

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

PROVISUR TECHNOLOGIES, INC.,

Petitioner,

v.

TEXTOR MASCHINENBAU GMBH,

Patent Owner

Case IPR2024-00224
U.S. Patent No. 9,457,487

**SUPPLEMENTAL DECLARATION OF PROFESSOR CHARLES
REINHOLTZ, Ph.D. REGARDING PATENT OWNER'S REPLY IN
SUPPORT OF ITS MOTION TO AMEND**

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I, Charles Reinholtz, declare as follows:

I. INTRODUCTION

1. I am over the age of 21 and am competent to make this declaration. I make this declaration based on facts and matters within my own knowledge and on information provided to me by others, and, if called as a witness, I could and would competently testify to the matters set forth herein.

II. OVERVIEW AND MATERIALS CONSIDERED

2. I have relied upon my education, knowledge, and experience as well as the other materials as discussed in this declaration in forming my opinions. My background, qualifications, and understanding of relevant legal principles were submitted in my original declaration. This declaration supplements my original opinions, responding to new theories introduced by Petitioner in its Opposition to Patent Owner's Motion to Amend.

3. For this work, I have been asked to analyze and opine on certain issues related to U.S. Patent No. 9,457,487 ("the '487 Patent") (Ex. 1001) and Provisor's Opposition to the Motion to Amend the '487 Patent. In developing my opinions set forth herein, I have considered the materials cited or discussed in Provisor's Opposition to the Motion to Amend as well as the following additional materials:

- Second Deposition Transcript of John Collins (Ex. 2016)

4. I have considered these materials from the viewpoint of a POSITA as of the priority date of the '487 Patent. For the purposes of this declaration, I have been asked to assume that the priority date of the '487 Patent is Dec. 12, 2012. I note that my opinions provided in this declaration are made from the perspective of a POSITA as of this priority date of the '487 Patent, unless expressly stated otherwise.

III. PETITIONER'S PROPOSED GROUNDS DO NOT ANTICIPATE OR RENDER OBVIOUS THE TOOLLESS REMOVAL/INSTALLATION

A. Dr. Collins's Analysis is Fatally Flawed

5. The Petitioner's expert, Dr. Collins, provided free body diagrams in his supplemental declaration and claimed that these show that that "one would need to lift the conveyor to have it pop-up under use[and t]here is no weight under which the conveyor[s of Konishi and McLaughlin] would be lifted." Ex. 1040, ¶¶34-42.¹ I disagree. This analysis fails to account for operational dynamic and vibrational forces, applies an improper coefficient of friction, and relies on impossible reactionary forces.

1. Operational Forces are not Accounted For

6. As stated, the free body diagrams advanced by Dr. Collins do not account for all the dynamic forces the conveyors would experience in use. Even if

¹ In ¶36, Dr. Collins identifies two typos in a footnote contained in my original declaration and identifies what he believes I intended to state. He correctly fixes both typos.

his (1) weight assumptions, (2) dimension assumptions, and (3) calculations are accepted as true, he has fatally failed to account for the vibrational and dynamic forces these conveyors would experience during use. A POSITA would understand these machines, like all industrial machines, must be designed to safely function under real world operating conditions. To ensure a conveyor design like Konishi's or McLaughlin's would function properly in the real world, it is mandatory to analyze the effects that dynamic forces, including loading/unloading, vibrations, and belt fluttering, would have on the conveyor. I have reviewed his original deposition transcript, and it appears that Dr. Collins understood the importance of considering vibrations when assessing whether conveyors like McLaughlin and Konishi are at risk of moving out of place during operation absent securing:

So my experience would be that these machines, they're operating in a mechanically robust environment and there can be vibrations. So I might be worried about vibrations. And if there were vibrations that ended up causing the conveyor to vibrate up, then, as a – and the predecessor conveyor would hit a lip of the conveyor and potentially cause the food product not to get on top of the conveyor.

Ex. 2014, 32:10-17. Dr. Collins also correctly understands that increasing the weight of a conveyor unit does not necessarily prevent the conveyor of Konishi or McLaughlin from becoming out of place as the result of vibrations:

As I mentioned before, with vibration it's not weight alone that you would be worried about. Heavier things can have – present frequencies

that would cause [the conveyor belt unit] to pop out. So it's not purely a weight issue.

Ex. 2014 34:11-15. In his supplemental analysis, however, Dr. Collins contradicts his own prior testimony, failing to consider vibrational forces and inaccurately asserting that the weight of the conveyor units and friction alone would hold the conveyor units of Konishi and McLaughlin in place during use. As explained below in more detail, a POSITA would not ignore dynamic forces like vibrations when implementing these conveyor designs, nor would a POSITA count on friction to keep the unit in place during operation. Accordingly, it is my opinion that neither Konishi nor McLaughlin discloses a conveyor unit that is secured by gravity and friction force alone.

7. A POSITA would have understood that there are additional issues created by leaving the conveyor units of Konishi and McLaughlin physically unsecured, as Dr. Collins proposes. Both Konishi and McLaughlin disclose vertically stacked weigh conveyors. A weigh conveyor is vertically stacked when the load cell is located near the base, and the conveyor components are mounted above the load cell. As recognized in Del Rosso, one of the Petitioner's background references submitted in this case, vertically stacked weigh conveyors are particularly susceptible to dynamic forces which can interfere with inaccurate readings in high-speed operations:

Such assemblies are accordingly statically imbalanced and top-heavy and therefor inherently subject to magnification of typically encountered dynamic unbalancing forces which when transmitted to the article weight detecting mechanism result in inaccurate weight measurement reports. Also, such encounters may apply physically destructive forces upon the mechanism such as call for constant maintenance attention; shut-downs, and repair expenses.

