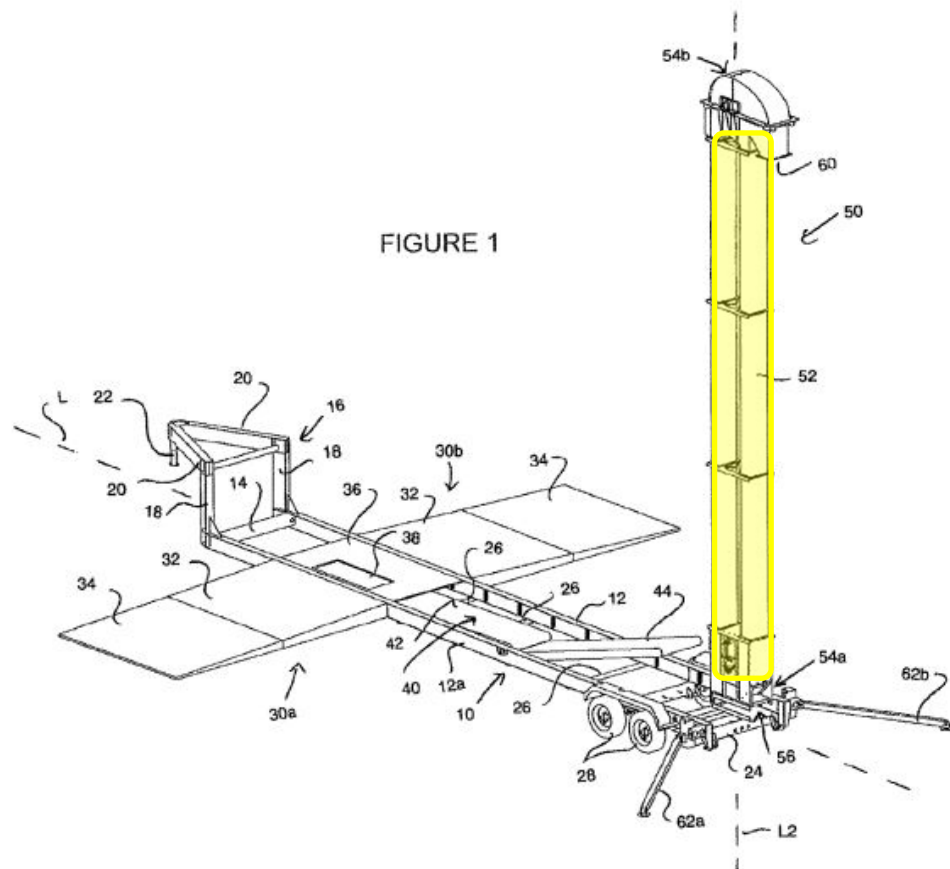


EX1004, Fig. 1 (annotated).

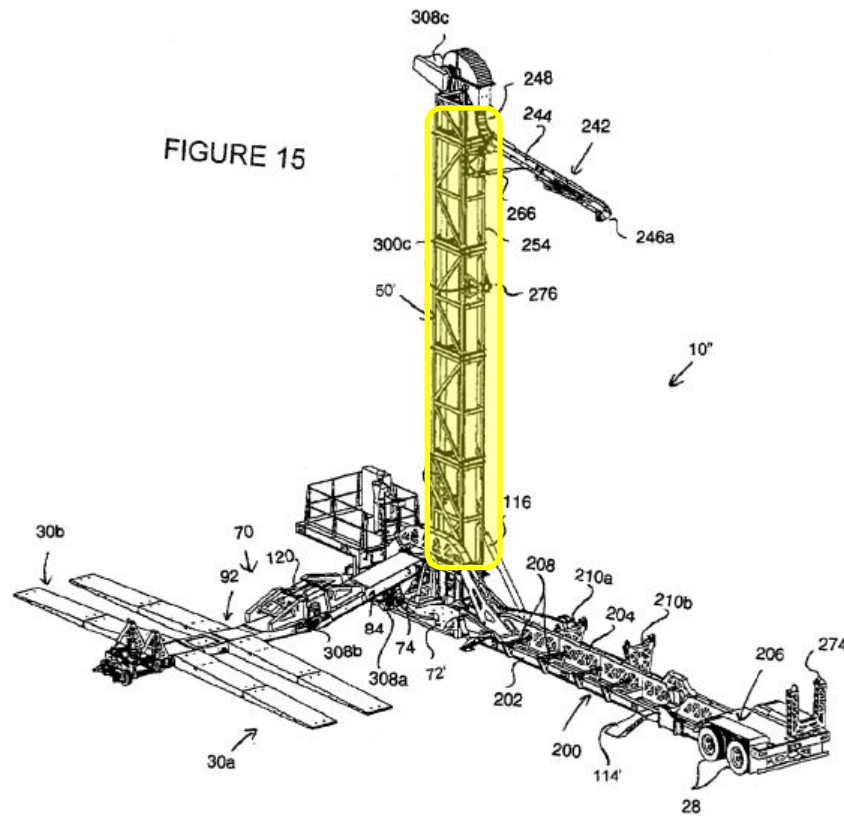
A POSITA would have understood that conveyor system 40 is mounted to frame 10. EX1003, ¶134-135. Further, as described in §VII.A.2.a)d, the combination of ramp assemblies 30a, 30b and bridging platform 36 are disposed over at least a portion of the first horizontal belt conveyor 42. Thus, *Waldner*, either alone or in view of a POSITA's knowledge, teaches that a portion of conveyor 42 is positioned adjacent to the unloader structure to receive aggregate from the vehicle positioned over the base frame. *Id.* at ¶131.

f) Claim 1[e]: “an aggregate elevating assembly for elevating aggregate from the base assembly, the aggregate elevating assembly comprising:”

Waldner discloses a bucket elevator 50 and 50' (yellow below) for “vertically conveying the material up to an elevated location using an on-board bucket conveyor, which is fed by a built in intermediate conveyor that automatically moves the material from beneath the transport vehicle to the bucket conveyor.” EX1004, 11:64-12:1.



EX1004, Fig. 1 (annotated).

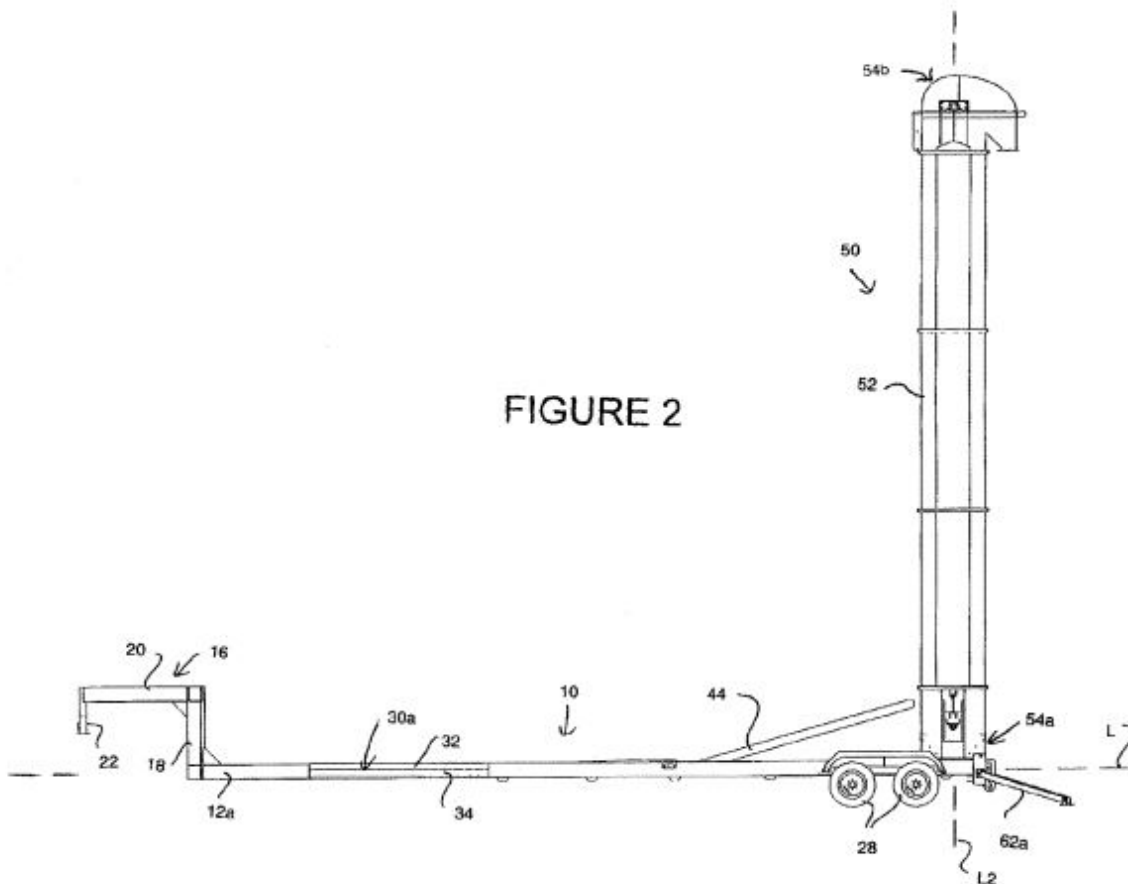


EX1004, Fig. 15 (annotated).

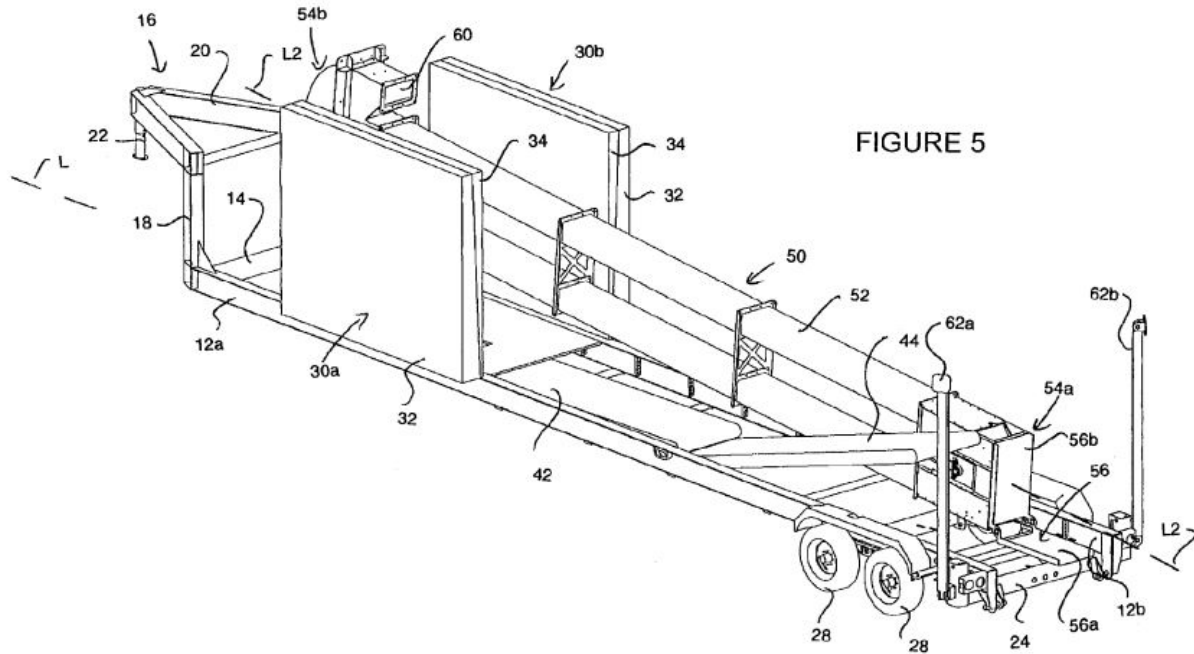
g) Claim 1[f]: “a deployable frame mounted on the base frame and being movable between a storage position and a deploy position, the storage position corresponding to a transport configuration of the apparatus and the deploy position corresponding to an operational configuration of the apparatus, the deployable frame being elongated with a base end and a free end; and”

Waldner discloses that bucket elevator 50 includes a housing 52 “having first and second ends 54a, 54b spaced apart along a longitudinal axis L2 of the bucket elevator.” *Id.*, 14:9-11. The first end 54a of bucket elevator 50 is connected to the trailer frame through pivotal connection 56 and material being conveyed up to the

top of bucket elevator housing 52 to second end 54b then discharged. *Id.*, 14:12-13; 16:45-46. “The bucket elevator housing can be pivoted about the axis of its pivotal connection 56 to the frame into a lowered storage position in which the longitudinal dimension of the bucket conveyor lies generally horizontally along the longitudinal axis L of the trailer” (see Fig. 5), and for operations, it can be pivoted to “an upright operational position in which the longitudinal axis L2 of the bucket elevator lies perpendicular to the longitudinal trailer axis L” (see Figs. 1 and 2). *Id.*, 14:39-43; 14:30-34.



EX1004, Fig. 2.



EX1004, Fig. 5.

A POSITA would have understood that the system in the lowered storage position is transportable and that deploying the bucket elevator housing upright places the system in the operational configuration. EX1003, ¶138-142.

