

UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE PATENT TRIAL AND APPEAL BOARD

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GUANGZHO EKO TRADING DEVELOPMENT CO., LTD.,  
Petitioner,  
v.  
NINE STARS GROUP (U.S.A.) INC.,  
Patent Owner.

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Case No. IPR2025-01191

U.S. Patent No. 10,822,165 B2

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**PETITION FOR *INTER PARTES* REVIEW**

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## LISTING OF EXHIBITS

<b>Exhibit</b>	<b>Description</b>
1001	U.S. Patent No. 10,822,165 B2 to Wang et al.
1002	File History of U.S. App. 15/271,211
1003	File History of U.S. App. 15/884,342
1004	CN 203740427U to Wang et al.
1005	Certified translation of CN 203740427U to Wang et al. and associated translator's declaration
1006	Declaration of Steven C. Visser
1007	U.S. Pub. No. 2002/0190615 A1 to Lin
1008	U.S. Pub. No. 2008/0084647 A1 to Wang et al.
1009	U.S. Pub. No. 2014/0238986 A1 to Crawford et al.
1010	WO 2016/040601 A1 to Howard et al.
1011	U.S. Pub. No. 2009/0194532 A1 to Yang et al.
1012	WO 02/070849 A1 to Winter

## I. INTRODUCTION

Petitioner Guangzho EKO Trading Development Co., Ltd. (“EKO” or “Petitioner”)<sup>1</sup> respectfully requests IPR of claims 1-24 of U.S. Patent No. 10,822,165 B2 (“the ’165 patent”) assigned to Nine Stars Group (U.S.A.) Inc. (“Nine Stars” or “Patent Owner”).

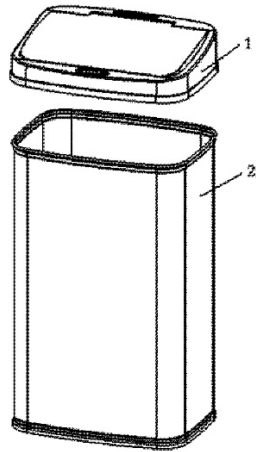
The ’165 patent relates to an automatically opening trashcan or container. A sensor located near the container front detects hand movement triggering a motor to open the container’s cover. The ’165 patent explains that in prior art trash containers, the electrical and mechanical components that control container opening could be exposed to water, moisture, or corrosive gases. To avoid this, the ’165 patent locates these components in waterproof, sealed compartments within the container cover unit.

All of the ’165 patent’s claims are unpatentable. More than two and a half years before the ’165 patent was filed, certain of the inventors listed on the face of the ’165 patent filed a patent application in China disclosing and claiming a trash container indistinguishable from that of the ’165 patent. This Chinese application published as CN 203740427 U to Wang et al. (“Wang,” Exs. 1004, 1005) two years

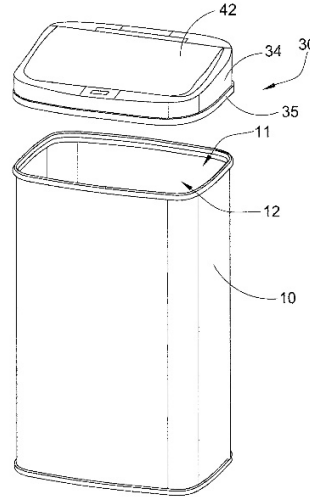
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<sup>1</sup> Guangzho EKO Trading Development Co., Ltd is also known as EKO Development Ltd.

before the filing of the '165 patent. As exemplified by the figure comparison below—and discussed in greater detail throughout this Petition—there is no difference between Wang and the '165 patent. Both disclose an identical trash container using the same figures (and in many cases the same words):



**Wang, Fig. 2**



**'165 patent, Fig. 1**

*Ground 1* explains why Wang anticipates all the '165 patent's claims. *Ground 2* explains why Wang—when considered in view of the background knowledge of a person having ordinary skill in the art (“POSITA”)—also renders these same claims obvious. Petitioner has shown more than a reasonable likelihood of success. Petitioner thus respectfully requests not only that IPR be instituted, but also that all of the '165 patent's claims be found unpatentable.

## **II. MANDATORY NOTICES**

### **A. Real Party-in-Interest**

Petitioner Guangzho EKO Trading Development Co., Ltd. (also known as

EKO Development Ltd.) and related corporate entities EKO North America Inc. and EKO Group, Ltd. are the real parties-in-interest.

**B. Related Matters**

The '165 patent is currently at issue in *Nine Stars Group USA Inc. v. Guangzhou EKO Trading Development Co., Ltd.*, 5-24-cv-01843 (C.D. Cal.), which was filed on August 28, 2024.

**C. Counsel, Service, and Fee Information**

Petitioner designates the following counsel:

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Petitioner consents to service by electronic mail at the addresses listed in the table above. Petitioner's Power of Attorney is attached.

The USPTO is authorized to charge the filing fee and any other fees incurred by Petitioner to the deposit account of Orrick, Herrington, & Sutcliffe LLP: 15-0665.

### **III. REQUIREMENTS FOR IPR**

#### **A. Grounds for Standing**

Petitioner certifies that the '165 patent is available for IPR, and that Petitioner is not barred or estopped from requesting this IPR.

#### **B. Identification of Challenge and Statement of Precise Relief Requested**

Petitioner requests IPR of claims 1-24. This petition discusses claim construction, explains why the claims are unpatentable, provides details regarding where the various claim limitations are found in the prior art, and is supported (in part) by the accompanying Declaration of Steven C. Visser (Ex. 1006), a leading industrial design expert.

The '165 patent was filed January 30, 2018 and identifies itself as a continuation of an earlier September 20, 2016 filing. *See* Ex. 1001, Cover. The '165 patent does not claim priority to any earlier filings. No foreign applications are identified on the patent's face. And no foreign priority claims were made during prosecution.

Petitioner relies only on Wang (Ex. 1004). Wang published in Chinese. Thus,

this Petition is accompanied by a certified translation and associated translator's declaration (Ex. 1005). Citations to Wang throughout this Petition refer to this translation. Wang is prior art. *See* Section VII.

Petitioner challenges the claims on the following grounds:

**Ground 1:** Claims 1-24 are anticipated by Wang; and

**Ground 2:** Claims 1-24 are obvious over Wang.

The expert testimony accompanying the Petition is focused. Ground 1 explains why Wang is anticipatory. The '165 patent not complicated: it is directed to a trashcan with a readily understandable structure and function. And Wang's disclosure is nearly identical to that of the '165 patent. Because of this, Petitioner submits that expert testimony is not required for this Ground. *See Perfect Web Techs., Inc. v. InfoUSA, Inc.*, 587 F.3d 1324, 1329 (Fed. Cir. 2009) ("Nor are expert opinions always a prerequisite [to show unpatentability], for '[i]n many patent cases expert testimony will not be necessary because the technology will be easily understandable without the need for expert explanatory testimony.'" (*quoting Centricut, LLC v. Esab Group, Inc.*, 390 F.3d 1361, 1369 (Fed. Cir. 2004).) Regardless, Petitioner's expert has reviewed Wang and agrees that it is anticipatory. Ground 2 explains why Wang renders the claims obvious. This ground summarizes the background knowledge possessed by a POSITA regarding certain aspects of trashcans. Petitioner's expert declaration focuses on—and discusses—this

background knowledge and its pertinence to Wang and the claims of the '165 patent. *See generally* Ex. 1006, ¶¶ 123-200.

#### **IV. THE '165 PATENT**

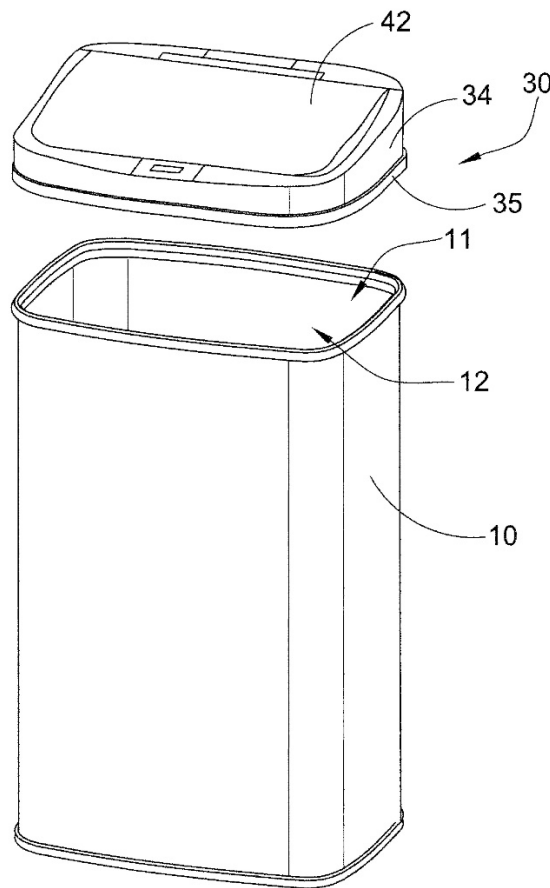
##### **A. Overview**

The '165 patent relates generally to a “waterproof induction container” or trashcan. Ex. 1001, 1:28-29. According to the patent, “conventional” “trash container[s]” include a “storage cavity” with an “opening” and “cover.” *Id.*, 1:37-47. The patent also explains that “[i]n recent years, electrically-operated containers or induction containers have been developed in which the cover panel is largely driven by electrical and mechanical components so as to achieve automatic opening or closing of that cover panel via a motor.” *Id.*, 1:48-52. The '165 patent refers to this type of known, automatically opening trashcan as an “induction container.” *Id.*, 1:52. The patent explains that “most ... induction containers” use a “sensor” to “detect[] ... movement of the person throwing trash.” *Id.*, 1:52-55. Upon detection of movement, “the sensor will send a signal to the relevant electrical components so as to automatically lift up the cover.” *Id.*, 1:56-59.