Such unbalancing impulses may be introduced for example by environmental shop noises; conveyor belt flutterings; drive chain or belt chatter vibrations; vagarious placements on the conveyor of the items to be weighed, and the intermittent item on-loading/off loading effects on the conveyor such as tend to disrupt smooth running operations of the conveyor. In prior machines, such impulses develop into torque moment forces and on occasion acquire resonance, and operate through substantial leverages relative to weight-measuring mechanism; ***thereby interfering with accurate readings especially in the case of high speed operations.***

Ex. 1025, 1:31-53. A POSITA would have understood the importance in accounting for vibrations and dynamic forces when implementing the weigh conveyors of McLaughlin and Konishi to ensure accurate readings. Specifically, a POSITA would have understood that relative vertical movement between parts of a weigh conveyor above a load cell would have a significant negative effect on the accuracy of the load cell. In the case of Konishi and McLaughlin, any movement between the pin and the frame in the vertical direction will cause the load cell to produce an inaccurate

reading as I explain below. These issues caused by any movement between the pin and the frame would reinforce a POSITA's view that the conveyor units of Konishi and McLaughlin must be secured by a physical mechanism that prevents such movement.

8. The load cells used in weigh conveyors consist of a spring element on which strain gauges have been mounted. The spring element is usually made of steel or aluminum. While the deflections are slight, the load cell and the base structure nevertheless act as stiff springs that store potential energy. For spring stiffness k and deflection due to the weight and impact of the conveyor pins with the base δ , the stored potential energy PE in the structure is given by:

$$PE = 1/2 * k * \delta^2$$

9. If left unsecured, vertical separation between the pin and the vertical slot will occur from vibrations. I will call this small but significant separation distance h . Once the pin loses contact with the bottom of the groove, the load the pin exerts on the frame is zero, and the load cell will indicate a weight value near zero for the portion of the conveyor and product weight supported by that pin. After falling back from height h the pin of the conveyor will continue to deflect the elastic base with spring constant k . The work done by the weight of the conveyor moving through a distance $\delta + h$ is calculated as follows:

$$Work = W * (\delta + h)$$

The work done in this elastic system is equal to the stored potential energy. Equating potential energy and work gives:

$$1/2 * k * \delta^2 = W * (\delta + h)$$

Solving this quadratic equation for the deflection, δ , gives:

$$\delta = \frac{W}{k} + \sqrt{\left(\frac{W}{k}\right)^2 + \frac{2Wh}{k}}$$

Assuming as best case that the separation distance approaches zero, i.e., the pin barely leaves the bottom surface of the groove, the deflection is:

$$\delta = 2 * W / K$$

10. In other words, the deflection is two times the deflection that would be due to weight alone. At this value of δ , the force the conveyor pin exerts on the frame is two times the static weight of the conveyor and product that are supported by that pin. The situation is made even worse as the clearance (the value of h) increases beyond a negligible amount. When this occurs, the conveyor pin impacts the bottom of the groove and creates even higher measured weight values at the load cell. Also, the load cell will indicate zero weight for the full time the pin is separated from the bottom of the groove. This relative motion between the pin and the groove is likely to lead to significant inconsistencies in weighing, making the weigh conveyor ineffective. Furthermore, when separation occurs, the impact and impulse loading resulting from the pin striking the bottom surface of the support hook is

highly destructive and can directly damage components of the conveyor, including the pins, hook surfaces and the load cell. The impact loading will also excite many modes of vibration in the entire structure, causing components and substructures to vibrate at their natural frequency long after the impact has occurred.

11. The failure to consider dynamic and vibrational forces is fatal to the findings of Dr. Collins. As Dr. Collins himself had recognized, vibrations are a concern for a POSITA in conveyor design and can cause displacement in any direction. Ex. 2014 32:10-17; Ex. 2016, 55:3-16. Failure to address forces Dr. Collins knows are the primary reason a conveyor unit would be secured renders his testimony incomplete. And, as I explain herein, if he had properly considered dynamic and vibrational forces, he could not have concluded that the conveyor units in Konishi and McLaughlin could operate without physical restraint and held in place by weight and friction alone.