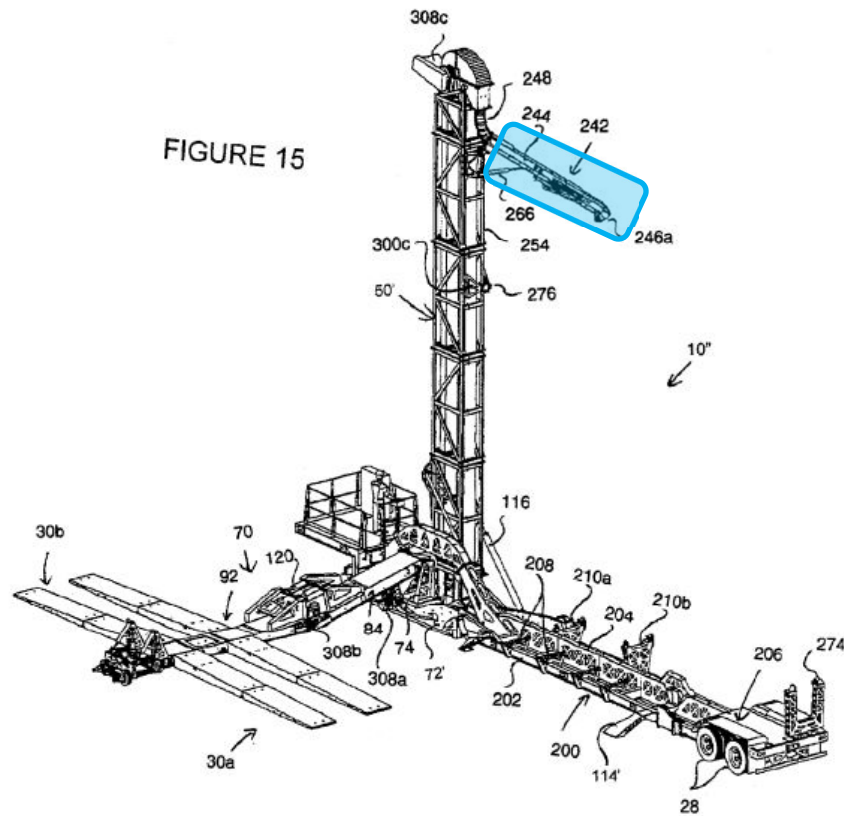
h) Claim 1[g]: “an elevating conveyor configured to receive aggregate from the base conveyor and convey the aggregate upwardly from the base assembly toward the free end of the deployable frame; and”

Waldner discloses that bucket elevator housing 52 includes a bucket conveyor using buckets to carry material upwardly from the inclined belt conveyor 44 on the trailer frame 10 up to an outlet port 60 at the second end 54b. EX1004, 14:47-15:21. *Waldner* further describes that first horizontal belt conveyor 42 feeds into the inclined belt conveyor 44, which conveys material to the inlet of the bucket conveyor 50. *Id.*, 16:42-47.

i) Claim 1[h]: “a conveyor extension assembly for conveying aggregate to locations horizontally outward from the aggregate elevating assembly, the conveyor extension assembly comprising:”

Waldner describes that “a discharge chute may be coupled to the outlet port 60 of the bucket elevator and have an actuator, such as a hydraulic cylinder, that is operable to move a discharge end of the chute relative to the outlet port 60 of the bucket elevator.” *Id.*, 15:14-21. Figure 15 shows the “discharge chute member 242” (blue below) so mounted at the top of the bucket elevator 50’ using an assembly that includes brackets (252a, 252b), links (256, 262), and pivot pins (*e.g.*, 258) that receives the material discharged from the outlet port 60 and directs the material horizontally away from the bucket elevator 50. *Id.*, 25:7-57, 25:66-26:19, & Figs. 22A-22D.⁶

⁶ To the extent Figure 15 illustrates a different embodiment than *Waldner*’s preceding figures, it would have been obvious for a POSITA to use a combination



EX1004, Fig. 15 (annotated); *see* Figs. 22A-22D; *see also* Figures 10-12 (showing discharge chute attached vertically to bucket elevator 50 with brackets 276 from Fig.15), 26:46-54. Actuators 266 and 270 can aim the discharge opening 246a of discharge chute 242 at a target destination, such as the fill port of a storage bin. *Id.*, 15:14-21, 26:55-63.

To the extent *Waldner* does not disclose a “conveyor extension assembly,” *Dynatek* discloses it. *Dynatek* discloses an articulated loader having two conveying

of components from the different embodiments presented by *Waldner* (i.e., discharge chute 242). EX1003, ¶151; *see also* EX1004, 33:22-39.

arms that each comprise their own belt conveyor. EX1005, pg2. As discussed above, it would have been obvious to a POSITA to substitute *Dynatek's* EconoLoader for *Waldner's* discharge chute 242, or to modify discharge chute 242 to include one or more conveyor belts. EX1003, ¶147-153.

- j) **Claim 1[i]: “an extension conveyor for moving aggregate from an inlet of the extension conveyor to an outlet of the extension conveyor at a location outward from the aggregate elevating assembly, the extension conveyor being movable with respect to the aggregate elevating assembly between a lowered position corresponding to the transport configuration of the apparatus and a raised position corresponding to the operational configuration of the apparatus, the lowered position being characterized by the extension conveyor being positioned adjacent to the deployable frame of the aggregate elevating assembly, the raised position being characterized by the extension conveyor being positioned generally away from the deployable frame of the aggregate elevating assembly,”**

Discharge chute 242 has an inlet end 244a receiving material from the outlet port 60 and a discharge end 246a opposite therefrom. EX1004, 25:7-13. The discharge chute 242 is an extension conveyor that discharges material from inlet end 244a to discharge end 246a and away from the bucket elevator 50. EX1003, ¶154.

Waldner's discharge chute 242 “is movable about two perpendicular axes to allow relocation thereof to various positions in 3D space” relative to bucket elevator 50. EX1004, 25:64-66, Fig. 15. *Waldner* discloses using brackets 252a, 252b and actuators 266, 270 to move discharge chute 242 relative to bucket elevator 50. *Id.*,

25:7-65, 26:46-63. A POSITA would have understood that discharge chute 242 can be raised relative to bucket elevator 50 to an operating position. EX1004, 26:55-63; EX1003, ¶154.

Figures 16 & 17 (showing *Waldner's* “collapsed transport state”) show discharge chute 242 (blue below) in a lowered position adjacent to bucket elevator 50 (yellow below) and the trailer. *Id.*, 11:31, 26:20-22.

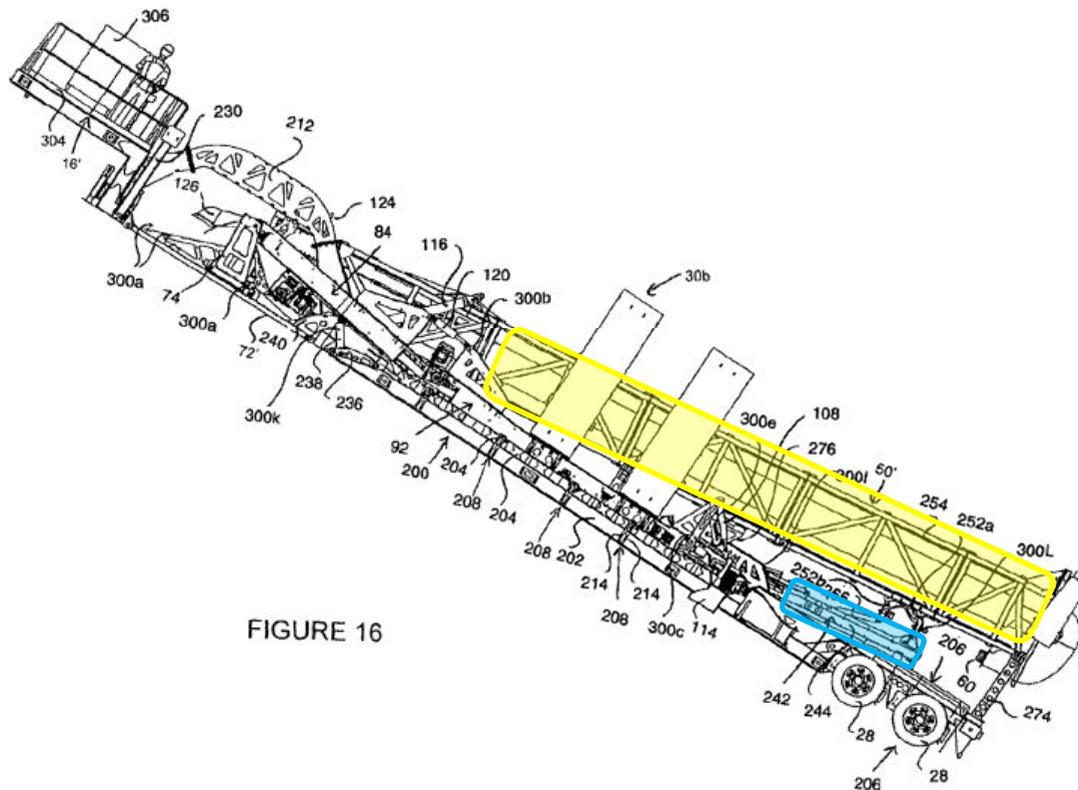


FIGURE 16

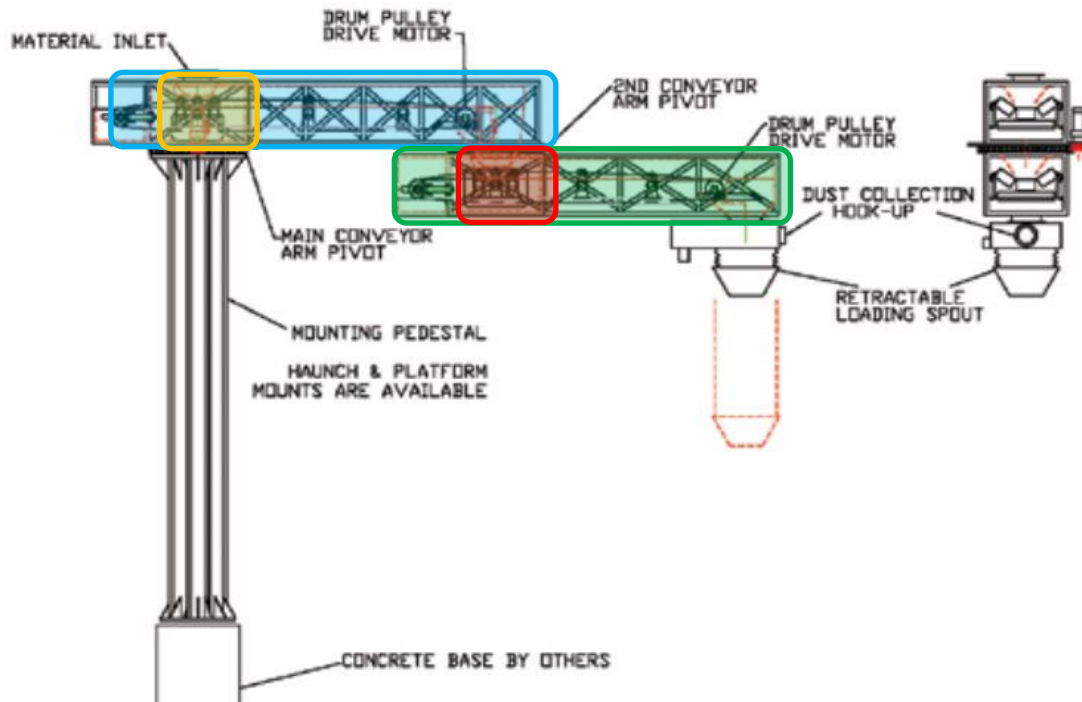
EX1004, Fig. 16 (annotated). A POSITA would have understood that discharge chute 242 is adjacent to bucket elevator 50 in the lowered position in Figs. 5-9 as well. EX1003, ¶155; *see also* Figures 10-12, 26:46-54.

To the extent that discharge chute 242 of *Waldner* is not an “extension conveyor,” *Dynatek* discloses one. *See* Claim 1[h], *supra*; EX1003, ¶157.

k) Claim 1[j]: “wherein the extension conveyor is articulated between the inlet and outlet with an inboard segment and an outboard segment, the inboard segment being pivotally connected to the deployable frame of the aggregate elevating assembly by an inboard pivot, the outboard segment being pivotally connected to the inboard segment by an outboard pivot; and”

Waldner discloses that discharge chute 242 is “of a telescopically adjustable length, having a proximal section 244 and a distal section 246 that are slidably coupled together....” EX1004, 25:7-12, Fig. 22. Proximal section 244 is pivotally connected to bucket elevator frame 254 using mounting brackets 252a/252b, links 256/262 and pivot pins. *Id.*, 25:30-57.

Dynatek discloses an articulated belt conveyor having two conveying arms. EX1005, pg2 (“Loader type”). “Material enters the loader through an inlet in the main arm and discharges through the outlet or a dust recovery load-out spout at the end of the 2nd arm (loading arm).” *Id.* A POSITA would have understood that the main arm and second arm would be the inboard segment and outboard segment of the extension conveyor, respectively. EX1003, ¶159-60.

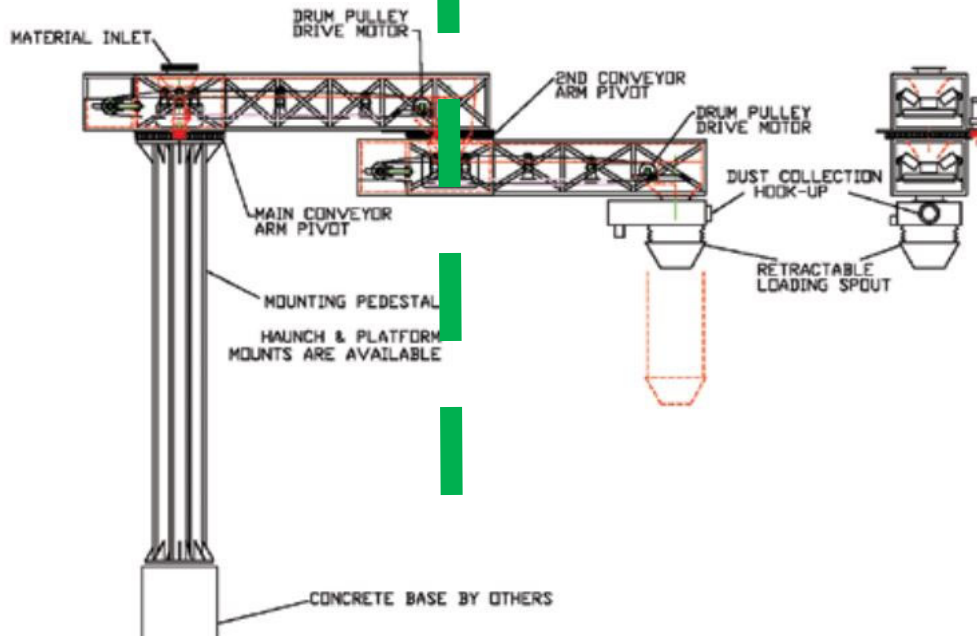


EX1005, pg2 (Fig. 2) (annotated).