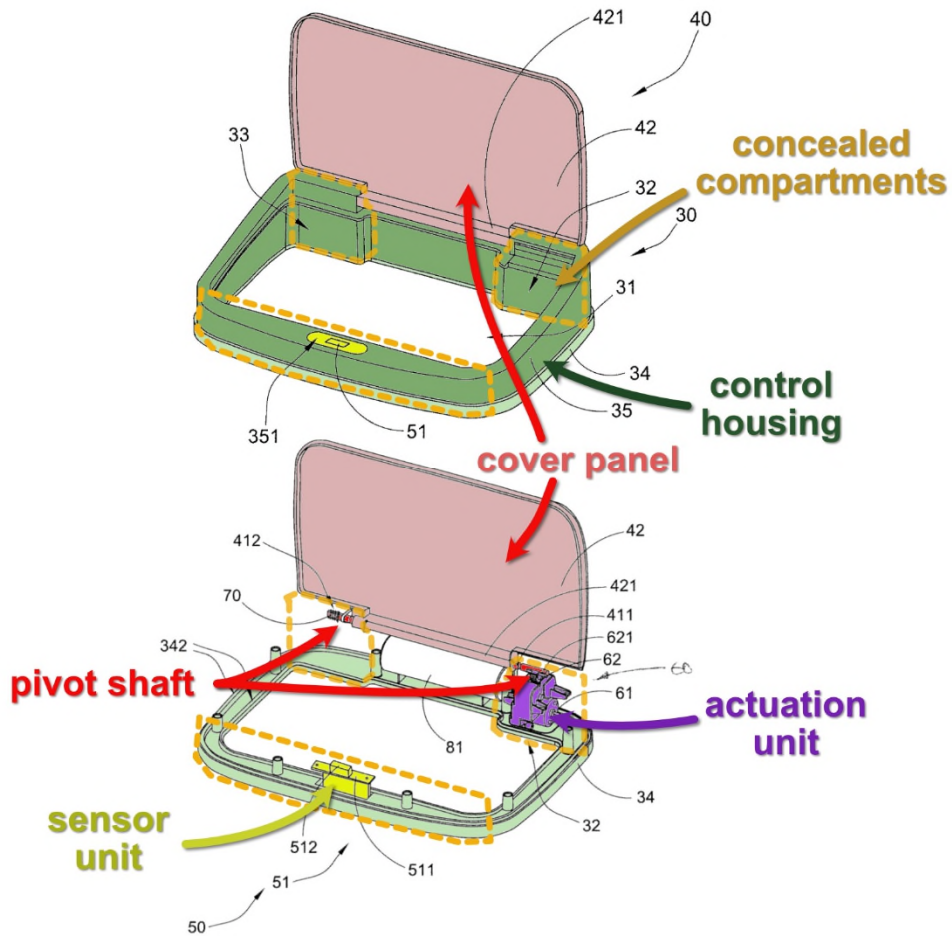
The '165 patent goes on to note that this type of “conventional induction container has ... drawbacks.” *Id.*, 1:63-64. In particular, the container “does not include any water resistance feature to protect the” container’s “electrical and mechanical components.” *Id.*, 1:64-66. This allows these components—such as a

controlling “circuit board,” “mechanical components” like a pivot shaft, “battery compartment,” or the like—to be damaged by “spilled” trash, or “moisture and/or corrosive gas ... released from the trash.” *Id.*, 1:66-2:19.

To address this purported problem, the '165 patent discloses a container “wherein the electrical and mechanical components are sealed in a concealed compartment of the container to prevent any contamination.” *Id.*, 1:28-34. Figure 1 provides an overview of a container with a “control housing 30” and “cover panel 42.” *Id.*, 4:63-5:20.



*Id.*, Fig. 1. Figures 2 and 3 provide a top and an interior view of the '165 patent's "induction actuated container cover." *Id.*, 4:26-32. As shown, the ends 411/412 of a pivot shaft, an actuation unit 60, and a sensor unit 51—which cooperate to open/close "cover panel 42"—are all located in "concealed compartment[s]" like 32/33 between a "base frame 34" and "upper casing 35" of the "control housing 30." *Id.*, 6:7-7:37.



*Id.*, Figs. 2-3 (annotated).

## **B. Prosecution History**

The '165 patent identifies itself as a continuation of U.S. App. 15/261,211 (“the '211 application”). The '211 application was filed September 20, 2016. The application data sheet accompanying this application did not make any foreign priority claims. *See* Ex. 1002, p. 3.<sup>2</sup> Nor did the originally filed specification. *See id.*, pp. 9-38.

An initial office action issued September 9, 2017. *See id.*, pp. 49-75. Here, claim 1 was rejected as anticipated by U.S. Pub. No. 2015/0259140 A1 to Yang et al. (“Yang 140”). *Id.*, pp. 52-55. Certain dependent claims were rejected as obvious over Yang 140 combined with U.S. Patent No. 8,678,219 to Wang et al. (“Wang 219”), U.S. Patent No. 8,129,930 to Wang et al. (“Wang 930”), and/or U.S. Pub. 2017/0096299 A1 to Yang et al. (“Yang 299”). *Id.*, 55-66. Claims 10-12, 15, 18, 21, and 24-27 were not rejected over the prior art.

In response, the applicant cancelled all the pending claims and replaced them with new claims 28-37. *See id.*, pp. 78-82. The applicant explained that new independent claim 28 combined original claim 1 with allowable claim 10. *Id.*, p. 83. Claim 10 required a “resilient element” in a “second side concealed compartment” that operates to supply a cover opening “urging force” for “partially offsetting a

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<sup>2</sup> Page citations in this section refer to the numbers added by Petitioner.

weight of said cover panel.” *Id.*, p. 26. Another new independent claim 36 combined original claim 1 with allowable claim 25. *Id.* Claim 25 required a “front concealed compartment” in the container’s “control housing” with a “slanted front wall” that supports a “sensor.” *Id.*, p. 29. This led to allowance. *See id.*, pp. 101-109.

The application underlying the ’165 patent—U.S. App. 15/884,342 (“the ’342 application”)—was filed on January 30, 2018. *See generally* Ex. 1003. Once again, the applicant did not make a foreign priority claim. *See id.*, p. 3.

The originally filed claims were rejected for non-statutory double patenting over U.S. 10,077,154 (the patent that issued from the earlier ’211 application) in a December 20, 2019 office action. *See id.*, pp. 54-60. Independent claim 1 and many dependent claims were also rejected as obvious over Yang 140, U.S. Patent No. 7,338,635 to Miyake et al. (“Miyake”), Wang 219, Wang 930, and/or Yang 299. *Id.*, pp. 60-72. Claims 10-12, 14-15, 17, 18, and 21-24 were not rejected over prior art. *Id.*, p. 72.

The applicant responded in March 2020. Claim 1 was amended to remove means-plus-function language. *See id.*, p. 86. Applicant responded to the double patenting rejection by filing a terminal disclaimer. *Id.*, p. 92. In response to the obviousness rejection of claim 1, the applicant argued that Yang 140 lacks the claimed waterproof “first and second side concealed compartments” that contain “end portions” of a “pivot shaft” and an “actuation unit.” *Id.*, pp. 93-95. Per

applicant, the portion of Yang’s housing that includes its motor and shaft is not waterproof. *Id.* Applicant also noted that Yang 140 lacks the claimed “means for initially pushing up said cover panel.” *Id.*, p. 96. The Applicant argued that while Miyake—the second reference in the Examiner’s claim 1 combination—includes a spring, this spring merely “support[s]” its “cover ... when it is in the fully open position.” *Id.*, p. 99. The spring purportedly does not assist in cover opening. *Id.* Moreover, according to the applicant, Miyake does not teach any “waterproof housing.” *Id.*

After this response, a notice of allowance issued. *See id.*, pp. 112-118. The Examiner noted that Yang 140 and Miyake do not teach “waterproof” “concealed compartments” that contain an “actuation unit” and the “ends” of a “pivot shaft.” *Id.*, 117-118.