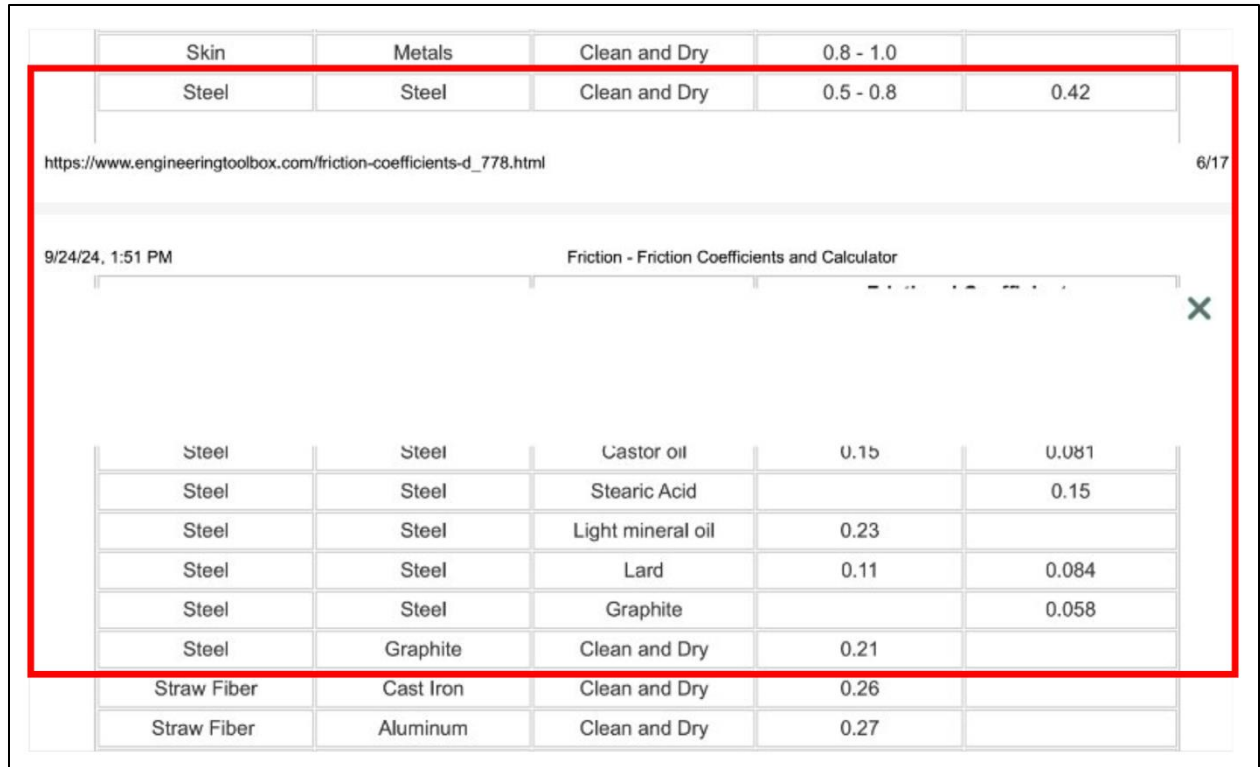
2. Friction Forces Would Not be Relied on by a POSITA

12. As a preliminary matter, a POSITA would never rely on friction to secure a running conveyor like Konishi's or McLaughlin's. Friction forces are notoriously variable and unreliable, and any prudent designer would not trust friction, or any other unreliable force to hold a critical component such as the conveyor in place, particularly given the specific mechanical designs and friction forces at issue here. Unreliable forces, such as those do to friction, can be difficult

to calculate. For example, the coefficient of friction used in calculations is only an average value and the instantaneous coefficient will vary above and below the average. Additionally, a bump or vibration can change static friction to dynamic friction. Thus, I did not attempt to account for friction in my initial analysis, as no POSITA would be comfortable relying upon friction forces when determining if a machine would function properly.

3. Dr. Collins Fails to Apply a Proper Coefficient of Friction

13. Even if friction forces were appropriate to rely on in this context, Dr. Collins fails to provide a coefficient of friction supported by any evidence. For instance, the coefficient of friction used by Dr. Collins—0.25—is not found in the exhibit he cites.



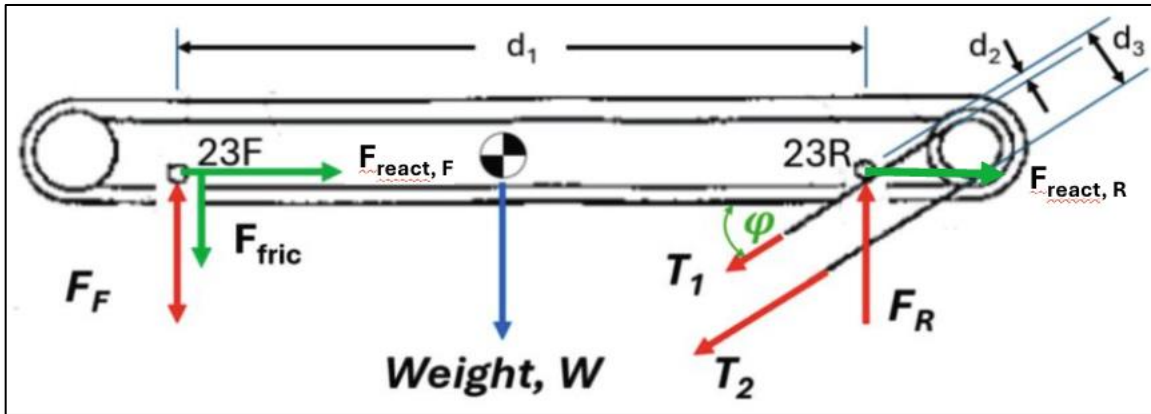
Skin	Metals	Clean and Dry	0.8 - 1.0	
Steel	Steel	Clean and Dry	0.5 - 0.8	0.42
https://www.engineeringtoolbox.com/friction-coefficients-d_778.html				
6/17				
9/24/24, 1:51 PM				
Friction - Friction Coefficients and Calculator				
Steel	Steel	Castor oil	0.15	0.081
Steel	Steel	Stearic Acid		0.15
Steel	Steel	Light mineral oil	0.23	
Steel	Steel	Lard	0.11	0.084
Steel	Steel	Graphite		0.058
Steel	Graphite	Clean and Dry	0.21	
Straw Fiber	Cast Iron	Clean and Dry	0.26	
Straw Fiber	Aluminum	Clean and Dry	0.27	

Ex. 1067, 7. Further, a POSITA would understand the importance of choosing a coefficient at least as low as a worst-case scenario possible under operating conditions. For example, in a food processing environment, there is a high likelihood of contamination by meat products, particularly lard, that can significantly impact the friction between two surfaces. It would be expected that a POSITA would be aware of the possible of meat products and other forms of grease contaminating the frame or the conveyor unit. Using Ex. 1067 cited by Dr. Collins, a POSITA would conservatively use, at the highest, the coefficient of static friction for steel on steel lubricated by lard, which is 0.11. This is less than half of the “conservative” estimate relied upon by Dr. Collins. Further, a POSITA would understand that vibrations can

change the friction from static to kinetic friction, introducing an even smaller coefficient of friction (0.084 in the case of lard). In my opinion, the failure to apply a truly conservative coefficient of friction tied to the evidence of record means Dr. Collins's analysis is unreliable.