Dynatek discloses a first pivot (orange above) connecting the first conveying arm (blue above) to a mounting pedestal and a second pivot (red above) connecting the second conveying arm (green above) to the first conveying arm. *Id.* It would have been obvious for a POSITA to use the articulated belt conveyor of *Dynatek* in place of *Waldner*'s discharge chute 242, or to modify discharge chute 242 to pivotally connect its distal section to its proximal section by an outboard pivot. EX1003, ¶71, 160-61; *see also* EX1033 & 1034. In substituting the articulated belt conveyor of *Dynatek* for the discharge chute 242 of *Waldner*, the first conveying arm would be pivotally connected to the bucket elevator housing and moveable as recited in claim 1[i]. *Id.*

- l) Claim 1[k]: “wherein the inboard segment of the extension conveyor of the conveyor extension assembly is pivotable at the inboard pivot about a substantially vertical axis with respect to the deployable frame at the inboard pivot when the extension conveyor is in the raised position, the outboard segment of the extension conveyor being pivotable at the outboard pivot about a substantially vertical axis with respect to the inboard segment when the extension conveyor is in the raised position.”**

Dynatek discloses that each one of the two conveying arms independently pivot via their respective pivots and that the articulated belt conveyor is capable of horizontal rotation. EX1005, pg2 (slewing bearings “rotate the loading conveyor up to 330 degrees horizontally”); EX1014, pg40-43. A POSITA would have understood that the two conveying arms of *Dynatek*, or the two portions of discharge chute 242 of *Waldner* when modified according to the teachings of *Dynatek*, must be pivotable about vertical axes (*e.g.*, green below) in order to rotate horizontally. EX1003, ¶162.



EX1005, pg2 (Fig. 2) (annotated).

Further, a POSITA would have understood that *Dynatek*'s two conveying arms or the two portions of *Waldner*'s modified discharge chute 242 would be so pivotable when in *Waldner*'s operational configuration, *i.e.*, when the extension conveyor is in a raised position. *Id.*

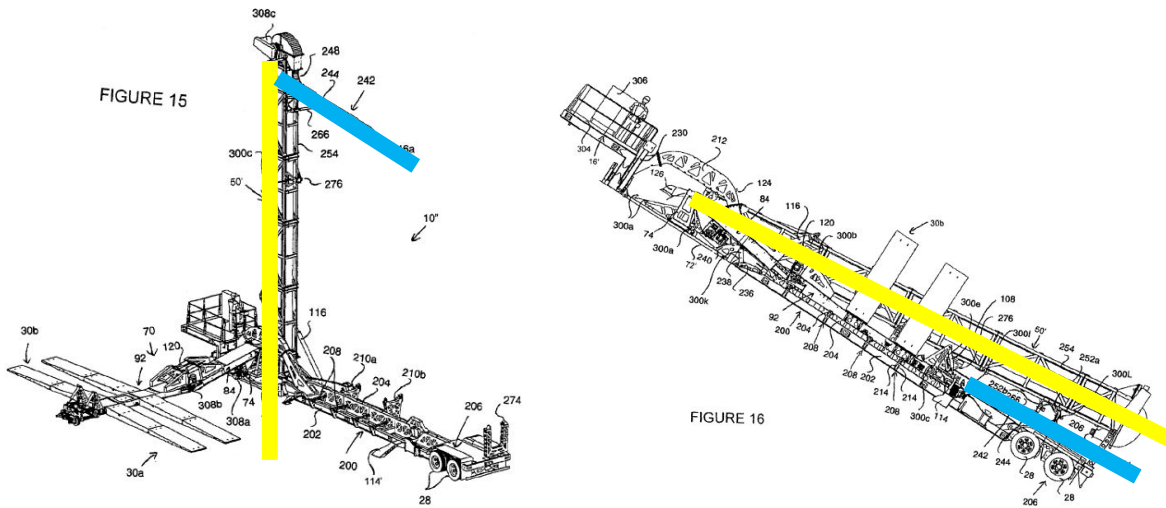
3. Claim 2: “the base assembly has at least one axle and a pair of wheels mounted on the at least one axle such that the base assembly is transportable across the ground surface.”

Waldner discloses “at least one pair of ground wheels 28 ... are rotatably supported on the frame near the second end thereof with the wheels of each pair disposed on opposite sides of the frame for rolling support of the trailer frame on the ground during towing of the trailer by a suitable tow vehicle (not shown).” EX1004,

12:41-47, Fig. 5. A POSITA would have understood that these wheels are connected to the frame through an axle. EX1003, ¶163-64.

4. Claim 4: “the lowered position of the extension conveyor ... is characterized by the extension conveyor being oriented substantially parallel to the deployable frame ..., the raised position of the extension conveyor being characterized by the extension conveyor being oriented substantially perpendicular to the deployable frame...”

Waldner’s discharge chute 242 (blue below) is located between the bucket elevator 50 and the trailer and is substantially parallel to the bucket elevator 50 (yellow below) when the conveyor extension assembly is in a lowered position. EX1004, 26:20-22 & Fig. 16; *see also* Figs. 10-12. Discharge chute 242 is substantially perpendicular to the bucket elevator 50’ (including its frame 254 or housing 52) when in its raised position. *Id.*, Fig. 15; *see also id.*, 25:64-66; EX1003, ¶165-68. In *Walder’s* system combined with *Dynatek*, the articulated conveyor would be so positioned.



EX1004, Figs. 15-16 (annotated).

5. Claim 5: “the raised position of the extension conveyor ... is characterized by the extension conveyor being cantilevered outwardly from the deployable frame of the aggregate elevating assembly.”

Waldner discloses using brackets 252a/252b, links 256/262, and actuators 266/270 to move discharge chute 242 relative to bucket elevator 50. *Id.*, 25:30-26:19, 26:46-63; Figs. 22A-22D. A POSITA would have understood that discharge chute 242 can be cantilevered outwardly away from bucket elevator 50 and/or its housing 52 or frame 254. EX1003, ¶169-70. *Dynatek* also discloses this configuration. EX1003, ¶171; EX1005, pg2 (Fig. 2).

6. Claim 6

a) Claim 6[p]

See Claim 1[h]; EX1003, ¶173-74.

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.

Dynatek also discloses a frame (truss-framing in red below) around its articulated belt conveyor movable relative to the mounting pedestal. EX1005, pg2 (Fig. 1); EX1003, 178. In the combined apparatus of *Waldner* and *Dynatek*, this frame would be movable in the same manner as discharge chute 242. EX1003, ¶179.



EX1005, pg2 (Fig. 1)(annotated).

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.

7. Claim 7: “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[and] being retractable to pivot the conveyor support frame toward the deployable frame and move the extension conveyor to the lowered position.”

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.” EX1004, 25:55-57. *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.” *Id.*, 25:58-63. 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. EX1003, ¶181. *Waldner* discloses discharge chute 242 “is movable about two perpendicular axes to allow relocation thereof to various positions in 3D space” relative to bucket elevator 50. EX1004, 25:58-66. A POSITA would have understood that discharge chute 242 (or *Dynatek’s* conveyor in the combined system) can be moved to lowered and raised positions. EX1003, ¶181-182.

8. Claim 8: “the conveyor extension assembly includes a chute mounted on the extension conveyor to extend downward from the extension conveyor and receive aggregate from the outlet of the extension conveyor.”

Waldner discloses “the granular material is fed into the storage bin or tank that is to be filled with the granular material, for example *via a discharge chute* if provided.” EX1004, 16:48-50 (emphasis added). A POSITA would have understood that structure shown at the discharge end 246a (purple below) is a discharge chute that extends downward as claimed. EX1003, ¶183.

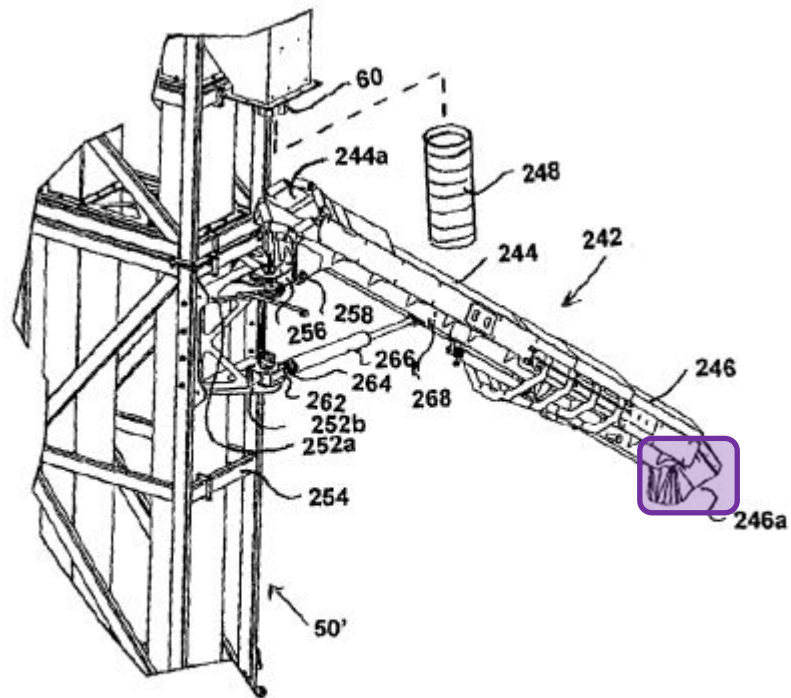


FIGURE 22A

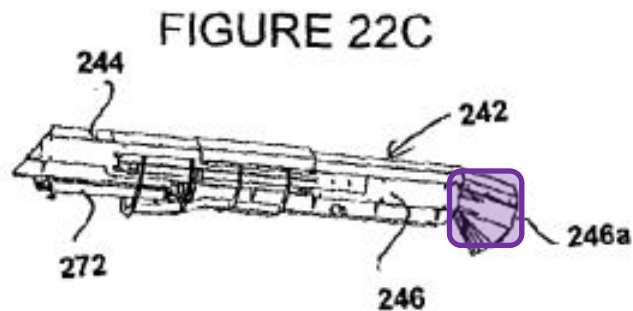
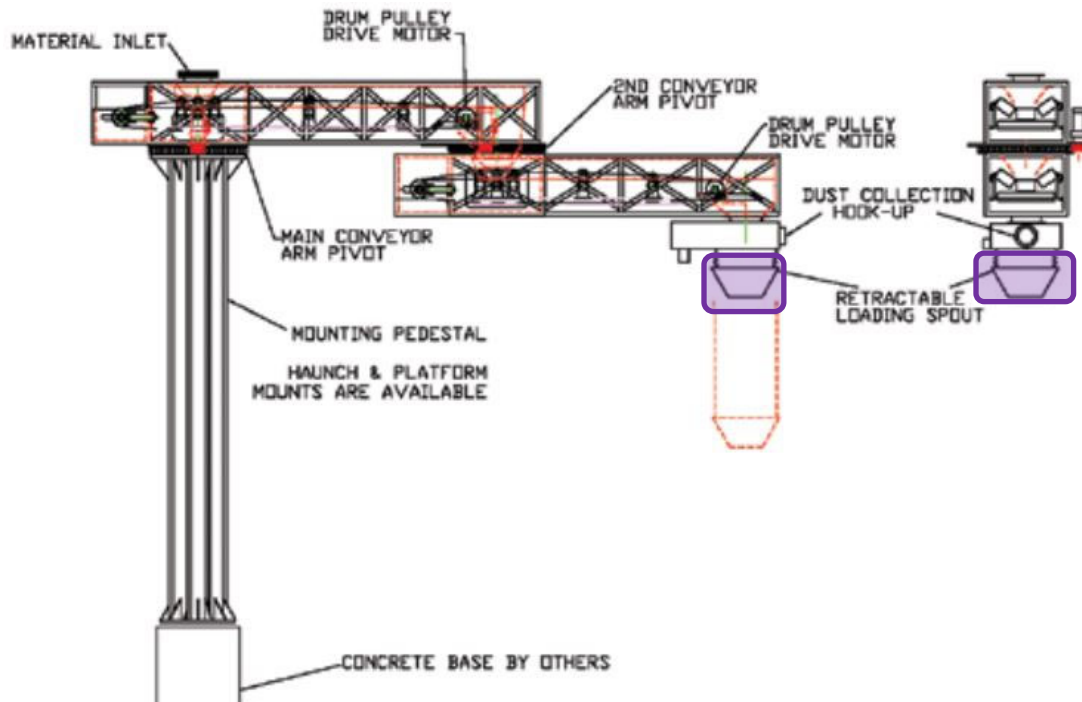


FIGURE 22C

EX1004, Figs. 22A & 22C (annotated).

To the extent that *Waldner* does not disclose this element, *Dynatek* does. *Dynatek*'s system "discharges [material] through the outlet or a dust recovery load-

out spout at the end of the 2nd arm (loading arm).” EX1005, 2; *see also* EX1003, ¶184.

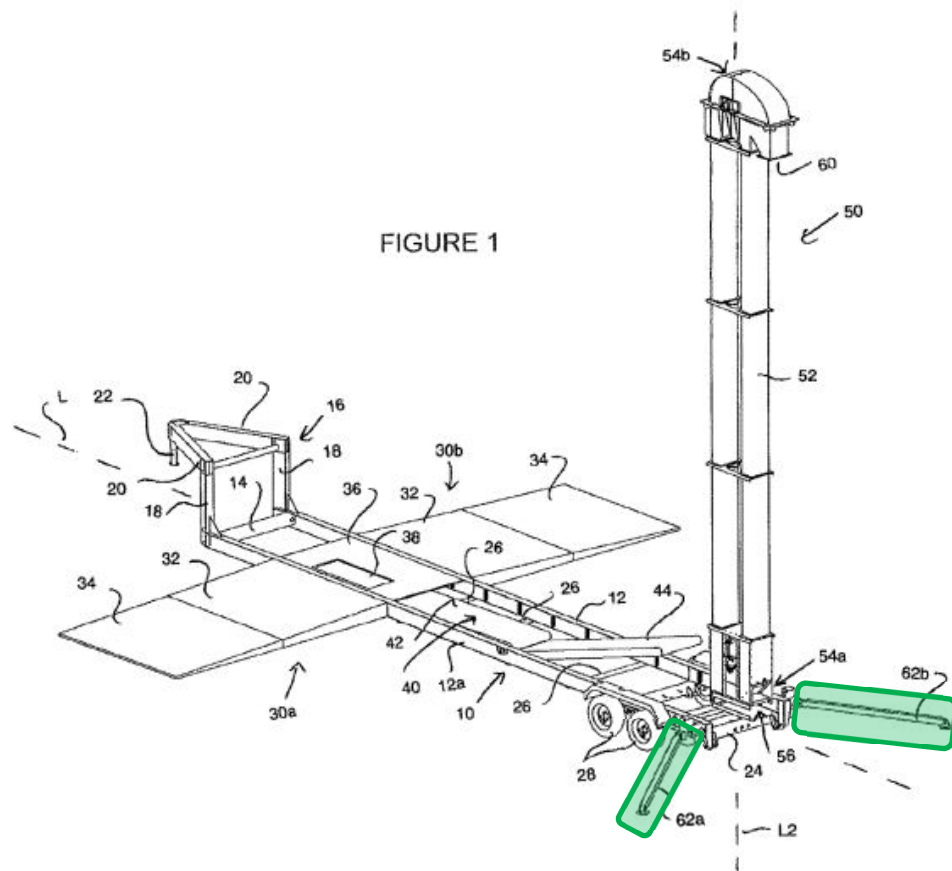


EX1005, pg2 (Fig. 2) (annotated).