The Wang reference at issue in this petition—which published only in China—was not identified, cited, or considered during prosecution of either the ’211 or the ’342 applications. *See generally* Exs. 1002, 1003.

## **V. CLAIM CONSTRUCTION**

The Board applies the same *Phillips* claim construction standard used by district courts. *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (*en banc*). Petitioner submits that the terms of the ’165 patent’s claims do not require further

construction and can be afforded their plain and ordinary meaning. *See* Ex. 1006, ¶ 66.

## **VI. LEVEL OF ORDINARY SKILL IN THE ART**

A POSITA in the field of the '165 patent would have had a degree in industrial design, industrial engineering, mechanical engineering, or an equivalent field, along with 2 years of consumer product design experience. Ex. 1006, ¶ 57. This POSITA would have been aware of and generally knowledgeable about the types of materials processes and components employed in typical consumer products. *See id.*

## **VII. WANG IS PRIOR ART**

Wang indicates on its face that it published July 30, 2014. *See* Wang, Cover. This is more than two years before the '165 patent's own effective filing on September 20, 2016. Given this date of publication, Wang is prior art to the '165 patent under AIA § 102(a)(1).

Wang discloses the same trashcan as the '165 patent. It also includes a list of inventors overlapping that of the '165 patent. Regardless, the '165 patent did not and cannot claim priority to Wang. Wang remains prior art.

To claim priority back to the foreign application, a U.S. application must be filed "within 12 months from the earliest date on which [the] foreign application was filed." 35 U.S.C. § 119(a). Wang was filed March 19, 2014. The '165 patent was

filed September 20, 2016: approximately two and a half years later. The '165 patent was filed too late to make a priority claim back to Wang.

Moreover, to be effective, a priority claim must be “filed in the Patent and Trademark Office” by “identifying the foreign application by ... application number.” 35 U.S.C. § 119(b)(1). This filed priority claim must also be timely made within “the later of four months from the actual filing date of the application or sixteen months from the filing date of the prior foreign application....” 37 C.F.R. §1.55(d). The '165 patent never made a priority claim to Wang at all, let alone the explicit, timely one that was required (nor could it have made such a priority claim given Wang’s date of filing and publication two years earlier).

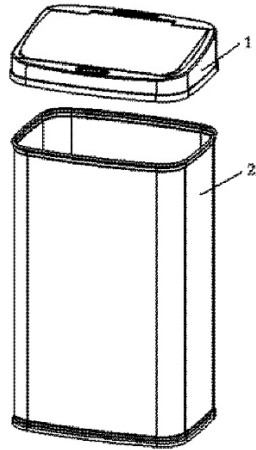
As discussed in the sections below, Wang discloses the very same trashcan / container as the '165 patent. Indeed, it uses the same figures (and much of the same language) as the '165 patent.

## **VIII. *GROUND 1: ANTICIPATION BY WANG***

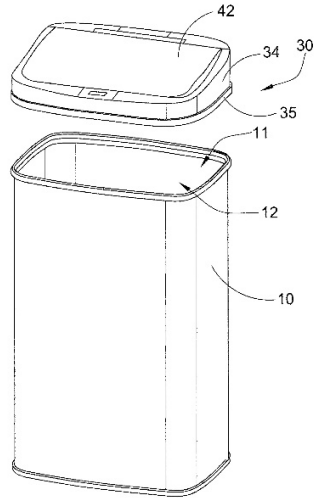
Wang anticipates all of the '165 patent’s claims.

### **A. The Disclosures of Wang and the '165 Patent Are Indistinguishable**

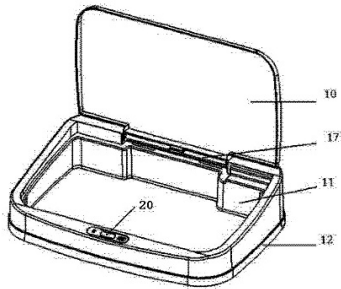
To begin, there is no meaningful difference between Wang’s and the '165 patent’s disclosures. As shown below, both depict a nearly identical trashcan in their figures:



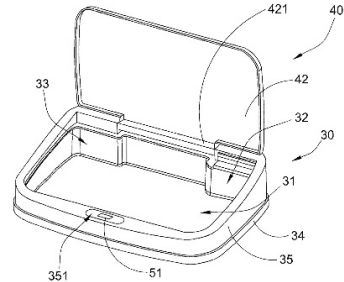
**Wang, Fig. 2**



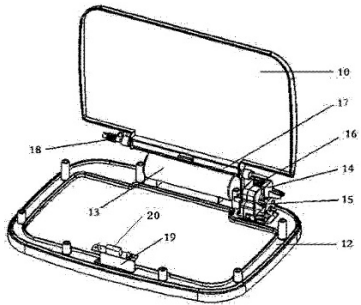
**'165 patent, Fig. 1**



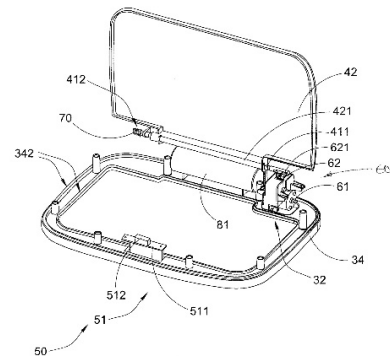
**Wang, Fig. 3**



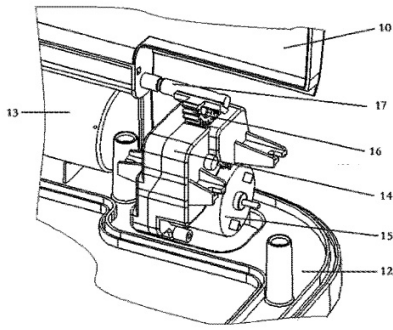
**'165 patent, Fig. 2**



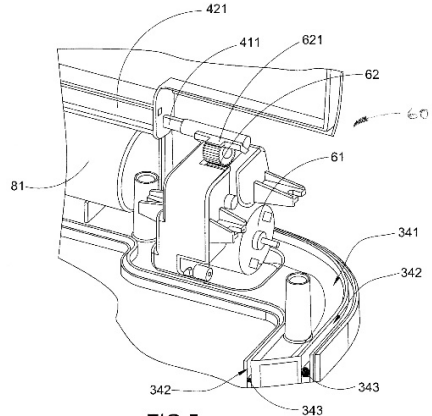
**Wang, Fig. 4**



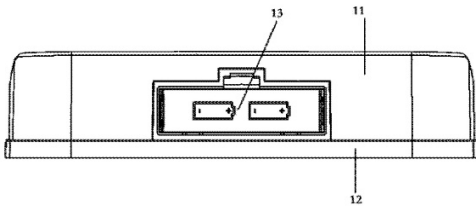
**'165 patent, Fig. 3**



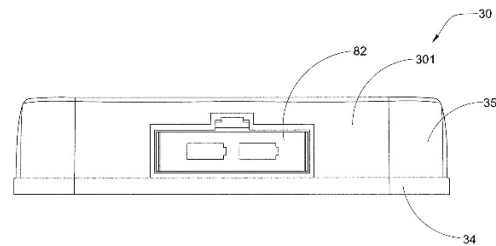
**Wang, Fig. 5**



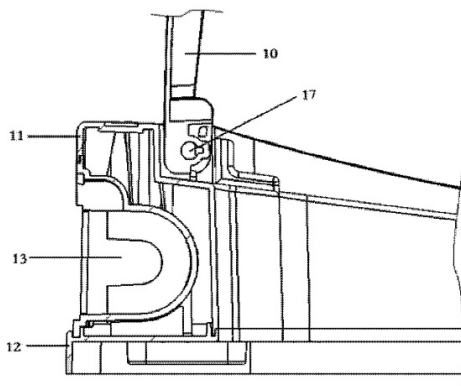
**'165 patent, Fig. 5**



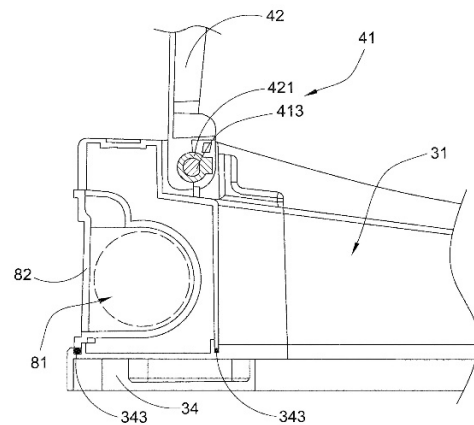
**Wang, Fig. 6**



**'165 patent, Fig. 6**



**Wang, Fig. 7**



**'165 patent, Fig. 7**

Both Wang and the '165 patent also describe the structure and operation of their respective trashcans in the very same way.