4. Dr. Collins Does Not Apply Plausible Reactionary Forces for Konishi

14. Another basic error made by Dr. Collins is he mischaracterized the reaction forces experienced by the pins supporting Konishi's conveyor unit. Incorrectly, Dr. Collins assumes that all the horizontal reaction force caused by belt tension ($T_1 + T_2$) is experienced by the pin 23F (i.e., Konishi's non-drive side pin and hook). *See* Ex. 1040, ¶36. In fact, a POSITA would understand that the drive-side pin would assume at least a portion of the reaction force. Therefore, the non-drive side pins (23F) resting against the walls of 25F will share a portion of the horizontal reaction force, rather than the full force. In his analysis, Dr. Collins incorrectly assumes that pins 23F take all of the horizontal reaction force. Below, I modify the free-body diagrams proposed by Dr. Collins to show that the horizontal reaction force acts on both pins in Konishi.



Konishi annotated to show horizontal reaction forces at both pins.

15. How much of the reaction force is assumed by front pins (23F) and how much by the rear pins (23R) depends on a number of specific implementation factors, including dimensional tolerances. For example, the distance between the center of the pins on the removable conveyor unit and the distance between the center of the mounting hooks will play a key role. If the distance between the pins were shorter than the distance between the hooks, most of the horizontal reaction force would be placed on the drive side (i.e. on 23R). In that scenario, as the belt is tightened, the drive-side pin 23R will make contact with the wall of hook 25R (i.e., the wall of hook groove 26R). When this happens, the non-drive pin 23F may not even make contact with the wall of hook 25F (i.e., the wall of hook groove 26F). This would create a situation in which there is no horizontal reaction force and hence no friction force tending to prevent the conveyor from popping out of place at pin 23F. Similarly, the angle of the hook walls, the location within a hook in which the pin rests, and other specific mechanical variables will affect how much of the horizontal

reaction force will be assumed by the non-drive pin 23F contacting the wall of hook groove 26F. Simply assuming, as Dr. Collins does, that 100% of the reaction force will be assumed by only one side is incorrect and unreasonable.

5. Conclusion

16. For the reason's above, I find that Dr. Collins's testimony that Konishi and McLaughlin would be held in place by gravity and friction force alone is flawed and cannot be relied upon. Dr. Collins fails to assume a reasonable coefficient of friction and incorrectly applies all of the horizontal reaction force at the non-drive pin. But even if Dr. Collins had properly determined a frictional force on the pin when static (i.e., when the machine is not operating), his analysis does not account for the vibrational or dynamic forces that a POSITA must consider when designing a conveyor. These forces would make the static friction analysis meaningless. Put simply, because friction is not a constant or reliable force during operation, it is not reasonable to assume that friction will hold the conveyor in place during operation. Accordingly, a POSITA would not view either Konishi or McLaughlin to disclose conveyor units that may be installed without tools and held in place with no additional securing mechanisms. Instead, as I explained in my original declaration, a POSITA would interpret both references to require additional physical securing mechanisms in order to constitute operational systems. That they do not describe these securing mechanisms would be interpreted by a POSITA merely as a design

feature that was not the focus of their disclosures. A POSITA would not view this silence to suggest that mechanical securing was unnecessary.

IV. THE NEW COMBINATIONS ALSO FAIL—NEITHER HERMAN NOR MATHUES TEACH LATCHES THAT SECURE AGAINST THE FORCES AT ISSUE

A. General Issues with Implementing Latches On Konishi and McLaughlin

17. There are two primary issues with implementing any generic latch on the conveyor units of Konishi and McLaughlin. Repeated vibrations tend to cause latches to slip out of place, mandating the use of mechanical securing mechanisms that resist vibrations. Indeed, Dr. Collins testified to this very point, confirming that a hook/latch could vibrate out of place if used to secure the conveyor of Konishi or McLaughlin:

Q [T]hose latch systems would also prevent inadvertent displacement from vibrational forces. Correct?

...

A Again, the hooks could vibrate out as well, so not necessarily. Ex. 2016, 56:12-17. Additionally, many latches, including the barrel latch described in Lee, must have a clearance between the pin and the barrel (slot) of the latch to allow an operator to put the latch into place. Without clearance, an operator would not be able to move the latch into place. However, this clearance allows the pin to oscillate within the slot, causing problems with weighing as discussed in ¶¶7-10 above. Provided the amount of clearance is non-zero, vibrations will cause the

weight exerted on the pin to vary between zero and over twice the weight of the conveyor and product supported by the pin. Any clearance will also result in destructive impact forces that excite vibrations in the system.

18. There is a key characteristic that any physical mechanism must exhibit in order to properly secure the conveyor belt units of Konishi and McLaughlin. It must resist movement in the direction that these conveyor belts would otherwise move when the non-drive pin is unseated and pops out of place. In both Konishi and McLaughlin, the non-drive side pin will primarily move in the positive Y direction when popping out of place. That is, the non-drive pin will move up in the Y direction and out of the slot within which it sits. Because the conveyor units of Konishi and McLaughlin rotate about the drive-side, there will be a small X direction component of force and potential motion as well. Accordingly, any effective latching mechanism must resist Y direction (and some X direction) movement of the non-drive side pin to ensure the conveyor unit does not pop out of place during operation. Neither Herman's latch nor Mathues's latch exhibits this characteristic.