It would have been obvious to a POSITA to substitute Dynatek's EconoLoader for discharge chute 242, or to modify it to include a dust recovery loud-out spout at the end of the second segment. EX1003, ¶185; *see also* EX1021.

9. **Claim 9:** “the base assembly includes an outrigger structure mounted on the base frame... being movable with respect to the base frame between a stabilizing condition corresponding to an operational configuration of the apparatus and a non-stabilizing condition corresponding to a transport configuration of the apparatus.”

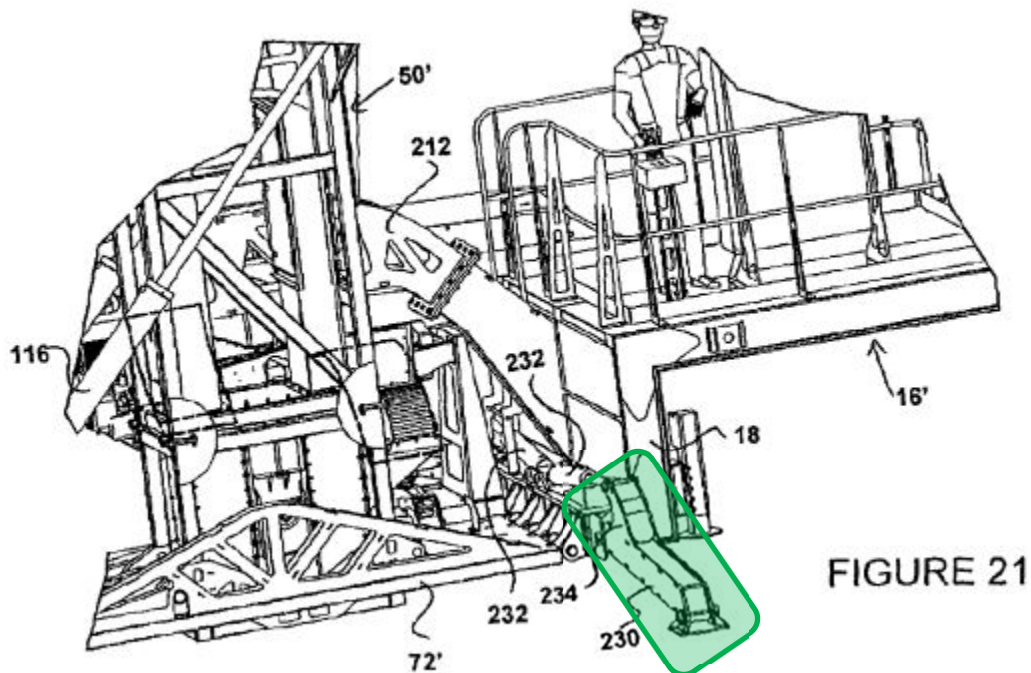
Waldner discloses a pair of outrigger arms 62a/62b (green below) mounted to the trailer frame adjacent the second end thereof at the first and second longitudinal frame beams 12a, 12b, respectively. EX1004, 15:47-50.⁷



EX1004, Fig. 1 (annotated).

⁷ To the extent that outrigger arms 62a/62b are not shown in certain embodiments of *Waldner*, it would have been obvious to a POSITA to include them in such embodiments. EX1003, ¶186-188.

Outrigger arms 62a/62b brace the trailer frame to improve stability in a deployed position (as shown in Figs. 1-4) and are retractable for transport as shown in Figs. 5-9. *Id.*, 15:50-16:7. In another embodiment, outrigger support legs 230 (green below) are mounted to the trailer near the gooseneck. *Id.*, 24:4-25.



EX1004, Fig. 21 (annotated).

A POSITA would have understood that outrigger arms 62a/62b and legs 230 are movable with respect to the frame 10. EX1003, ¶186-188.

10.Claim 10: “the unloader structure includes a pair of ramps and a grate mounted on the base frame... positioned between the pair of ramps, at least a portion of the grate being reticulated to permit aggregate to pass through the grate and fall onto the base conveyor.”

See Claim 1[c]; EX1003, ¶189-191. A POSITA would have considered *Waldner*'s opening 38 a reticulated grate or equivalent thereof. EX1003, ¶132, 190. Alternatively, a POSITA would have considered it obvious to add a reticulated grate to opening 38, *e.g.*, to meet safety requirements and/or to prevent items other than particulate from falling onto conveyor 42 below. EX1003, ¶133, 191; EX1032 (discharge opening 19); 29 C.F.R. 1910.29(e) (OSHA regulations).

11.Claim 11: “each of the ramps of the unloader structure is pivotable with respect to the base frame [and] extending laterally in substantially horizontal and opposite directions from the base frame in the operational condition of the apparatus [and] extending substantially vertical and parallel to each other in the transport condition of the apparatus.”

Waldner discloses ramp assemblies 30a, 30b hingedly connected to a respective longitudinal beam 12a, 12b of frame 10. *Id.*, 12:60-63. For each of ramp assemblies 30a, 30b, the ramp sections “extend[] laterally outward from the hinged connection at the respective side of the trailer frame” in the deployed position (Figs. 1-4), and “stand[] upwardly from the hinged connection so as not to project laterally outward therefrom” and generally parallel to one another in the retracted position (Figs. 5-8). *Id.*, 12:63-13:3. A POSITA would have understood that ramp assemblies 30a, 30b would be extended in the operational configuration and upright in the transport configuration. EX1003, ¶192-194.

12.Claim 16

a) Claim 16[p]

See Claim 1[p]; EX1003, ¶195-197.

b) Claim 16[a]

See Claim 1[a]; EX1003, ¶198.

c) Claim 16[b]

See Claim 1[b]; EX1003, ¶199.

d) Claim 16[c]

See Claim 1[c]; EX1003, ¶200.

e) Claim 16[d]

See Claim 1[d]; EX1003, ¶201.

f) Claim 16[e]

See Claim 1[e]; EX1003, ¶202.

g) Claim 16[f]

See Claim 1[f]; EX1003, ¶203.

h) Claim 16[g]

See Claim 1[g]; EX1003, ¶204.

i) Claim 16[h]

See Claim 1[h]; EX1003, ¶205.

j) Claim 16[i]

See Claim 1[i]; EX1003, ¶206.

k) Claim 16[j]

See Claim 1[j]; EX1003, ¶207.

l) Claim 16[k]: “wherein the outboard pivot of the extension conveyor...”

As discussed above, it would have been obvious to a POSITA to substitute *Dynatek’s* EconoLoader for discharge chute 242. *Dynatek* discloses material entering into the articulated belt conveyor through an inlet of the first conveying arm and discharging from a distal end of the second conveying arm. EX1005, pg2. A POSITA would have understood that the material would travel through *Dynatek’s* slewing bearing-based outboard pivot to be discharged at a distal end of the second conveying arm. EX1005, pg2; EX1014, pg41 (“slewing rings”); EX1003, ¶71, 208; *see also* EX1033 & 1034.

Alternatively, *Waldner* discloses that material is transferred from the proximal section of its discharge chute 242 to the distal section. EX1004, 15:14-21, 25:7-20, 26:55-63. In modifying discharge chute 242 to connect those elements with a pivot

joint, it would have been obvious to use a pivot joint like the one in *Dynatek* that allows the passage of particulate material from one end of the first segment to the connected end of the second segment so that the modified discharge chute still transfers material from the proximal section to the distal section. EX1003, ¶71, 209; *see also* EX1033 & 1034.

13.Claim 17

See Claim 1[k]; EX1003, ¶210.

14.Claim 18

a) Claim 18[p]

See Claim 1[p]; EX1003, ¶211-213. A POSITA would have understood that the elevated location refers to a location above a ground surface. EX1003, ¶213.

b) Claim 18[a]-18[b]

See Claims 1[a]-1[b]; EX1003, ¶214-215.

c) Claim 18[c]

See Claim 1[d]; EX1003, ¶216.

d) Claim 18[d]

See Claim 1[e]; EX1003, ¶217.

e) Claim 18[e]

See Claim 1[f]; EX1003, ¶218.

f) Claim 18[f]

See Claim 1[g]; EX1003, ¶219.

g) Claim 18[g]: “a conveyor extension assembly configured to convey aggregate...”

See Claim 1[h]; EX1003, ¶220-222. A POSITA would have understood that the aggregate is discharged from the discharge chute 242 at a location elevated above the ground surface. EX1003, ¶222.

h) Claim 18[h]

See Claim 1[i]; EX1003, ¶224.

i) Claim 18[i]: “wherein the extension conveyor includes an inboard segment and an outboard segment...”

See Claim 1[j]; EX1003, ¶225. A POSITA would have understood that the conveying arms of *Dynatek*’s EconoLoader or the modified discharge chute of *Waldner* are pivotable with respect to each other and to *Waldner*’s bucket elevator 50 about a vertical axis at each pivot point. EX1003, ¶225-228. *Dynatek* and *Waldner* further disclose positioning the discharge point of the discharge chute or the articulated belt conveyor, respectively. EX1004, 15:14-21, 26:46-63; EX1005, pg2 (“Loader Moves – Not The Transport Vehicle”).

j) Claim 18[j]: “wherein the inboard and outboard segments...”

See Claim 1[k]; EX1003, ¶229. A POSITA would have understood that the two conveying arms of *Dynatek* or the two portions of discharge chute 242 of *Waldner* when modified according to the teachings of *Dynatek* are pivotable in a substantially horizontal plane. EX1003, ¶229-230; EX1005, pg2 (“rotate the loading conveyor up to 330 degrees horizontally”).

15.Claim 19: “The apparatus of claim 18 wherein the extension conveyor is movable...”

See Claims 1[i] and 1[k]; EX1003, ¶231-235. A POSITA would have understood that the two conveying arms of *Dynatek* or the two portions of discharge chute 242 of *Waldner* when modified according to the teachings of *Dynatek* are pivotable in a substantially horizontal plane. *Id.*

16.Claim 20: “The apparatus of claim 18 wherein the inboard segment of the extension conveyor is pivotable...”

See Claims 1[j] and 1[k]; EX1003, ¶236. A POSITA would have understood that the second pivot of *Dynatek* or the outboard pivot connecting the distal and proximal sections of *Waldner*’s modified discharge chute is spaced from the bucket elevator by the first conveying arm or the proximal section. EX1003, ¶236-238.

17.Claim 22

a) Claim 22[p]

See Claim 18[p]; EX1003, ¶239.

b) Claim 22[a]-22[b]

See Claim 1[a]-1[b]; EX1003, ¶240-241.

c) Claim 22[c]-22[f]

See Claims 1[d]-1[g]; EX1003, ¶242-245.

d) Claim 22[g]

See Claim 18[g]; EX1003, ¶246.

e) Claim 22[h]

See Claim 1[i]; EX1003, ¶247.

f) Claim 22[i]

See Claim 18[i]; EX1003, ¶248.

g) Claim 22[j]

See Claim 20; EX1003, ¶249.

h) Claim 22[k]

See Claim 1[k]; EX1003, ¶250.

18.Claim 23

a) Claim 23[p]

See Claim 18[p]; EX1003, ¶251.

b) Claim 23[a]-23[b]

See Claim 1[a]-1[b]; EX1003, ¶252-253.

c) Claim 23[c]-23[f]

See Claims 1[d]-1[g]; EX1003, ¶254-257.

d) Claim 23[g]

See Claim 18[g]; EX1003, ¶258.

e) Claim 23[h]

See Claim 1[i]; EX1003, ¶259.

f) Claim 23[i]

See Claim 18[i]; EX1003, ¶260.

g) Claim 23[j]

See Claim 20; EX1003, ¶261.

h) Claim 23[k]

See Claim 16[k]; EX1003, ¶262.

19.Claim 24

See Claim 18[j]; EX1003, ¶263.

B. Ground 1A: Claims 1-2, 4-11, 16-20, and 22-24 are rendered obvious by *Waldner* in view of *Dynatek* and *Sleeman*

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

Sleeman is analogous art to *Waldner* and *Dynatek* and to the '689 Patent. Similar to *Waldner* and *Dynatek*, *Sleeman* is directed to portable conveyor systems that receive and convey particulate material to downstream equipment, *e.g.*, in hydraulic fracturing and agricultural systems. EX1006, Abstract, 1:40-61; EX1003, ¶265-266. Further, *Sleeman* teaches systems that include an “elevating assembly” such as a bucket elevator for elevating the particulate material to an elevated discharge location (EX1006, 3:7-15), which would have been relevant to the problem that the '689 Patent purports to solve. EX1003, ¶266-271.

Sleeman and *Waldner* disclose systems with numerous similarities that are directed to solving essentially the same problems. EX1003, ¶272; *see also* §V.A & V.C, *supra*. In optimizing the design of *Waldner*, a POSITA would have considered *Sleeman*'s similar system and its different features that may have certain advantages. *Id.* For example, *Waldner* teaches detaching its discharge chute 242 from the outlet port of the bucket elevator and attaching it to the elevator frame using brackets 276 when the system is placed in its collapsed (transport) position. EX1004, 26:46-54. *Sleeman* discloses discharge spouts 50 that are attached to the elevator assembly and can be collapsed vertically down alongside its main frame when the system is

articulated to its stored position or transport mode. EX1006, 19:10-38, 20:1-12, Figs. 1 & 4. A POSITA would have found *Sleeman's* teaching to provide a potentially more user-friendly and less labor-intensive design for moving the discharge chute 242 or *Dynatek's* articulated conveyor system as substituted for it to the stored position, at least because it would not require an operator to detach and reattach those components. EX1003, ¶273. This configuration would have more easily met *Waldner's* goal of a portable “trailer-mounted solution”. EX1004, 1:17; EX1003, ¶61, 70-73, 273.

A POSITA would have had a reasonable expectation of success in combining *Sleeman* with *Waldner* and *Dynatek*. EX1003, ¶274. As discussed above, *Waldner* already teaches the use of actuators to move components of its conveyor system, including the discharge chute 242. *Id.* *Sleeman* simply adds additional attachment and arrangement of actuators to assist in raising or lowering that discharge chute. *Id.* Moreover, the use of actuators to move such components was a well-known technique, and employing the teachings of *Sleeman* in this way would have yielded predictable results in raising and lowering *Waldner's* discharge chute or *Dynatek's* articulated conveyor system. *Id.*

2. Claims 1[p]-1[g]

See Ground 1, Claims 1[p] – [g]; EX1003, ¶275.