Wang explains that it relates generally to the field of “[i]ntelligent [a]utomatic” trashcans. Wang, [0002]. Wang’s “trash can” employs a “sensing

opening-closing apparatus” that “detect[s]” when a “hand approaches the sensing trash can” and automatically opens/closes the can. *Id.*, [0018]-[0023]. The trashcan also “has good waterproof, moisture-proof, and corrosion-proof performance” that “greatly improve[s] reliability and service life....” *Id.*, [0008]. To accomplish this, Wang “dispose[s]” its “sensing opening-closing apparatus” in an “inner cavity” within its trashcan’s housing. *Id.*, [0018].

The ’165 patent likewise discloses a trashcan with “electrical components” that operate to “detect[] a target movement, such as a movement of the person throwing trash” to “automatically lift up” the can’s “cover panel....” Ex. 1001, 1:48-62. Just like Wang, the ’165 patent explains that its trashcan’s “different electrical and mechanical components ... are concealed in ... concealed compartment[s]” within its trashcan housing to render the trashcan “waterproof” by “prevent[ing] any contamination of the electrical and mechanical components by moisture, corrosive gas, and/or trash residuals.” *Id.*, 2:37-43.

Due to these marked similarities in disclosure, Wang discloses everything claims 1-24 of the ’165 patent require. Because of this, it is anticipatory. Additional explanation identifying the presence of the various required claim limitations in Wang is set forth in the sections below.

## B. Claim-By-Claim Analysis

### 1. *Claim 1*

*[1-p] “1. A waterproof induction container, comprising:”*

To the extent this preamble language is limiting, it is disclosed by Wang. Wang explains that it relates to a “waterproof sensing trash can.” Wang, Title, Abstract, [0001]. A trashcan is a “**container.**” Next, Wang’s trashcan is specifically designed to “isolate” its opening/closing components from splashing “water” and “moisture and corrosive gases” released by garbage stored in the can. *Id.*, [0002]-[0003]; *see also id.*, [0008] (explaining that Wang’s trashcan “has good waterproof, moisture-proof, and corrosion-proof performance during use”). Thus, Wang’s trashcan is “**waterproof.**”

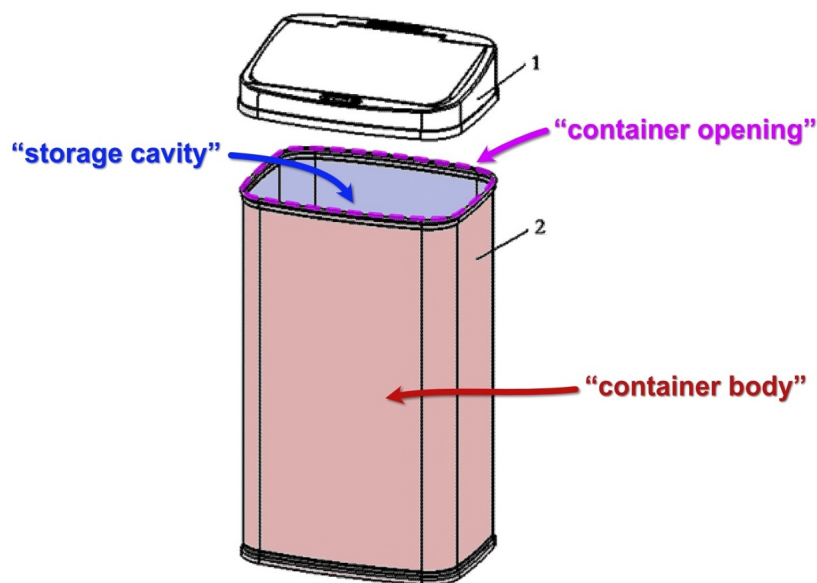
Wang also explains that its trashcan includes a “sensing opening-closing apparatus” that “comprises a sensor, a circuit board, a battery box, a motor, and a transmission mechanism.” *Id.*, [0004]. “When a hand approaches the sensing trash can, the sensor ... sends a signal” causing the “can cover” to be “driven to open.” *Id.*, [0023]. The same components also operate to close the trashcan cover. *See id.*, [0020]. The ’165 patent explains that an “**induction container**” includes “electrical and mechanical components” that operate to “lift up the cover” of the can when “movement of [a] person throwing trash” is detected. Ex. 1001, 1:28-30, 1:48-62. This is exactly what Wang discloses: a trashcan that automatically opens (and then closes) when a hand is detected nearby. *See* Wang, [0005] (noting that Wang’s

electrical and mechanical components operate to “drive the can cover to open and close”), [0020], [0023] (similar).

**[1-1] “a container body having a storage cavity and a container opening; and”**

Wang’s trashcan includes these components. According to Wang, its “waterproof sensing trash can” includes a “lower can body 2.” Wang, [0018]. Like all trash cans, “garbage” is meant to be “put into the trash can.” *Id.*, [0002]. Thus, the trashcan includes a “garbage storage portion.” *Id.*, [0008]; *see also id.*, [0018] (similarly referencing a “garbage storage space); [0020] (similar).

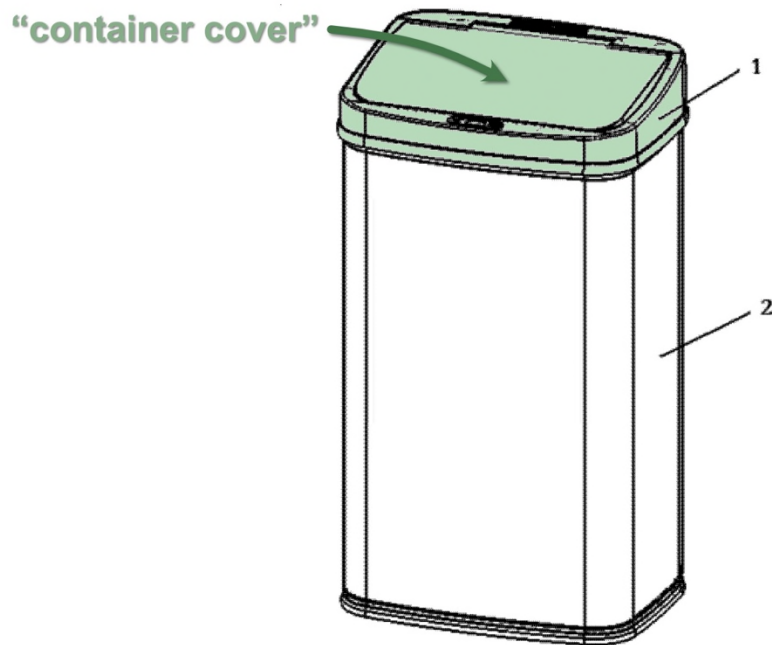
This is all depicted in Figure 2. As shown, Wang’s trashcan includes a “**container body**” (lower can body 2). The interior of body 2 includes a “**storage cavity**” (Wang’s garbage storage space). And this storage space is accessible via a “**container opening**” (the depicted opening at the top of body 2):



*Id.*, Fig. 2 (annotated).