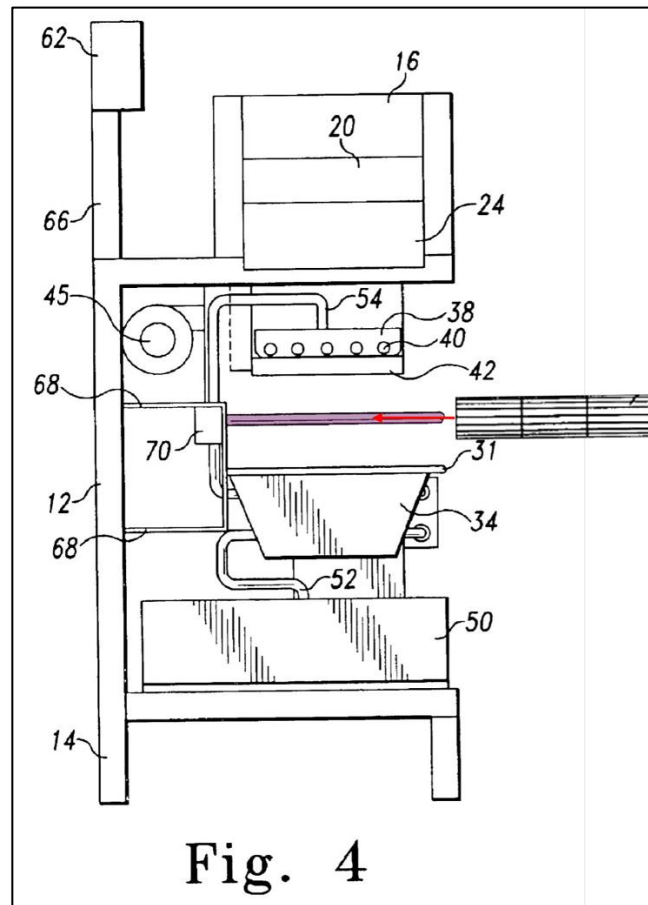
B. Herman's Latch Does Not Secure Against X-Y Operational Forces

19. Herman's latch does not resist movement in either the X or Y direction. Instead, Herman's machine places its conveyor unit on permanent mounting rods that resist all X and Y direction movement. Herman's latch is simply there to ensure

the conveyor unit does not slide of the mounting rods. That is, it resists Z direction movement only.

20. Petitioner argues that the amended claims are obvious over McLaughlin in light of Herman. Specifically, Petitioner argues that the conveyor unit of McLaughlin can be secured by the latch of Herman. Neither Petitioner nor its expert details how this combination would be implemented other than that the latch would be “re-oriented.” Ex. 1040, ¶155. Critically, neither Petitioner nor is its expert considers that Herman's latch does not resist movement in the directions required for the combination. Indeed, the latch of Herman only restricts movement in the Z direction, while the conveyor of McLaughlin must be secured in the Y direction. As I discuss below, the latch of Herman merely prevents the conveyor unit from sliding off a support rod in the Z direction. Thus, the latch does not serve a role in Herman's machine that would, if incorporated into McLaughlin's machine, adequately secure McLaughlin's conveyor. That Petitioner and Dr. Collins failed to acknowledge or address this fundamental inconsistency is fatal to the theory of obviousness advanced in Ground 5. For a number of reasons, no POSITA would have viewed Herman's latch as an effective solution for securing McLaughlin's conveyor. Herman's latch is designed to prevent movement in only the Z direction.

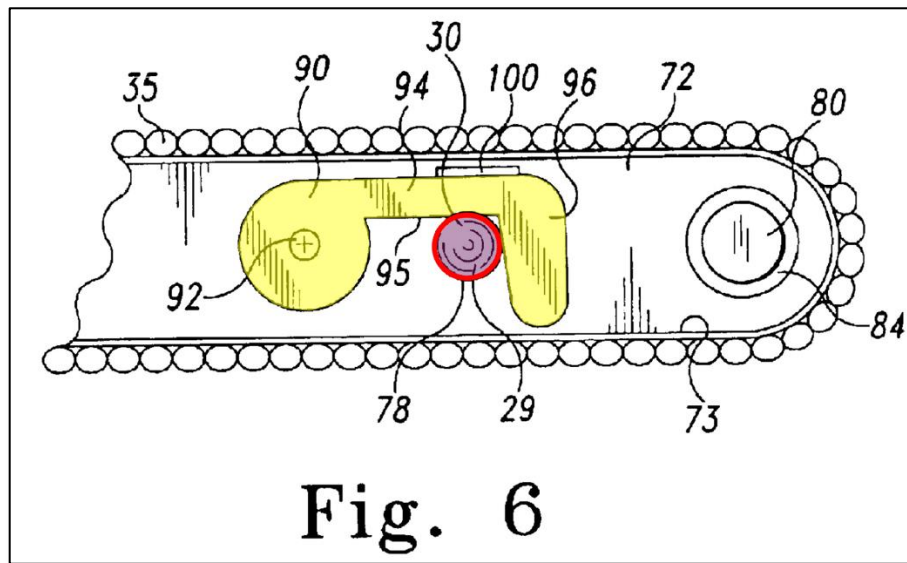
21. Herman teaches a doughnut glazing machine with a removable conveyor. The conveyor is installed by sliding tubing elements 78 over outwardly projecting support rods 30. See *Herman*, 7:10-41, Fig. 4, Fig. 6, Fig. 7.