3. Claim 1[h]

Sleeman discloses discharge spouts 50 (blue below) connected to the main frame 26 of the elevating assembly 24 (yellow below), which is coupled to the pivot shaft 60. EX1006, 19:33-35. Spouts 50 convey particulate material from main frame 26 to a silo. *Id.*, 7:59-8:8, Figs. 3-4. Each spout 50 “is coupled to the main frame 26 by a horizontal pivot shaft 60 defining a horizontal tilt axis of the discharge spout relative to the main frame 26.” *Id.*, 19:33-35. A gear and rack member configuration between the spouts 50 and main frame 26 provides control of a swing motion for the respective spout coupled thereto about a vertical swing axis. *Id.*, 19:39-55, Fig. 3.



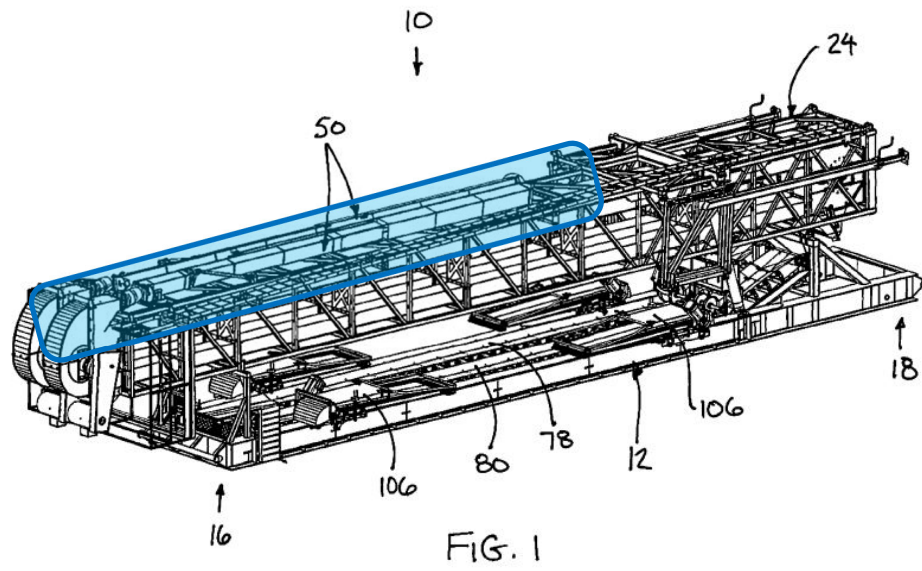
EX1006, Fig. 3 (annotated).

It would have been obvious to a POSITA to substitute *Sleeman's* spouts 50, pivot shaft 60, and gear and rack member configuration for discharge chute 242 and a combination of brackets, links, and pivot pins connecting discharge chute 242 to

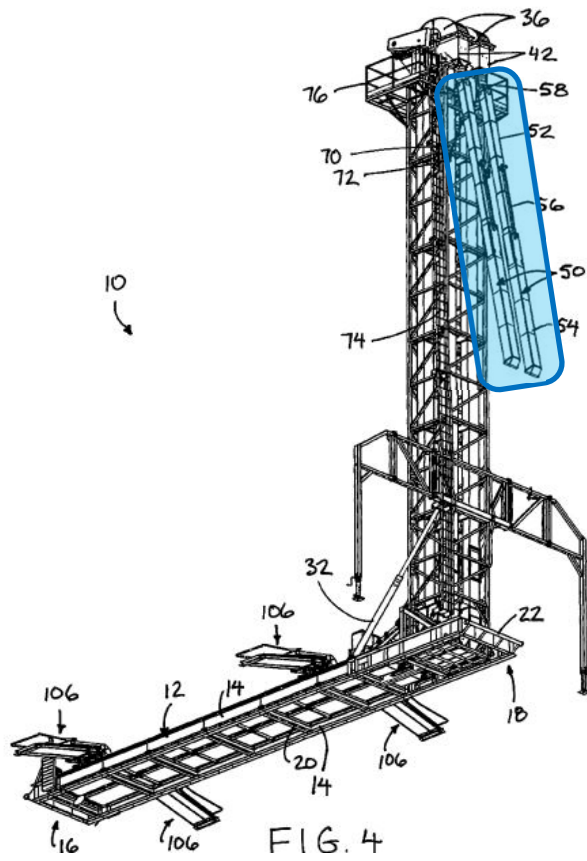
bucket elevator 50 of *Waldner*, and/or to modify the discharge chute 242 of *Waldner* (as modified in view of or substituted with *Dynatek's* conveyor system) with the coupling of *Sleeman's* spouts 50 to main frame 26. EX1003, ¶276-277.

4. Claim 1[i]

To the extent *Waldner* does not disclose that its discharge chute is “movable with respect to the aggregate elevating assembly between a lowered position ... and a raised position...”, *Sleeman* discloses that arrangement. *Sleeman* discloses that spouts 50 receive material from the elevating assembly through an inlet that later exits through a “discharge opening at the bottom discharge end” of each spout 50, which “can be repositioned in a large variety of positions and orientations relative to the main frame 26.” EX1006, 19:27; 20:9-12; Figs. 1 & 15. *Sleeman* provides that “each discharge spout is operable from a stored position to a working position thereof. In the stored position, the discharge spout extends vertically and parallel along the rear side of the main frame 26 of the elevating assembly in the working position or along the top side of the main frame of the elevating assembly in the stored position thereof.” *Id.*, 20:1-7, Figs. 1 & 4.



EX1006, Fig. 1 (annotated).



EX1006, Fig. 4 (annotated).

In the working position (*e.g.*, Fig. 25), the discharge spout can be controlled by the extension actuator 56, the swing actuator 68 and the tilt actuator 70 so that the discharge opening at the bottom discharge end of the spout 50 can be repositioned in a large variety of positions and orientations relative to the main frame 26.” *Id.*, 20:1-12. It would have been obvious to a POSITA to substitute *Sleeman’s* spouts 50 and main frame 26 for discharge chute 242 and bucket elevator frame 254 of *Waldner*, and/or to modify the discharge chute 242 of *Waldner* (as modified in view of or substituted with *Dynatek’s* conveyor system) with the coupling / actuator configuration of *Sleeman’s* spouts 50 to main frame 26. EX1003, ¶278-279.

5. Claim 1[j]

Sleeman’s discharge spouts 50 each include a first duct 52 and a second duct 54 that are coupled to one another in a telescopic configuration. EX1006, 19:11-13. The first duct 52 is connected to main frame 26 at a horizontal pivot shaft 60 which is connected to a vertical shaft 62 which defines a vertical swing axis of movement of the spout with respect to the main frame. *Id.*, 19:33-37, 19:55-67. A POSITA would have understood that the first duct 52 is pivotally connected to the main frame 26. EX1003, ¶280.

As discussed above in Ground 1, claim 1[j], *Dynatek* discloses an articulated belt conveyor that would have been obvious to combine with *Waldner*. *See also*

EX1003, ¶281-283. For the same reasons, it would have been obvious for a POSITA to use the articulated belt conveyor of *Dynatek* with the system of *Waldner* as modified per *Sleeman*, or to modify the spouts 50 of *Sleeman* and/or the discharge chute 242 of *Waldner* to pivotally connect its outboard segment to its inboard segment by an outboard pivot. EX1003, ¶283.

6. Claim 1[k]

Like *Waldner*, *Sleeman*'s first duct 52 of each discharge spout 50 is pivotably connected to the main frame 26. EX1006, 19:55-67. *Dynatek* discloses each one of the two conveying arms being able to independently pivot via their respective pivots. EX1005, pg2 ("Arm Positioning"). A POSITA would have understood that the two conveying arms of *Dynatek*, or either a) the two portions of discharge chute 242 of *Waldner*, or 2) the first and second ducts 52, 54 of *Sleeman*, when modified according to the teachings of *Dynatek* must be pivotable about substantially vertical axes in order to rotate horizontally. EX1003, ¶284. Further, a POSITA would have understood that *Dynatek*'s two conveying arms, the two portions of *Waldner*'s discharge chute 242, or the first and second ducts 52, 54 of *Sleeman* would be so pivotable when in *Waldner*'s operational configuration, *i.e.*, when the extension conveyor is in a raised position. *Id.*

7. Claims 2, 4-5

As explained above, *Waldner* in view of *Dynatek* and *Sleeman* renders Claims 2 and 4-5 obvious. See Ground 1, Claims 1-2 and 4-5; Ground 1A, Claim 1; see also EX1003, ¶286.

8. Claims 6-7

a) Claim 6[p]

See Grounds 1 and 1A, Claim 1[h]; EX1003, ¶287.

b) Claim 6[a]

See Ground 1, Claim 6[a]; EX1003, ¶288. A POSITA would have understood that the conveyor support frame shown in *Waldner* or *Dynatek* is a conveyor support frame that can support the spouts 50 of *Sleeman* relative to the aggregate elevating assembly and would have to be movable when transitioning between lowered and raised positions. EX1003, ¶288. *Waldner* in view of *Dynatek* and *Sleeman* renders Claim 6[a] obvious. *Id.*

c) Claim 6[b]

See Ground 1, Claim 6[a]; EX1003, ¶289. *Sleeman* discloses a swing actuator 68 “mounted in a generally lateral direction between the rack member 66 and the main frame 26 so that extension and retraction of the swing actuator 68 displaces the rack to in turn control swing motion of the respective spout.” EX1006, 19:39-55. A

POSITA would have understood that the swing actuator 68 would be an extension conveyor lift structure that acts on the conveyor support frame to move the extension conveyor. EX1003, ¶289-290.

d) Claim 7

See Ground 1, Claim 7; EX1003, ¶291. *Sleeman* discloses swing actuator 68 being “a linear piston cylinder hydraulic actuator” that induces pivotal motion for the conveyor support frame taught in *Waldner* or *Dynatek*. EX1006, 19:39-50. A POSITA would have understood that as the conveyor system 10 transitions between stored and working positions, the conveyor support frame would be pivoted away from or towards the main frame 26, depending on the desired position, by extending or retracting the swing actuator 68 coupled thereto. EX1003, ¶291.

9. Claims 8-11

As explained above, *Waldner* in view of *Dynatek* and *Sleeman* renders Claims 8-11 obvious. See Ground 1, Claims 8-11; Ground 1A, Claim 1; *see also* EX1003, ¶286.

10. Claims 16-17

a) Claims 16[p]-16[g]

See Ground 1, Claims 16[p]-16[g]; EX1003, ¶286.

b) Claims 16[h]-16[j]

See Ground 1A, Claims 1[h]-1[j]; EX1003, ¶276-283, 286.

c) Claim 16[k]

See Ground 1, Claim 16[k]; EX1003, ¶286.

d) Claim 17

See Ground 1A, Claim 1[k]; EX1003, ¶284, 286.

11.Claims 18-20

a) Claims 18[p]-18[f]

See Ground 1, Claims 18[p]-18[f]; EX1003, ¶286.

b) Claims 18[g]-18[j]

See Ground 1A, Claims 1[h]-1[j]; EX1003, ¶276-283, 286.

c) Claims 19-20

As explained above, *Waldner* in view of *Dynatek* and *Sleeman* renders Claims 19-20 obvious. See Grounds 1 and 1A, claims 19-20; see also EX1003, ¶286.

12.Claim 22

a) Claims 22[p]-22[f]

See Ground 1, Claims 22[p]-22[f]; EX1003, ¶286.

b) Claims 22[g]-22[k]

See Ground 1A, Claims 1[h]-1[k] and 20; EX1003, ¶276-286.

13. Claims 23-24

a) Claims 23[p]-23[f]

See Ground 1, Claims 23[p]-23[f]; EX1003, ¶286.

b) Claims 23[g]-23[i]

See Ground 1A, Claims 1[h]-1[j]; EX1003, ¶276-283, 286.

c) Claim 23[j]

See Ground 1A, Claim 20; EX1003, ¶286.

d) Claim 23[k]

See Ground 1, Claim 16[k]; EX1003, ¶286.

e) Claim 24

Waldner in view of *Dynatek* and *Sleeman* renders Claim 24 obvious. See Grounds 1 and 1A, claim 24; *see also* EX1003, ¶286.

C. Ground 2: Claims 6-7 are rendered obvious by *Waldner* in view of *Dynatek* and *Pham*

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

Pham is analogous art to *Waldner* and *Dynatek* and to the '689 Patent. Like the '689 Patent, *Waldner*, and *Dynatek*, *Pham* discloses a portable conveyor system

used for handling and storage of aggregate material (*i.e.*, sand) for oilfield operations. EX1008, 1:15-67; EX1003, ¶¶66-69 & 293. *Pham* also discloses storing proppants in vertically oriented silos with inlets at an elevated location and a means of conveying the transported component (EX1008, 1:23-59, 2:51-67, 12:5-33; §V.D, *supra*), which would have been relevant to the problem that the '689 Patent purports to solve. EX1003, ¶¶293-297.

Waldner teaches brackets 252a/252b support discharge chute 242 on the bucket elevator frame. EX1003, ¶¶298. However, a POSITA would have considered other similar structures to support discharge chute 242 (or the articulated conveyor of *Dynatek*) on the bucket elevator frame 254, *e.g.*, to facilitate converting it between its operational and collapsed configurations to optimize *Waldner's* design. EX1003, ¶¶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.*

A POSITA would have had a reasonable expectation of success in those combinations to obtain predictable results since they would involve substituting one

known component (*Pham*'s support frame and articulation mechanism) for another (e.g., *Waldner*'s brackets 252), or improving *Waldner*'s known bracket components to be moveable as taught in *Pham*. EX1003, ¶301; *Agrizap*, 520 F.3d at 1344.

2. Claim 6

a) Claim 6[p]

See Ground 1, Claim 6[p]; EX1003, ¶302-306.

b) Claim 6[a]

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.