**[1-2] “an induction actuated container cover which comprises:”**

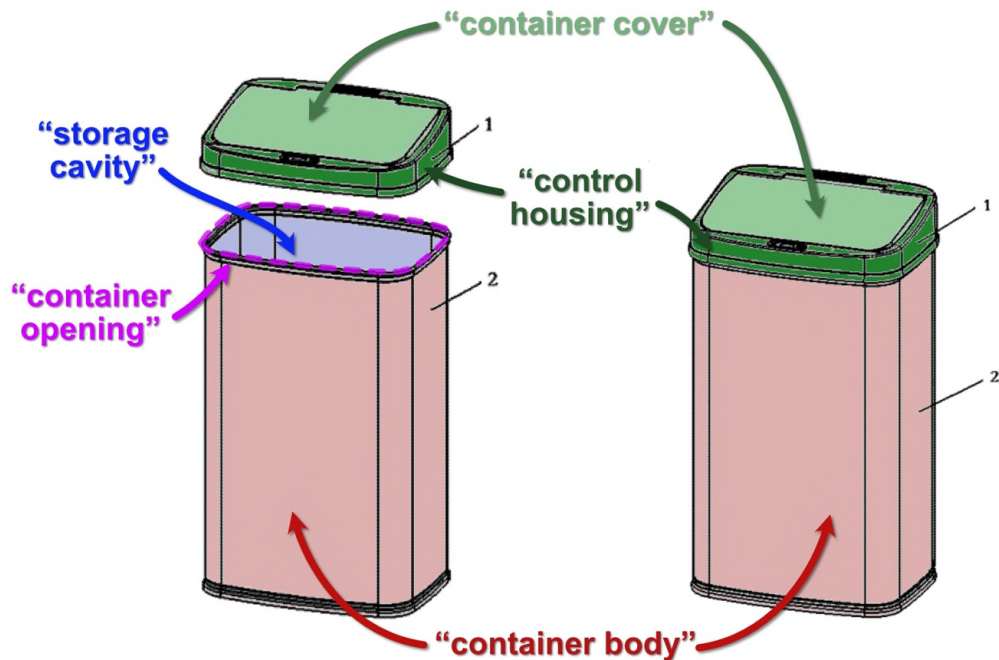
According to Wang, its trashcan includes an “upper can body 1.” Wang, [0018]. This upper body has an “annular middle body seat 12” (which “buckle[s]” or attaches to the “lower can body 2”) and an “annular covering housing 11.” *Id.* The “annular covering housing 11” includes a “can cover 10” that is controlled by an “opening-closing apparatus.” *Id.* Again, Wang’s trashcan includes electrical and mechanical components that allow it to “open and close” when “a hand approaches the sensing trash can.” *Id.*, [0020], [0023]. Thus, Wang includes the claimed “*container cover*” (upper can body 1) that is “*induction actuated*” (the electrical and mechanical components open the cover upon detection of a hand). Wang’s “*container cover*” is shown in Figure 1 below:



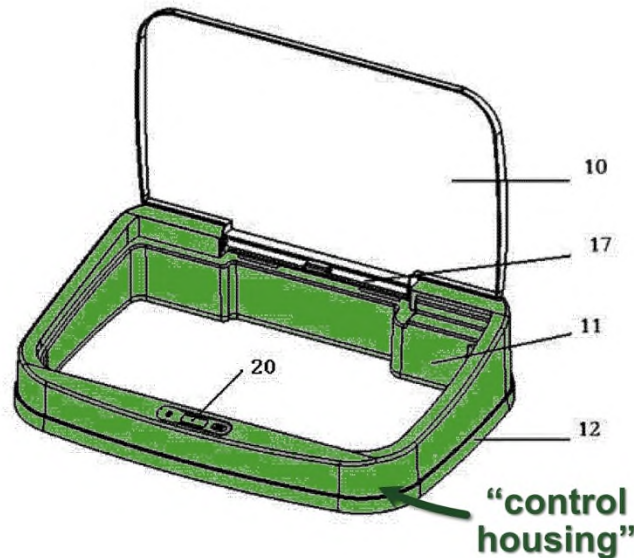
*Id.*, Fig. 1 (annotated).

**[1-2-A] “a control housing detachably coupled at said container body at said container opening thereof, wherein said control housing has first and second side concealed compartments formed at a rear portion of said control housing, and a cover opening formed between said first and second side concealed compartments to communicate with said storage cavity of said container body;”**

Again, Wang’s trashcan includes a “upper can body 1.” Wang, [0018]. This “body 1” includes an “annular middle body seat 12” that is “buckled on” a “lower can body 2.” *Id.* The body 1 also includes an “annular covering housing 11” that is “buckled on the middle body seat 12.” *Id.* The trashcan’s “opening-closing apparatuses” are all located within the “annular covering housing 11.” *Id.* The housing 11 and attached middle body seat 12 together form Wang’s “**control housing.**” As shown below, this “**control housing**” is “**detachably coupled**” (it can be removed from or attached to) to the end of Wang’s “**container body**” (the lower can body 2) that includes a “**container opening**” (the top opening of body 2):



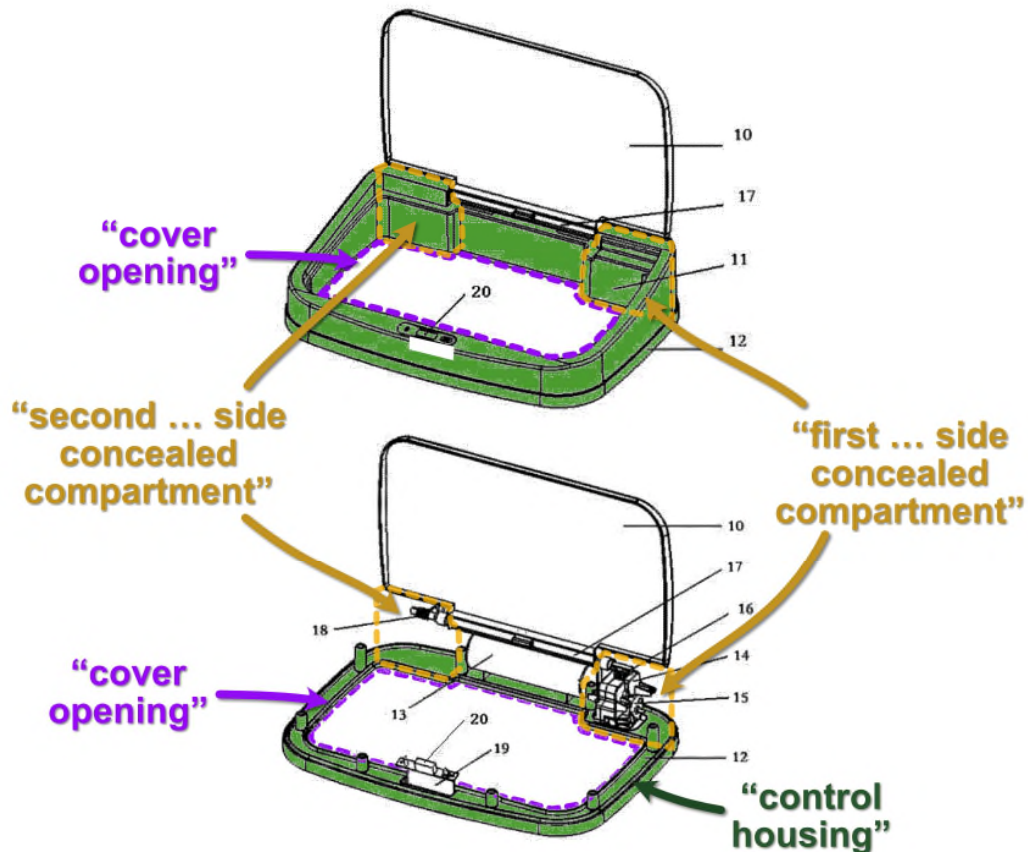
*Id.*, Figs. 1, 2 (annotated). Figure 3 also shows this “*control housing*”:



*Id.*, Fig. 3 (annotated).

Next, Wang’s “*control housing*” includes the required “*first and second side concealed compartments formed at a rear portion of said control housing.*” Wang explains that its “annular covering housing 11” includes multiple “inner cavities.” *Id.*, [0018]; *see also* Abstract (similarly referencing “inner cavities of the annular covering housing”); [0004] (similar). The location of these cavities are shown in Figures 3 and 4. Figure 3 shows the entirety of Wang’s upper can body, including the “annular covering housing 11” and “annular middle body seat 12.” *Id.*, [0011]. Figure 4 shows the upper can body with the “annular covering housing removed.” *Id.*, [0012]. Because the covering housing is removed in Figure 4, the interior space is visible. As shown, there are two “*side concealed compartments*” (Wang’s inner cavities) located at the “*rear portion*” (the rear sides near the opening/closing

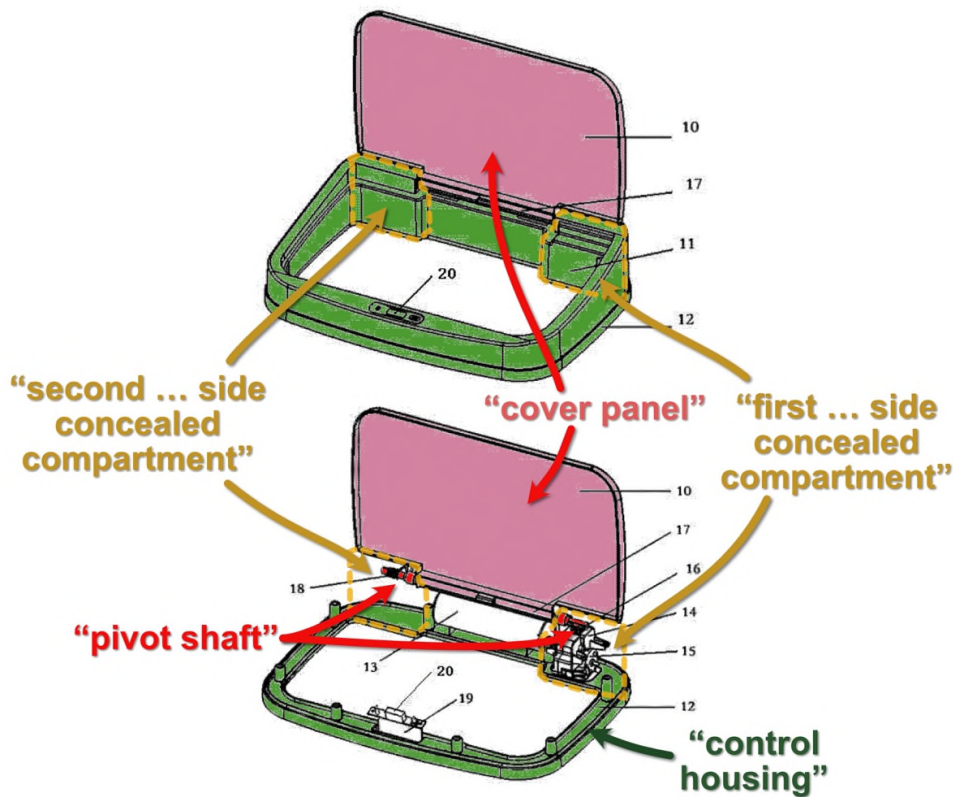
cover)) of the “*control housing*” (the upper can body). Further, a “*cover opening*” (an annular opening that communicates with the interior of the trashcan) is located between these cavities:



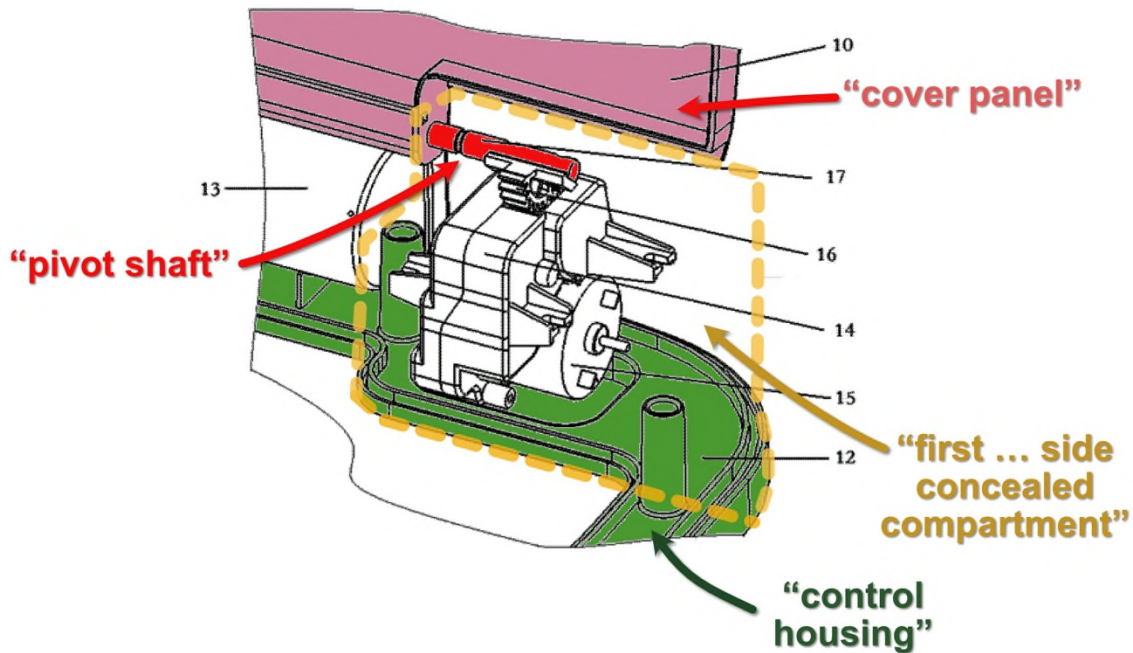
*Id.*, Figs. 3, 4 (annotated).

**[1-2-B]** “a cover unit which comprises a pivot shaft having first and second end portions extended into said first and second side concealed compartments respectively, and a cover panel pivotally mounted to said control housing via said pivot shaft to pivotally move between a closed position that said cover panel covers at said cover opening to enclose said storage cavity and an opened position that said cover panel exposes said cover opening for communicating with said storage cavity; and”

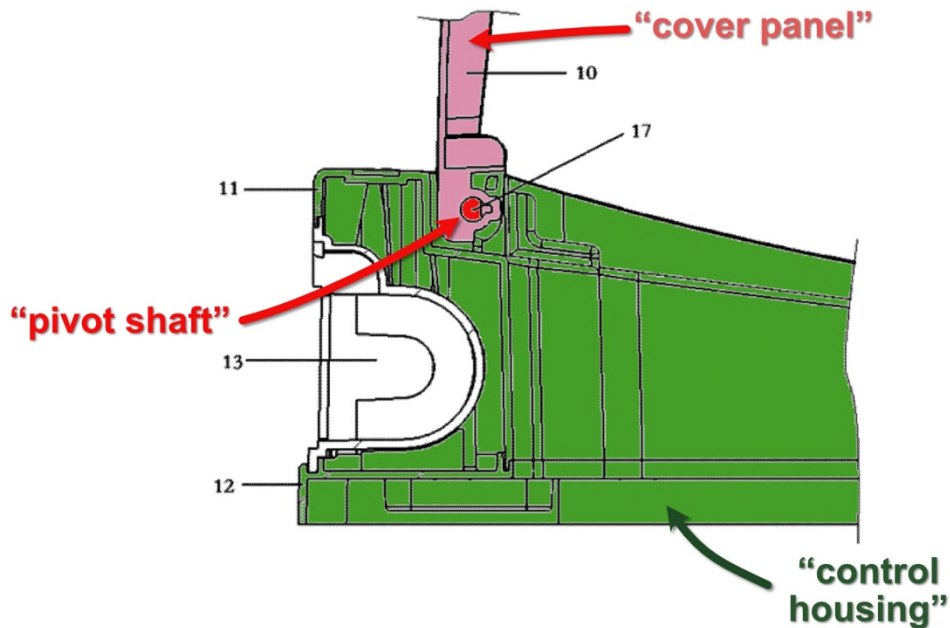
Wang includes the claimed **“cover unit.”** In particular, a “can cover 10 is hinged to the annular covering housing 11 ... using a rotating shaft 17 fixedly connected under the can cover 10.” Wang, [0018]. Per Wang, “the two ends of the rotating shaft 17 extend into inner cavities of the annular covering housing 11.” *Id.*; *see also* Abstract (similarly explaining that the cover’s “shaft” “extend[s]” “into inner cavities of the annular cover housing”); [0004] (same). This is depicted below in Figures 3 and 4. The trashcan includes a **“cover panel”** (can cover 10). A **“pivot shaft”** (rotating shaft 17, only the two ends of which are visible) is located at one end of this cover and extends into the trashcan’s **“side sealed compartment[s]”** (the two depicted ends of shaft 17 extend into the inner cavities within housing 11):



*Id.*, Figs. 3, 4 (annotated). Figure 5 provides a zoomed in view of one side of this structure. *Id.*, [0013]. As shown, the “*pivot shaft*” (rotating shaft 17) at the end of the “*cover panel*” (cover 10) extends into the “*first ... side concealed compartment*” (the inner cavity):



*Id.*, Fig. 5 (annotated). Figure 7 provides a “partial sectional view.” *Id.*, [0015]. As shown, the “rotating shaft 17” is “fixedly connected under the can cover 10” because it has a portion that is fixed under the mid-portion of the cover. *Id.*, [0018]; *see also* [0004].