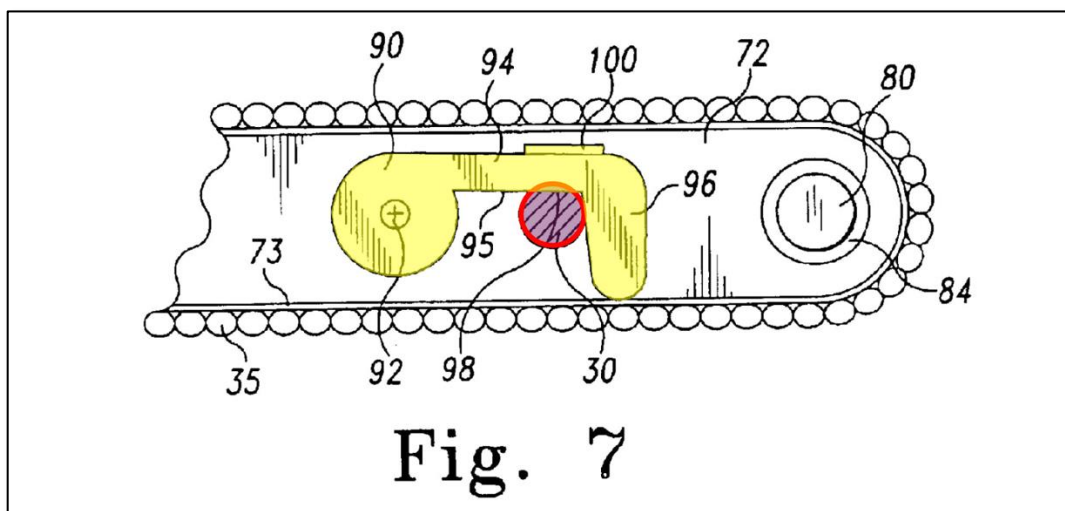
Herman, Fig. 4 (annotated).

22. A slot 98 is provided on the upper surface of at least one of the support rods, which receives the lower surface 95 of arm 94 (both part of latch 90). *Herman*, 7:31-35, Fig. 7. This interface prevents movement in the Z direction (out of the page in Figs. 6 and 7, to the right in Fig. 4), while the interface between the tubing elements 78 and support rods 30 bound movement of the conveyor in the X and Y

directions (to the right/left and top/bottom of the page in Figs. 6 and 7). The downwardly extending end portion 96 does not resist movement but rests on contact edge 73 to prevent arm 94 from blocking the opening of the tubing element. *Herman*, 7:22-27. Figs. 6 and 7 show the process of the tubing elements 78 being slid over the support rod 30, and the latch 90 falling into place in the slot 98.



Herman, Fig. 6 (annotated).



Herman, Fig. 7 (annotated).

23. Notably, the latch of Herman only resists movement perpendicular to a slot on the support rod. Rotating the latch as suggested would not prevent the vertically upward motion the pin in McLaughlin is at risk of making. If the latch is rotated as proposed by Dr. Collins, the angled end portion 96 would encourage the latch to slide off of the pin of McLaughlin and fall out of place. In other words, the latch is only designed to resist movement in the Z direction. Even if rotated a POSITA would understand it could not be used to secure the pin of McLaughlin. Given the mechanical mismatch between the role Herman's latch plays in its machine and the need for a securing mechanism in McLaughlin, a POSITA would not have been motivated to add such a latch to McLaughlin.

24. Dr. Collins suggests that a POSITA would have added a spring to bias the latch in a closed direction as taught by Suguira. Ex. 1040, ¶155. As an initial matter, this appears to implicitly concede that Herman's latch would not be effective in securing McLaughlin's conveyor unit during operation. Dr. Collins never actually describes how the combination could be implemented to resolve the fundamental problem in McLaughlin, namely, unwanted vertical movement of the conveyor. For example, the latch in Herman is intended to prevent axial Z-direction motion of the conveyor relative to the rod or extended pin. Although Dr. Collins does not provide an explanation, it appears that the spring bias would be required to create a force that