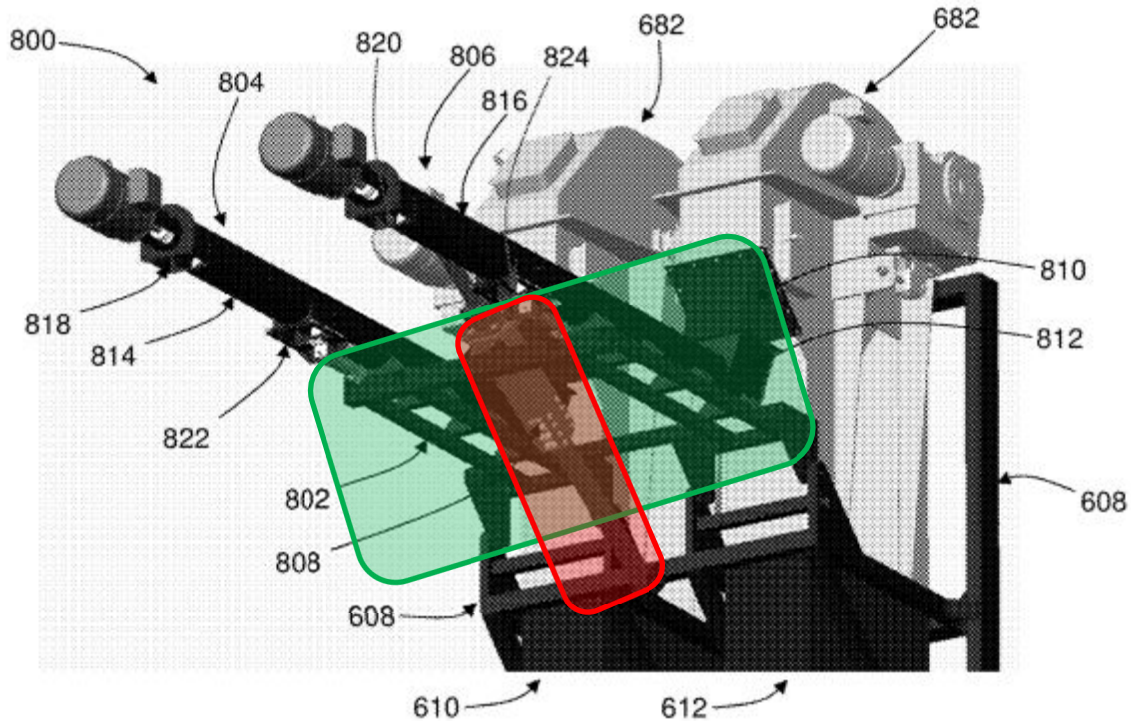


FIG. 19

EX1008, Fig. 19 (annotated).

It would have been obvious to use support frame 802 of *Pham* with the modified system of *Waldner* and *Dynatek*, or to modify the brackets 252a, 252b and actuators 266, 270 of *Waldner* with the movability of *Pham*'s support frame 802 relative to *Waldner*'s bucket elevator frame 254. EX1003, ¶304-307.

c) Claim 6[b]

See Ground 1, Claim 6[b]; EX1003, ¶307. To the extent that *Waldner* and *Dynatek* do not teach Claim 6[b], *Pham* discloses articulation mechanism 808 “which moves support frame 802 to any securable position at any point in the range

of motion.” EX1008, 14:23-25, Fig. 19. It would have been obvious for a POSITA to use articulation mechanism 808 of *Pham* with the combined system of *Waldner* and *Dynatek*. EX1003, ¶307.

3. Claim 7

See Ground 1, Claim 7; EX1003, ¶308. To the extent that *Waldner* and *Dynatek* do not teach Claim 7, *Pham* discloses that articulation mechanism 808 is “any suitable device including, hydraulic, pneumatic, drive screw, or any other mechanical actuation means, which moves support frame 802 to any securable position at any point in the range of motion.” EX1008, 14:21-25. A POSITA would have understood that such articulation mechanisms can be extended and/or retracted during operation to move frame 802 to operational and stowed positions, respectively. EX1003, ¶308. It would have been obvious for a POSITA to use *Pham*’s articulation mechanism 808 and movability of support frame 802 with the modified system of *Waldner* and *Dynatek*. *Id.* A POSITA would have understood that *Pham*’s support frame 802 or *Waldner*’s brackets 252a/b modified according to *Pham* would be pivoted towards and away from *Waldner*’s bucket elevator frame when transitioning between positions. *Id.*

D. Ground 2A: Claims 6-7 are rendered obvious by *Waldner* in view of *Dynatek*, *Sleeman*, and *Pham*

1. *Rationale for Combining Waldner, Dynatek, Sleeman, and Pham*

For the same reasons in §VII.A.2.a)1 and §VII.A.2.a)1, a POSITA would have deemed it obvious to combine *Pham* with *Waldner*, *Dynatek*, and *Sleeman*. EX1003, ¶309-310, 111-121, 265-274, 293-301.

2. Claims 6-7

Waldner in view of *Dynatek*, *Sleeman*, and *Pham* renders Claims 6-7 obvious. Grounds 1A and 2, claims 6-7; *see also* EX1003, ¶311, 302-308.

E. Ground 3: Claims 3, 12, 21, and 25 are rendered obvious by *Waldner* in view of *Dynatek* and *Auld*

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.

Waldner teaches a hitch coupler 22 that is equipped to form a gooseneck connection to a suitable towing vehicle in a conventional manner, but expressly states that “other hitch types may alternatively be employed.” EX1004, 12:28-34. Based on this express teaching, a POSITA would have been motivated to look for “other hitch types”, such as *Auld*’s kingpin 57. EX1003, ¶317-318. A POSITA would have recognized the advantages of replacing *Waldner*’s hitch coupler with *Auld*’s king pin, e.g., reducing frame material and a reduction in overall length of the trailer, and more evenly distributing the load across the towing vehicle’s bed and the trailer. EX1003, ¶319-320. Alternatively, a POSITA would have been motivated to move *Waldner*’s hitch coupler to an upper portion of the elevator 50 as suggested in *Auld* to gain similar advantages. EX1003, ¶321. A POSITA would have had a reasonable expectation of success in the combination to obtain predictable results since both types of couplers were well known and commonly used devices applicable across a broad selection of towing applications, and would have been compatible with similar towing vehicles. EX1003, ¶322; *Agrizap*, 520 F.3d at 1344.

Further, *Waldner* teaches outrigger arms to provide stability to a trailer when transitioning to an operational mode. EX1004, 15:47-56. *Auld* teaches a parking stand 61 attached to the silo such that the parking stand 61 is raised as the silo transitions to a vertical position. EX1009, Fig. 1, 4:74-5:3. A POSITA would have recognized the advantages of including *Auld*’s parking stand with *Waldner*’s system,

e.g., providing stability to the bucket elevator 50 when lowered in the stored position. EX1003, ¶323-325. A POSITA would have had a reasonable expectation of success in the combination to obtain predictable results since landing legs were well known and commonly used devices applicable across a broad selection of towing/storing applications, and would have been compatible with similar structures to support a load when disengaged from a towing vehicle. EX1003, ¶325. Although *Auld* describes kingpins and landing legs on a silo, a POSITA using or designing *Waldner*'s system would have also been familiar with silos (e.g., silos filled using that system) and would have understood that kingpins and landing legs useful for transporting silos could also be useful in transporting conveyor systems used to fill them. EX1003, ¶326; *also see* EX1003, ¶98-106; *compare* EX1011 (self-erecting silos) with EX1010 (self-erecting conveyor for filling silos); *see KSR*, 127 S. Ct. at 1742 (POSITA is “a person of ordinary creativity”).

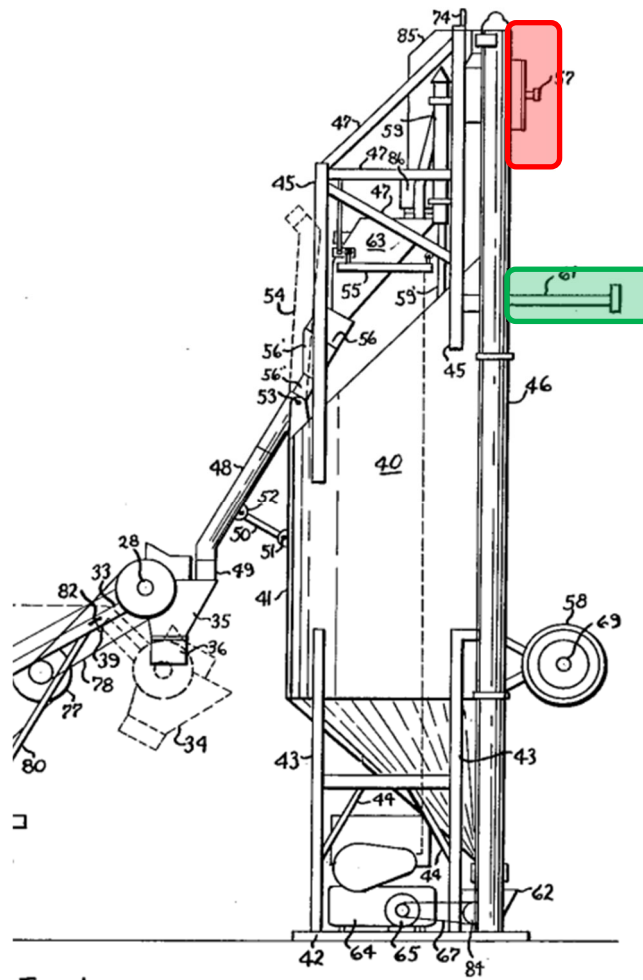
2. Claim 3: “the aggregate elevating assembly includes trailer structure...”

Waldner discloses a hitch coupler 22 (red below) mounted to beams 18 at an end of trailer frame 10 for attachment to a tow vehicle. EX1004, 12:28-51, Fig. 1; EX1003, ¶327-328.

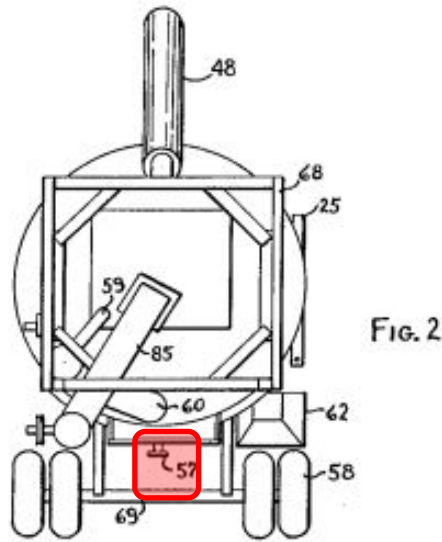


EX1004, Fig. 1 (annotated).

Auld discloses portable cement batching plant 40 having cement silo 41 that can be positioned in a vertical, operational position and in a horizontal, stored position. EX1009, Figs. 1-2; 3:2-9; 4:64-5:4; EX1003, ¶329-330.



EX1009, Fig. 1 (annotated, cropped).



EX1009, Fig. 2 (annotated).

King pin 57 (red above) is coupled to cement silo 41 and adjacent to a ground surface when in the horizontal position for attachment to a tractor for transportation. *Id.*, Fig. 2; 3:20-25; 4:63-67; 4:74-5:3; 6:47-52. A POSITA would have understood that, like *Waldner's* bucket elevator 50, *Auld's* cement silo 41 is raised and lowered between horizontal and vertical positions. EX1003, ¶331. It would have been obvious for a POSITA to use king pin 57, or its location as disclosed in *Auld* with the modified system of *Waldner* and *Dynatek*. *Id.*

3. Claim 12

a) Claim 12[p]-12[j]

See Ground 1, Claims 1[p]-1[j]; EX1003, ¶333-343.

b) Claim 12[k]

See Ground 1, Claim 2; EX1003, ¶344.

c) Claim 12[l]

See Ground 3, Claim 3; EX1003, ¶345.

d) Claim 12[m]: “the trailer structure comprises: at least one landing leg mounted on the deployable frame...”

Auld discloses pivoted parking stand 61 (green below) “swingably attached to the silo 41 and swingable outwardly ... to hold the silo 41 temporarily in [a] stored position when the truck is moved away from under the king pin 57.” EX1009, 4:74-75; 5:1-3; Fig. 1.

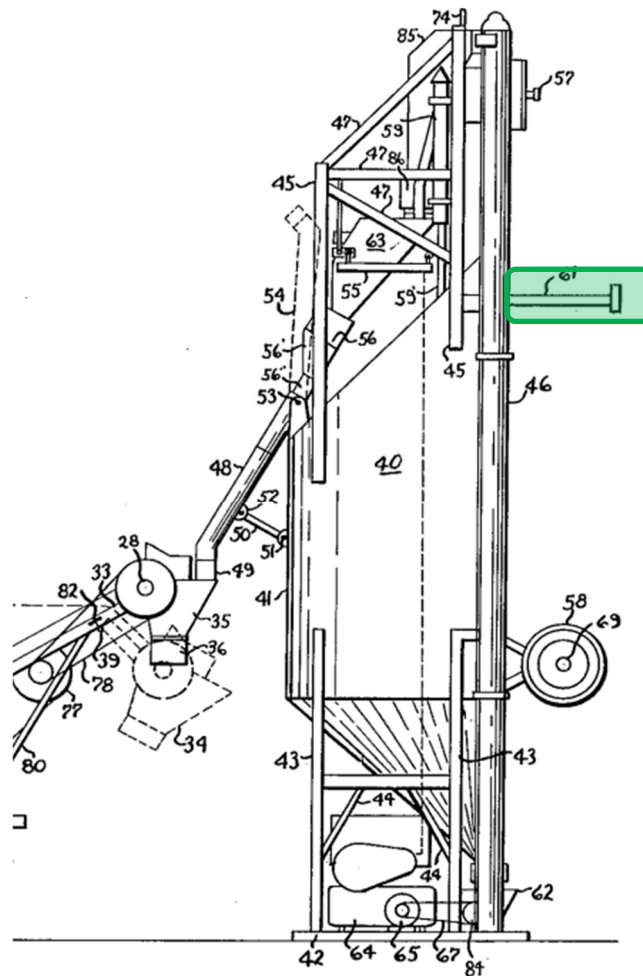


FIG. 1

EX1009, Fig. 1 (annotated, cropped).

A POSITA would understand that parking stand 61 rests on grade line 15 (the ground surface) to support cement silo 41 in the stored position. EX1003, ¶346-347. It would have been obvious for a POSITA to incorporate such a parking stand with the modified system of *Waldner* and *Dynatek*. *Id.*

e) Claim 12[n]: “a kingpin mounted on the deployable frame...”

Auld discloses that king pin 57 (red below) is coupled to an upper end of cement silo 41. EX1009, Fig. 1; 6:47-52.