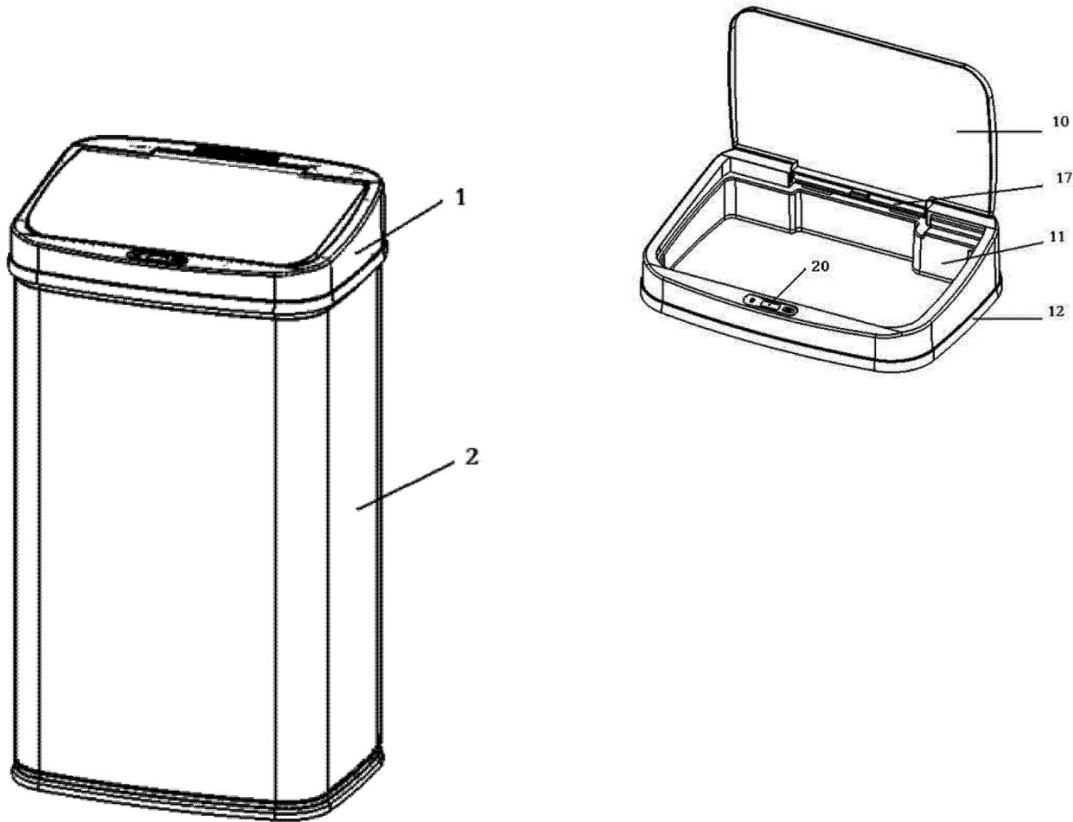


*Id.*, Fig. 7 (annotated).

Wang’s trashcan also operates in the way this limitation requires. According to Wang, its “can cover 10” is “fixedly connected” to a “rotating shaft 17” that extends into its “cover housing 11.” *Id.*, [0018]; *see also* Abstract (similarly discussing a “rotating shaft”); [0004]. This causes the “can cover” to be “hinged to the annular covering housing” via the attached “rotating shaft.” *Id.* The shaft is driven by a rotating “motor” to “open and close” the “can cover 10.” *Id.*, [0020]; *see id.*, [0023] (similarly noting that a “motor” allows the cover to be “driven to open”). Thus, Wang’s “*cover panel*” (can cover 10) is “*pivotaly mounted to said control housing via said pivot shaft*” (the cover 10 is fixed to rotating shaft 17) “*to pivotaly move*” between a “*closed position*” and an “*opened position*” that

opens/closes the container's "*storage cavity*" (the rotating shaft is driven by a rotating motor to open/close the cover to allow trash to be thrown into the container).

Figure 1 to the left below shows the "*cover panel*" in the "*closed position.*" Figure 3 to the right below shows the "*cover panel*" in the "*open position*":



*Id.*, Figs. 1, 3. As shown, the cover is hinged at its back (where rotating shaft 17 is located) and pivots around this point when opening/closing.

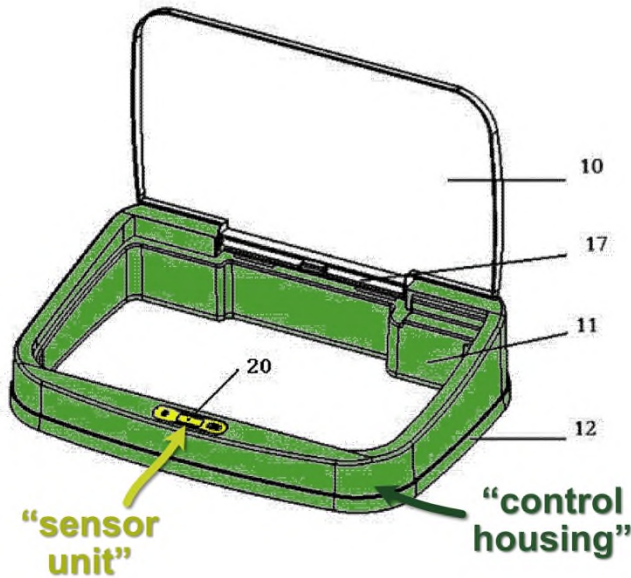
**[1-2-C] “an automatic driving arrangement, which comprises:”**

Wang explains that its trashcan includes various “sensing opening-closing apparatuses” within the “annular covering housing 11.” Wang, [0018]. This allows

the trashcan to automatically open (and then close) “[w]hen a hand approaches the sensing trash can.” *Id.*, [0023]. These apparatuses are collectively the claimed **“automatic driving arrangement.”**

**[1-2-C-1] “a sensor unit mounted at said control housing for detecting a target movement of a user;”**

According to Wang, its trashcan’s “sensing opening-closing apparatus” includes, among other things, “a sensor 20...” *Id.*, [0018]; *see also* Abstract, [004]. This “sensor 20 is disposed on a front side of the middle body seat 12” of Wang’s upper can body. *Id.*, [0019]. A “mounting hole” allows the “sensor ... to extend out” of the “annular covering housing.” *Id.*, [0006]. Thus, “[w]hen a hand approaches the sensing trash can, the sensor 20 sends” a “detecting” “signal.” *Id.*, [0023]. So, Wang includes the claimed **“sensor unit”** (sensor 20). This sensor is **“mounted at said control housing”** (it is attached to the middle body seat) and operates to **“detect a target movement of a user”** (it detects a nearby hand). The sensor 20 is shown in Figure 3 below:



*Id.*, Fig. 3 (annotated).

***[1-2-C-2] “an actuation unit concealed in said first side concealed compartment of said control housing in a waterproof manner to operatively link with said sensor unit and to operatively coupled to said pivot shaft, wherein said actuation unit is actuated to move said cover panel via said pivot shaft between said opened and closed positions; and;”***

Next, Wang explains that the “sensing opening-closing apparatus” includes a “motor 15” and “transmission mechanism.” Wang, [0018]. The “motor” is “transmission-connected to” a “sector gear” 16<sup>3</sup> mounted on the “rotating shaft 17.”

*Id.* The motor operates to “drive[]” the “can cover 10 ... open” once a signal from

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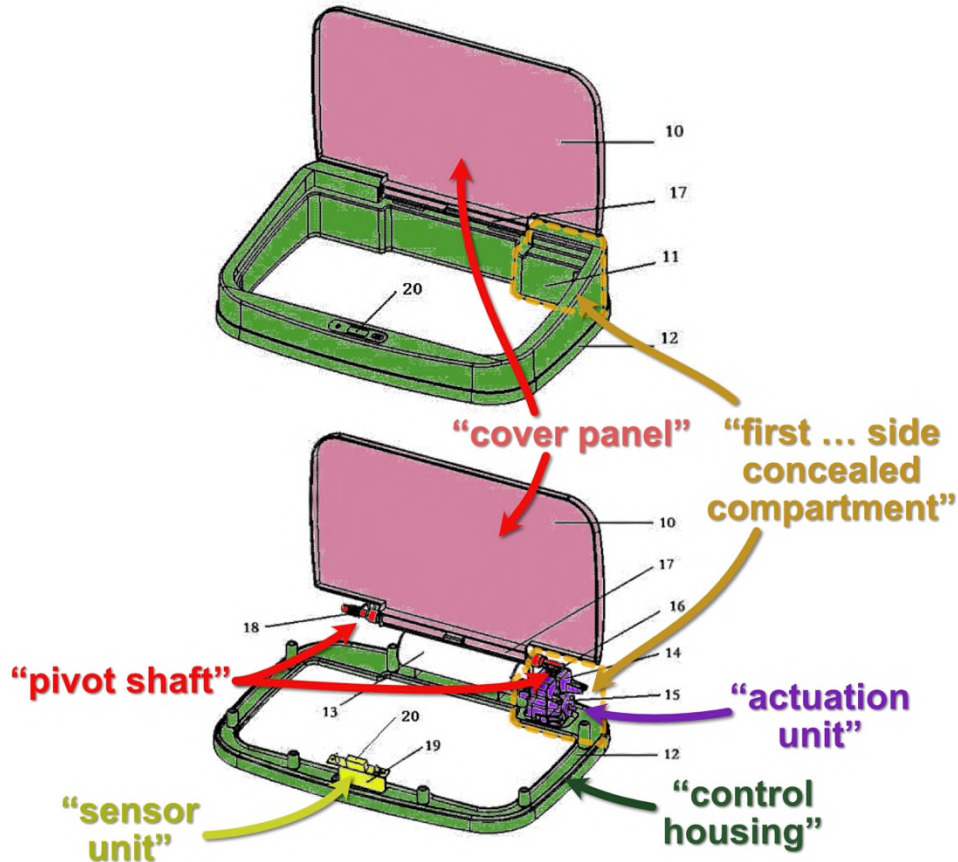
<sup>3</sup> Wang refers to sector gear 6 in paragraphs [0018] and [0020] and a sector gear 16 in paragraphs [0016] and [0021]. Use of 6 rather than 16 is an obvious typographic error since the figures do not have a labeled item 6 and the item 16 in figures 4 and 5 is consistent with the description of both sector gear 6 and sector gear 16.