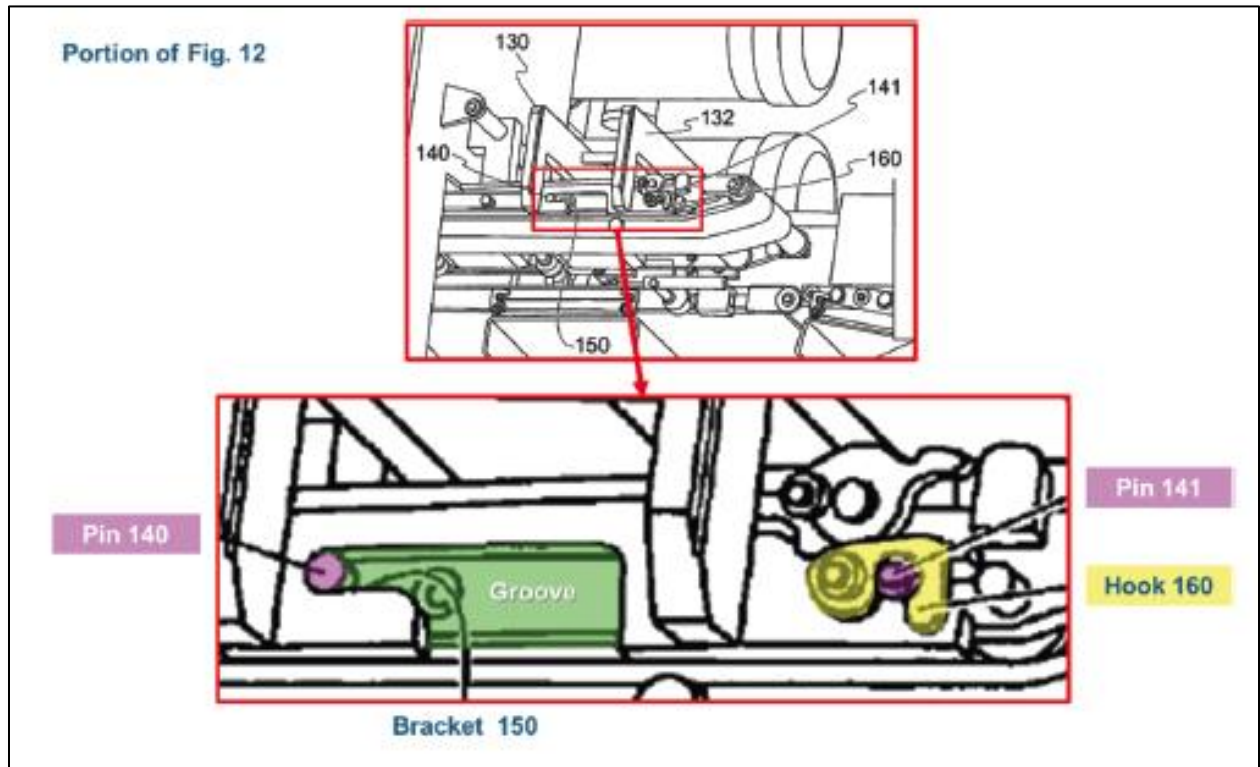
retains the pins in the horizontal and vertical (X-Y) directions. This leaves the questions of (1) how much spring force is necessary and (2) is a tool required to overcome the force of the spring when rotating the latch to remove the conveyor. Since there are at least two pins that would need to be retained in McLaughlin, this also raises a practical question of how many operators would be needed to simultaneously hold open all the spring biased latches in the release position and, at the same time, lift the conveyor assembly from its mounts. At least two operators would be needed to hold open even one latch and lift the conveyor assembly from its mounts. These unanswered questions render Dr. Collins' proposed combination unsuitable for its intended purpose.

C. Mathues's Latch Does Not Secure Against Operational Forces Required to Secure Konishi's Conveyor Unit

25. Even less applicable than Herman's latch, the latch described in Mathues does not resist movement in any direction. The entire conveyor unit in Mathues is bolted in place, as illustrated in Fig. 13, resisting movement in any direction and relieving Mathues's latches from any responsibility to resist movement. Further, Mathues's pins are mounted in horizontal slots, which resist any motion in the Y direction.

26. As an initial matter, there's some ambiguity in the record regarding what combination of Konishi and Mathues is actually proposed. In his declaration, Dr. Collins suggests that Mathues teaches "the same two pin (160 and 161) and

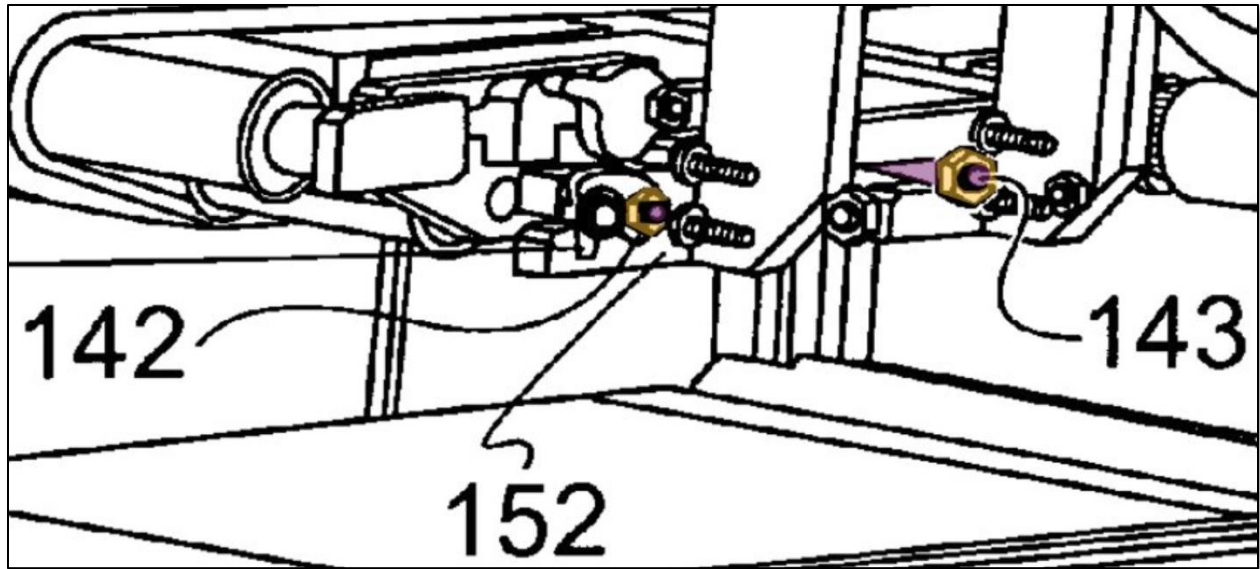
groove arrangement to hold a removable conveyor in place” and “simple rotating hooks (160 and 162) to hold the conveyor in place and prevent unintentional removal without the need for tools,” pointing to the following zoomed in and annotated Fig. 12 from Mathues:



Ex. 1040, ¶219. Assuming he means pins 140 and 141 (there are no pins 160 or 161), there's some confusion about what he believes is similar between the references and what he proposed to add from Mathues to Konishi. There are no horizontal grooves in Konishi nor does Konishi utilize a two-pin structure on one end of its conveyor unit like Mathues. In the next paragraph, Dr. Collins argues it would have been obvious “to use the concept of Mathues’ toolless hooks with Konishi’s removable

conveyor” and suggests these hooks would have prevented “unintentional removal” as he appears to believe these hooks prevent in Mathues. In his deposition, he clarified that Mathues’s hook(s) (annotated yellow) would be used to secure Konishi’s non-drive side pin(s) vertically oriented groove(s). Ex. 20XX, 44:7-45:11.

27. Dr. Collins appears to have misunderstood the mechanics of Mathues. He assumes the only securing structure holding the conveyor of Mathues in place on the arms of the machine is the hook 160 and 162. See Ex. 1040, ¶219 (claiming Mathues “teaches simple rotating hooks (160 and 162) to hold the conveyor in place and prevent unintentional removal without the need for tools”). A POSITA would not interpret Mathues to place this responsibility on hooks 160 and 162, at least because this interpretation fails to consider the role of the nut on the end of pin 143, as illustrated in Fig. 13. Indeed, Mathues illustrates a removable conveyor unit with at least one pin that is bolted in place for operation. Fig. 13 illustrates the opposite side of the removable conveyor unit from that depicted in Fig. 12. As shown below, at least pin 143 is secured to the structure 152 via a nut and bolt assembly:



Mathues, Fig. 13 (enlarged view, annotated). It is somewhat unclear whether pin 142 is also secured via a nut and bolt assembly. As annotated above, the label 142 is applied to an illustration that depicts a nut and bolt arrangement. But the nut and bolt that is labeled 142 appears to be the bolt that secures hook 161 to the main structure. Regardless of whether pin 142 is secured with a nut, *Mathues* unambiguously illustrates a removable conveyor structure that secures its conveyor unit to structure 150/152 with a bolt and nut arrangement on at least one pin. Although the specification does not describe the nut on the end of pin 143, a POSITA would have understood that there is no point in including such a nut other than to secure pin 143 to the main structure. This directly contradicts Dr. Collins's opinion that *Mathues*'s hooks 160 and 162 are the exclusive means of preventing unintentional removal during operation. A POSITA would understand that bolting the conveyor belt to the substructure at pin 143 prevents both unintentional movement and removal. Hooks

160 and 162 prevent removal at initial installation, but they are not sufficient to prevent small amounts of motion. Although Mathues does not explain in any detail how hooks 160 and 162 work in conjunction with the nut and bolt assemblies, a POSITA would understand that hooks 160 and 162 serve to ensure the conveyor unit is in place and secure before the nut and bolt assembly/assemblies are tightened. When removing the conveyor unit, hooks 160 and 162 allow the technician to loosen the nut and bolt assembly/assemblies without the conveyor unit assembly immediately sliding out of place. In other words, a POSITA would understand that the hooks generally align the conveyor unit in place, then the nuts can be tightened to secure the conveyor against even small amounts of free motion. Further, the hooks could prevent the conveyor unit from accidentally being dislodged when the nut and bolt assemblies are loose during installation/removal, protecting an operator. In sum, Mathues does not teach hooks that retain a removable conveyor unit in place during operation. Instead, it teaches hooks that allow a conveyor to be positioned before being bolted into place for use. Even setting aside that Mathues depicts a conveyor unit held in place by a nut and bolt arrangement, hooks 160 and 162 do not resist Y direction movement as is required in Konishi. As shown in Figs. 12-14 of Mathues, pins 140-143 slide into horizontal grooves. Those horizontal grooves serve to resist significant Y direction movement, preventing the conveyor unit from popping out of place as Konishi's conveyor unit would tend to do.

28. Dr. Collins suggests that a POSITA would have added a spring to bias the latch in a closed direction as taught by Suguira. Ex. 1040, ¶231. As an initial matter, this appears to implicitly concede that Mathues's latch would not be effective in securing Konishi's conveyor unit during operation. Dr. Collins never actually describes how the combination could be implemented to resolve the fundamental problem in Konishi, namely, unwanted vertical movement of the conveyor. For example, the latch in Mathues does not prevent motion of the conveyor in any direction. Although Dr. Collins does not provide an explanation, it appears that the spring bias would be required to create a force that retains the pins in the horizontal and vertical (X-Y) directions. This leaves the questions of (1) how much spring force is necessary and (2) is a tool required to overcome the force of the spring when rotating the latch to remove the conveyor. Since there are at least two pins that would need to be retained in Konishi, this also raises a practical question of how many operators would be needed to simultaneously hold open all the spring biased latches in the release position and, at the same time, lift the conveyor assembly from its mounts. At least two operators would be needed to hold open even one latch and lift the conveyor assembly from its mounts. These unanswered questions render Dr. Collins' proposed combination unsuitable for its intended purpose.

V. CONCLUSION

29. I hereby declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct, and that all statements made of my own knowledge are true and that all statements made on information and belief are believed to be true. I understand that willful false statements are punishable by fine or imprisonment or both. *See* 18 U.S.C. § 1001. If called to testify as to the truth of the matters stated herein, I could and would testify competently.

Date: Nov. 1, 2024

Respectfully submitted:



Dr. Charles Reinholtz