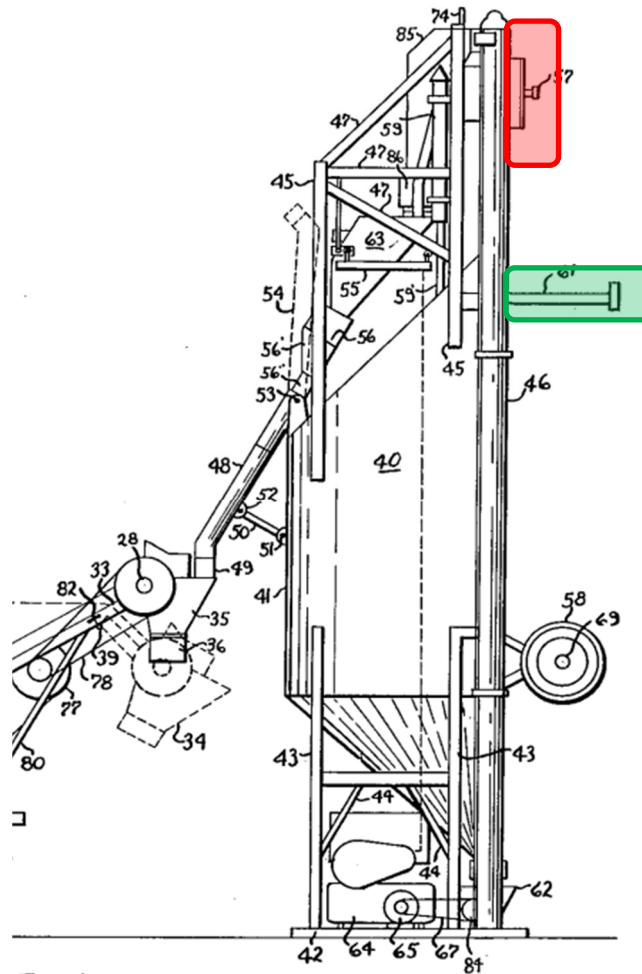


FIG. 1

EX1009, Fig. 1 (annotated, cropped).

As shown, king pin 57 is directed in the same direction as pivoted parking stand 61 (*Id.*, Fig. 1. King pin 57 is “received in a tractor when said

silo is disposed in a horizontal position for transportation.” *Id.*, 6:47-52. It would have been obvious for a POSITA to use king pin 57 with the modified system of *Waldner* and *Dynatek*, or to move *Waldner*’s hitch coupler 22 to the free end of bucket elevator frame 254 similar to the location of *Auld*’s king pin 57. EX1003, ¶¶348-349. Additionally, it would have been obvious for a POSITA to use parking stand 61 with the modified system of *Waldner* and *Dynatek*. *Id.*

4. Claim 21

See Ground 3, Claim 3; EX1003, ¶350.

5. Claim 25

a) Claim 25[p]

See Ground 1, Claim 18[p]; EX1003, ¶351-352.

b) Claim 25[a]

See Ground 1, Claim 1[a]; EX1003, ¶353.

c) Claim 25[b]

See Ground 1, Claim 1[b]; EX1003, ¶354.

d) Claim 25[c]-25[f]

See Ground 1, Claims 1[d]-1[g]; EX1003, ¶355-358.

e) Claim 25[g]

See Ground 1, Claim 18[g]; EX1003, ¶359.

f) Claim 25[h]

See Ground 1, Claim 1[i]; EX1003, ¶360.

g) Claim 25[i]

See Ground 1, Claim 18[i]; EX1003, ¶361.

h) Claim 25[j]

See Claim 12[l]; EX1003, ¶362.

i) Claim 25[k]

See Claim 12[m]; EX1003, ¶363.

j) Claim 25[l]

See Claim 12[n]; EX1003, ¶364.

F. Ground 3A: Claims 3, 12, 21, and 25 are rendered obvious by *Waldner* in view of *Dynatek*, *Sleeman*, and *Auld*

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

For the same reasons in §VII.A.2.a)1 and §VII.A.2.a)1, a POSITA would have deemed it obvious to combine *Auld* with *Waldner*, *Dynatek*, and *Sleeman*. EX1003, ¶365-366, 111-121, 265-274, 313-326.

2. Claims 3, 12, 21, and 25

Waldner in view of *Dynatek*, *Sleeman*, and *Auld* renders Claims 3, 12, 21, and 25 obvious. See Ground 1A, claims 1 & 18; Ground 3, claims 3, 12, 21, and 25; see also EX1003, ¶367, 327-364.

G. Ground 4: Claims 13-15 are rendered obvious by *Waldner* in view of *Dynatek* and *McIver*

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

McIver is analogous art to *Waldner* and *Dynatek* and to the '689 Patent. Like the '689 Patent, *Waldner*, and *Dynatek*, *McIver* is directed to transportable silo systems that receive and store material, such as sand or proppants used in hydraulic fracturing. EX1011, 1:13-18, 5:10-14; EX1003, ¶369-370. Moreover, *McIver* discloses storing such materials in a vertically oriented silo with an inlet at an elevated location (EX1011, 1:13-18, 5:10-14), which would have been relevant to the problem that the '689 Patent purports to solve. EX1003, ¶369-371.

In optimizing *Waldner's* design, a POSITA would have considered *McIver's* similar system and its different features that may have certain advantages. For example, *Waldner* discloses actuating hydraulic cylinders 116 to raise the bucket elevator 50 relative to the trailer frame 10 from a "stored" to an "operational" configuration. EX1004, 15:22-24, 19:25-62. *McIver* uses an actuator 202 coupled to connected arms 204, 206 for a similar purpose in raising a silo. EX1011, 8:63-9:13,

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 *McIver* involves a self-erecting silo, a POSITA would have recognized that similar types of lift arm systems have been used successfully in conveyor systems used to fill silos, and thus would be applicable to *Waldner* as well. EX1010, Figs. 6-7, 10:62-12:16; EX1003, ¶70-73, 98-105, 374-375.

A POSITA would have had a reasonable expectation of success in combining these teachings of *McIver* with *Waldner* and *Dynatek*. The combination would have been a simple substitution of known components (*McIver*'s actuator 202 and arms 204, 206) for others (*Waldner*'s hydraulic cylinders 116 coupled between trailer frame and bucket elevator) using a known technique, or modifying *Waldner*'s well known hydraulic cylinders with aspects of *McIver*'s well known arms 204, 206, each of which share a common purpose of elevating a component. EX1003, ¶373-377. These combinations would have yielded to obtain predictable results in extending

Waldner's bucket elevator to its upright position while making the collapsed configuration more compact. EX1003, ¶373, 377; *Agrizap*, 520 F.3d at 1344.

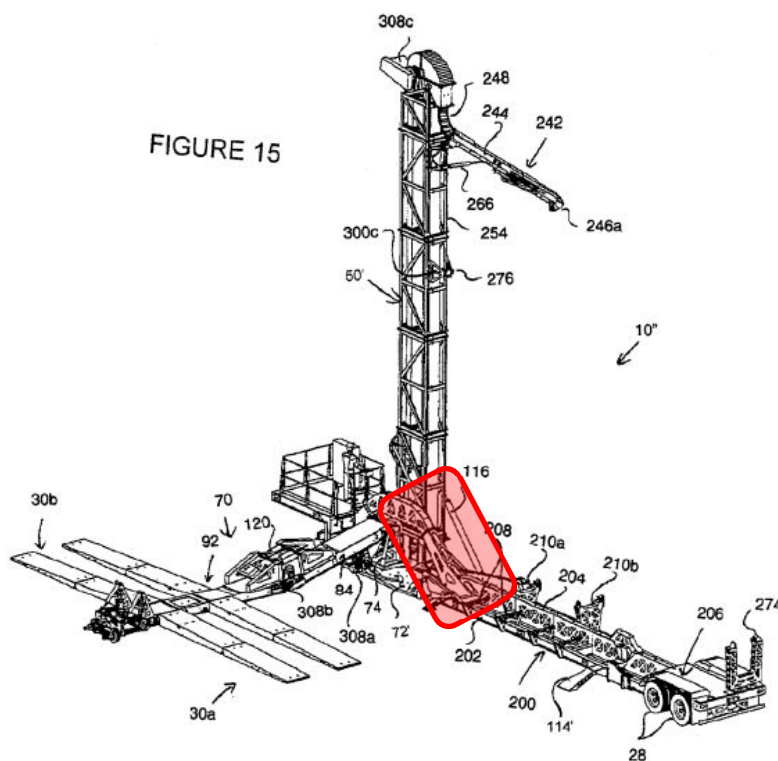
2. Claim 13

a) Claim 13[p]-[j]

See Ground 1, Claims 1[p]-1[j]; EX1003, ¶378-388.

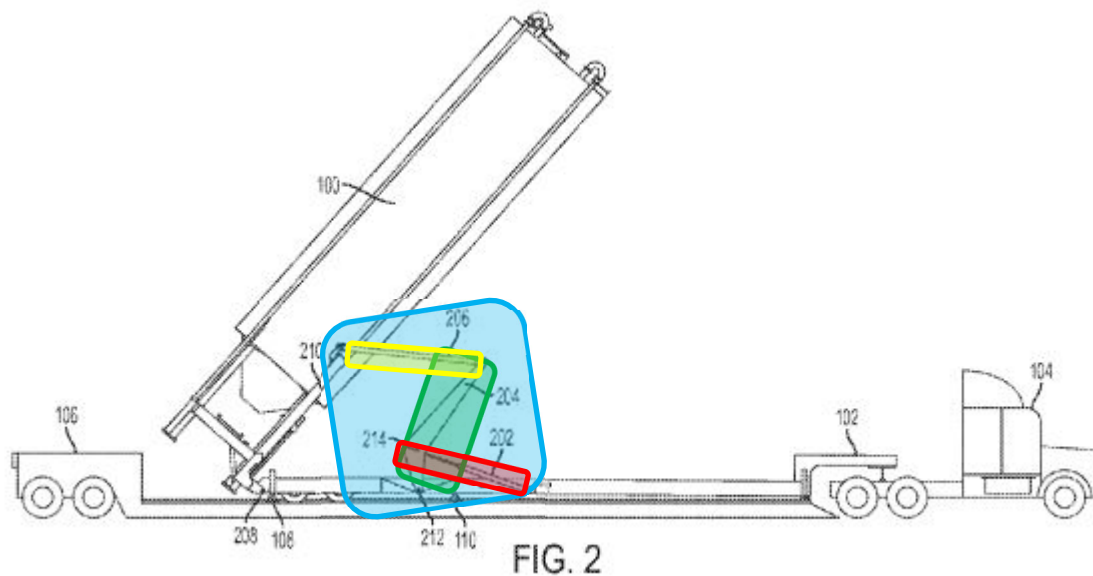
b) Claim 13[k]: “the aggregate elevating assembly includes a frame deployment assembly...”

Waldner discloses one or more hydraulic cylinders (red below) operably coupled between the trailer frame and bucket elevator housing. EX1004, 15:22-24, 19:25-62.



EX1004, Fig. 15 (annotated). As shown, hydraulic cylinders 116 are configured to move the bucket elevator 50' relative to the trailer frame 10. *Id.*, Fig. 15.⁸

McIver discloses raising silo 100 from trailer 102 using actuator 202 (red below). EX1011, 8:63-9:13.



EX1011, Fig. 2 (annotated).

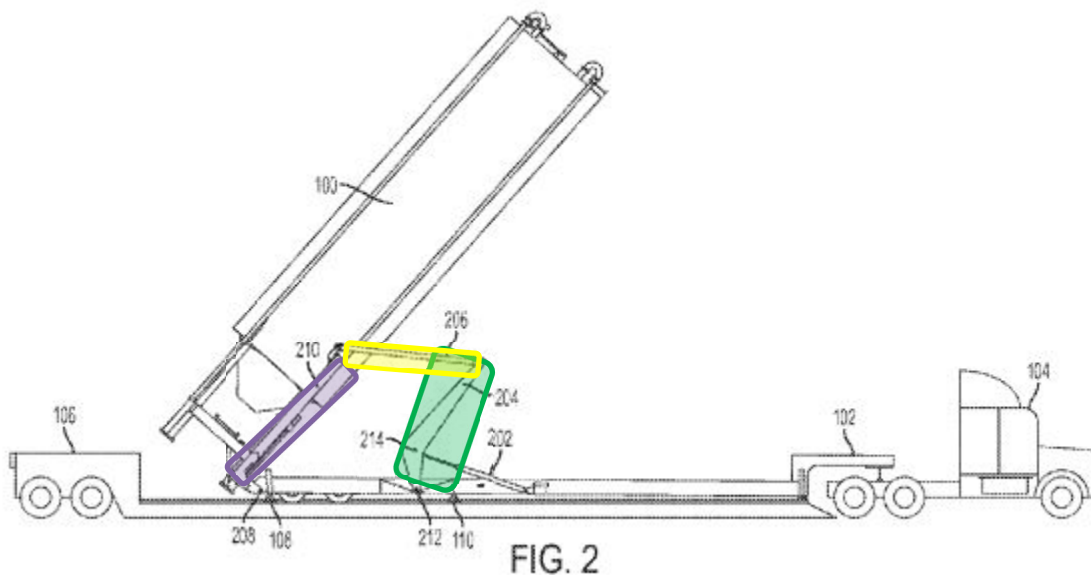
As shown, rocker arm 204 (yellow above) is actuated by actuator 202 to rotate and move arm 206 (green above) to rotate silo 100 from a transportable, horizontal position to a deployable, vertical position. EX1003, ¶391-392. It would have been

⁸ It would have been obvious to include cylinders 116 in other embodiments of *Waldner*. See note 6, *supra*; EX1003, ¶389-390.

obvious for a POSITA to substitute or modify *Waldner*'s hydraulic cylinders based on actuator 202, rocker arm 204, and arm 206 of *McIver*. EX1003, ¶392.

c) Claim 13[l]: “at least one lift arm structure...”

McIver discloses rocker arm 204 (green below) coupled to trailer 102 at pin 212 and is indirectly coupled to silo 100 through arm 206 (yellow below) and flipper mechanism 210 (purple below). EX1011, 8:63-9:13.



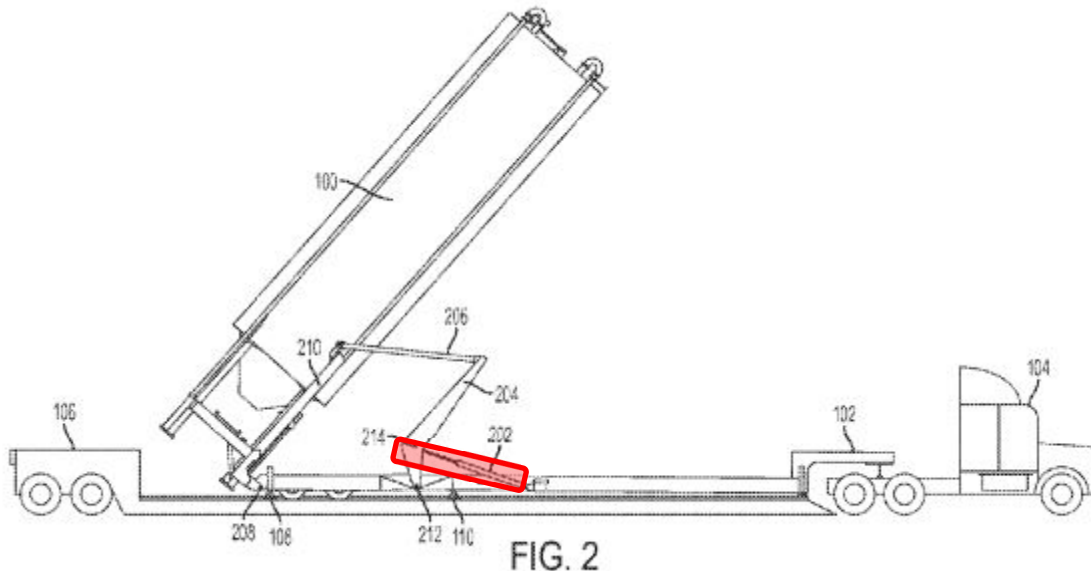
EX1011, Fig. 2 (annotated).

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.

2. It would have been obvious for a POSITA to use rocker arm 204 of *McIver* with *Waldner*'s system, or to modify *Waldner*'s hydraulic cylinders 116 to connect to an arm structure. EX1003, ¶394.

d) Claim 13[m]: “an actuator...”

McIver discloses that actuator 202 (red below) “is coupled to the trailer 102 and a rocker arm 204,” and activating actuator 202 such that arms 204 and 206 rotate. EX1011, 8:63-65, 9:8-9.

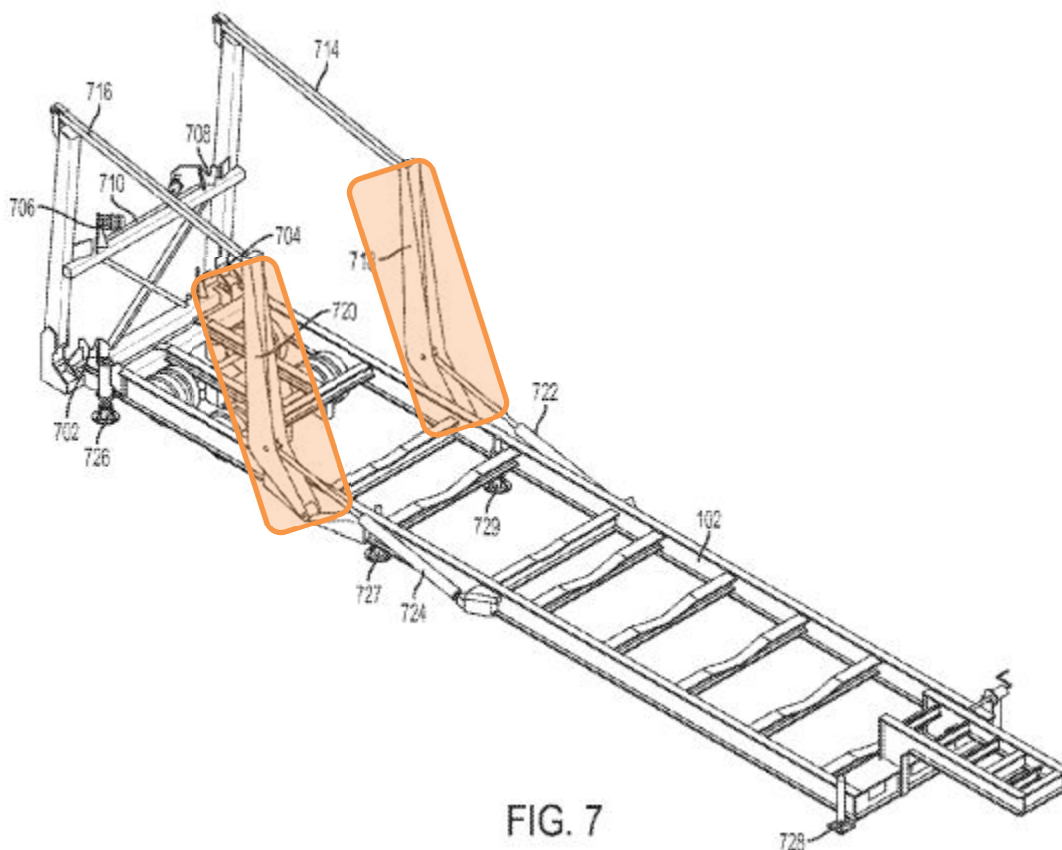


EX1011, Fig. 2 (annotated).

A POSITA would have understood that actuator 202 is used to move rocker arm 204 relative to trailer 102. EX1003, ¶395-396 It would have been obvious for a POSITA to use actuator 202 of *McIver* with *Waldner*'s system or to modify *Waldner*'s hydraulic cylinders 116 to connect to an arm structure. *Id.*

3. Claim 14: “the at least one lift arm structure comprising a pair of the lift arm structures...”

McIver also discloses a pair of rocker arms 718, 720 (orange below) disposed on opposite sides of the trailer 102. EX1011, 9:37-44. Similar to Fig. 2’s embodiment, a POSITA would have understood that rocker arms 718, 720 are indirectly coupled to silo 100 through respective arms 714, 716 and flipper mechanism 710. EX1003, ¶397-398.



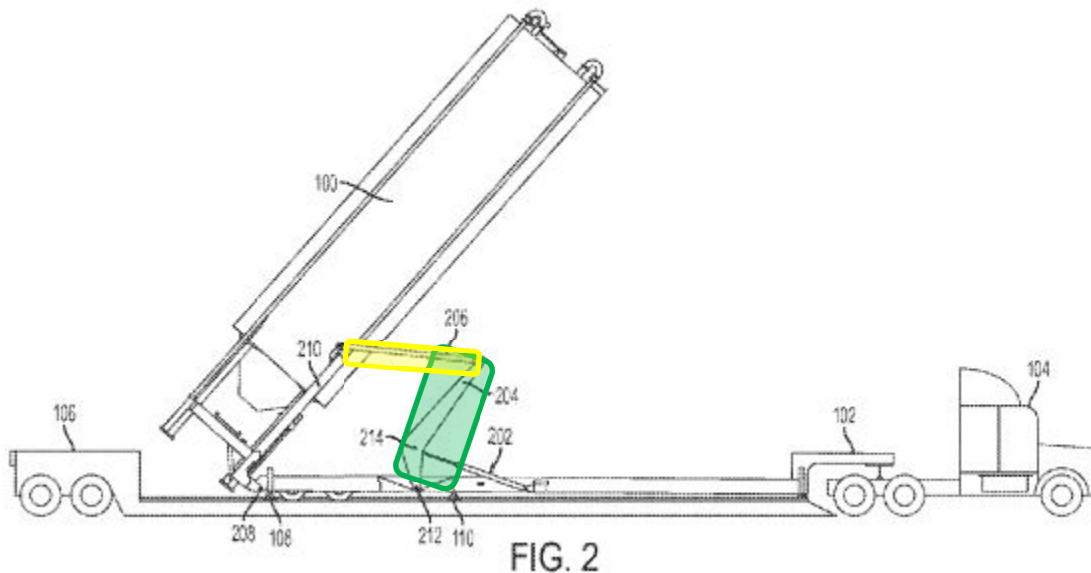
EX1011, Fig. 7 (annotated).

Further, a POSITA would have understood that rocker arms 718, 720 are in-line with opposing edges of a side of the silo 100. EX1003, ¶397-398. It would have been obvious for a POSITA to use rocker arms 718, 720 of *McIver* with *Waldner's* system, or to modify *Waldner's* hydraulic cylinders 116 to connect to a pair of lift arm structures. *Id.*

4. Claim 15

a) Claim 15[a]: “the at least one lift arm structure comprises a first link member and a second link member...”

McIver discloses rocker arm 204 (green below, second link member) pivotally connected to arm 206 (yellow below, first link member). EX1011, 8:63-9:13, Figs. 2-3.

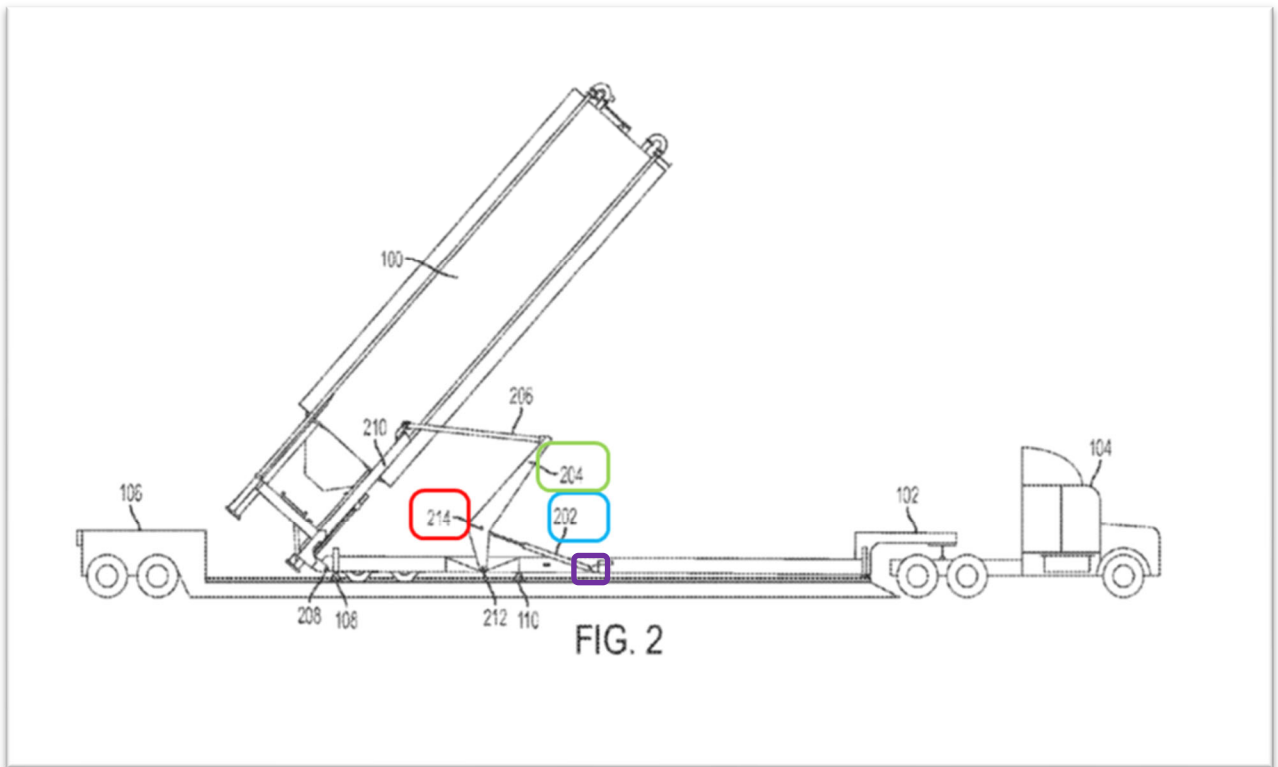


EX1011, Fig. 2 (annotated).

It would have been obvious for a POSITA to use arms 204 and 206 with *Waldner's* system, or to modify *Waldner's* hydraulic cylinders 116 to connect to similar arms. EX1003, ¶399.

b) Claim 15[b]: “the actuator ... is mounted on a base mount point ... and a medial mount point...”

McIver discloses that actuator 202 (blue below) “is coupled to the trailer 102,” at a location a POSITA would have understood as a base mount point (shown in purple below). EX1011, 8:63-65; EX1003, ¶400. *McIver* further discloses that actuator 202 is coupled to rocker arm 204 (green below) at pin 214 (red below) located between the ends of rocker arm 204 (a medial mounting point). EX1011, Fig. 2; EX1003, ¶400-401.



EX1011, Fig. 2 (annotated).

H. Ground 4A: Claims 13-15 are rendered obvious by *Waldner* in view of *Dynatek*, *Sleeman*, and *McIver*

1. *Rationale and Motivation for Combining Waldner, Dynatek, Sleeman, and McIver*

For the same reasons in §VII.A.2.a)1 and §VII.A.2.a)1, a POSITA would have deemed it obvious to combine *McIver* with *Waldner*, *Dynatek*, and *Sleeman*.

EX1003, ¶402-403, 111-121, 265-274, 369-377.

2. *Claims 13-15*

As explained above, *Waldner* in view of *Dynatek*, *Sleeman*, and *McIver* renders Claims 13-15 obvious. *See* Ground 1A, claim 1; Ground 4, claims 13-15; *see also* EX1003, ¶404, 378-401.

VIII. SECONDARY CONSIDERATIONS

Patent Owner has not identified secondary considerations tied to the '689 Patent claims. Petitioners reserve the right to address any such evidence Patent Owner presents. However, even if Patent Owner could establish secondary considerations and nexus, they would not overcome the strong case of obviousness. *Leapfrog Enters., Inc. v. Fisher-Price, Inc.*, 485 F.3d 1157, 1162 (Fed. Cir. 2007).

Respectfully submitted,

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Lead Attorney for Petitioners

Date: July 19, 2024

CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. § 42.24(d), the undersigned certifies that the foregoing Petition, exclusive of the exempted portions as provided in 37 C.F.R. § 42.24(a), contains no more than 13,846 words and therefore complies with the type-volume limitations of 37 C.F.R. § 42.24(a). This Petition complies with the general format requirements of 37 C.F.R. § 42.6(a) and has been prepared using Microsoft® Word in 14-point Times New Roman.

Respectfully submitted,

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CERTIFICATE OF SERVICE

In accordance with 37 C.F.R. §§ 42.6(e) and 42.105, the undersigned certifies that on the July 19, 2024, a complete and entire copy of this Petition for *Inter Partes* Review under 35 U.S.C. § 311 and 37 C.F.R. § 42.104, and all supporting exhibits were provided via Express Mail, postage prepaid, to the Patent Owner and its known representatives by serving the correspondence address of record for the '689 Patent Owner and the Patent Owner's counsel:

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The undersigned further certifies that a courtesy copy of the complete and entire Petition, and all supporting exhibits, were provided by electronic service to counsel retained by Patent Owner in the Related Matters identified herein:

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Date: July 19, 2024