“sensor 20” is detected. *Id.*, [0023]. These components are all “disposed in an inner cavity formed between the middle body seat 12 and the annular cover housing 11” such that they are “wrapped in the annular covering housing 11.” *Id.*; *see also id.*, [0004] (similarly referencing an “opening-closing apparatus” within the “annular cover housing”). This allows the components to be “isolated from the garbage storage space” and provides “[t]he sensing opening-closing apparatus” with “good waterproof, moisture-proof, and corrosion-proof performance, thereby greatly improving reliability and ... service life of the sensing trash can.” *Id.*, [0018]. Relatedly, Wang notes that the can’s “transmission component, ... power supply component, and ... control component are all wrapped in isolation space, and are completely isolated from a garbage storage portion of the trash can” allowing for “good waterproof, moisture-proof, and corrosion-proof performance during use[.]” *Id.*, [0008].

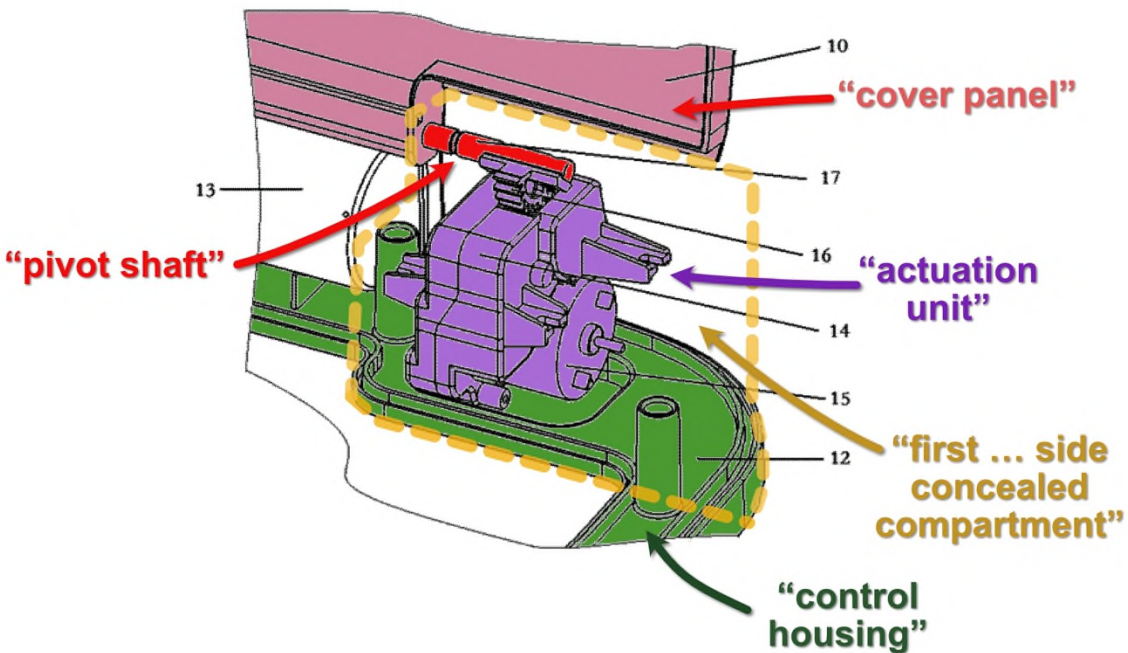
So, in sum, Wang includes the claimed “***actuation unit***” (its motor 15, transmission mechanism, and sector gear 16). This unit is “***concealed in said first side concealed compartment of said control housing in a waterproof manner***” (it is located within annular covering housing 11’s inner cavity such that it is protected from water/moisture exposure). And it is “***operatively linked with said sensor unit***” (motor 15 operates in response to sensor 20), “***operatively coupled to said pivot shaft***” (it drives the shaft via sector gear 6), and “***is actuated to move said cover***”

*panel via said pivot shaft between said opened and closed positions”* (the motor drives can cover 10 open when a hand is detected).

These components, and their location within Wang’s upper can body, are shown in Figures 3 and 4 below:



*Id.*, Figs. 3, 4 (annotated). Figure 5 also provides a more detailed view of Wang’s “*actuation unit*” (the motor 15, transmission mechanism, and sector gear 6 that drive shaft 17 to open cover 10) within the “*first ... side concealed compartment*” (the inner cavity in annular covering housing 11):

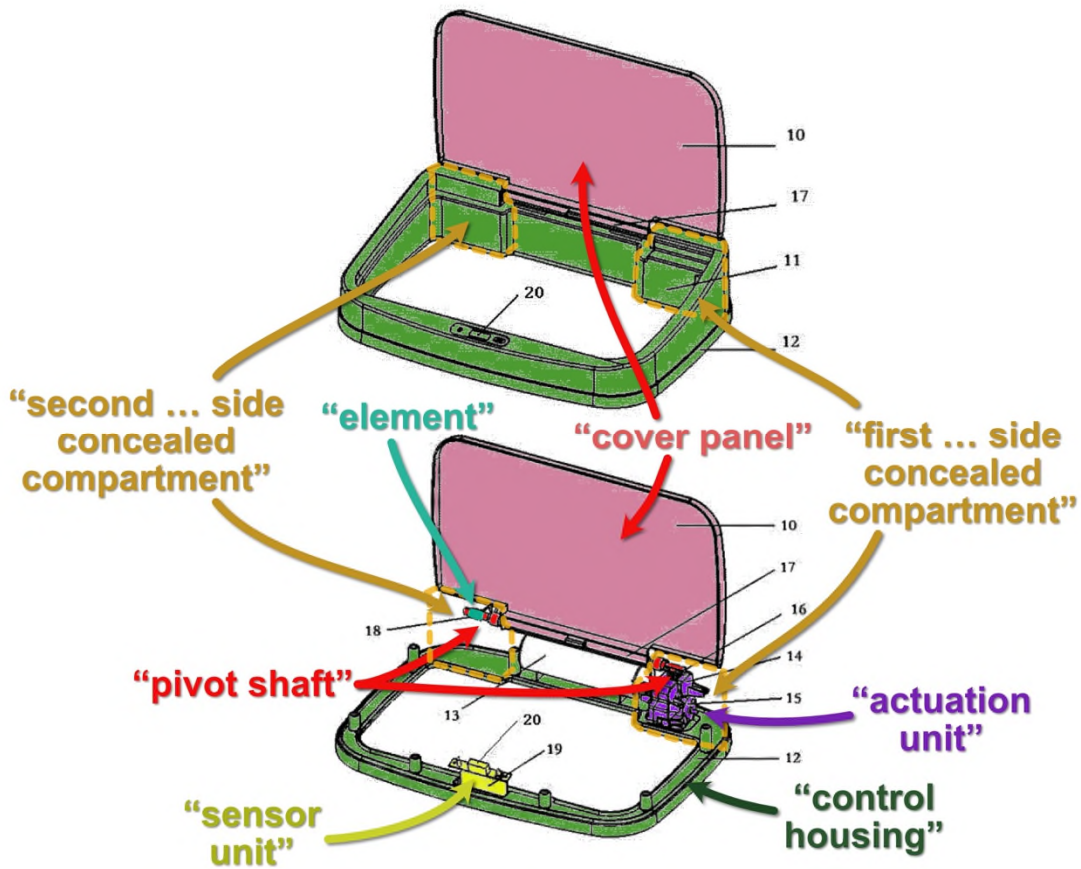


*Id.*, Fig. 5 (annotated).

**[1-2-C-3]** *“an element arranged to initially push up said cover panel simultaneously when said cover panel is started to move from said closed position and partially offsetting a weight of said cover panel when said cover panel is started to move from said opened position.”*

Wang includes the claimed *“element.”* In particular, Wang explains that a “torsion spring 18” is “disposed at the other end of the rotating shaft 17” opposite the “opening-closing apparatus.” Wang, [0022]; *id.*, [0007] (similarly referencing presence of a “torsion spring”). The spring operates to “offset some of the gravity of the can cover 10, so that the motor 15 can open the can cover 10 with a relatively small power.” *Id.*, [0022]. This in turn “sav[es] electricity and prolong[s] a service life of the motor.” *Id.* It also “reduce[s]” “an impact between the can cover 10 and the annular covering housing 11” “when the can cover 10 is closed.”

The spring 18 is the claimed *“element arranged to initially push up said cover panel”* *“partially offsetting a weight of said cover panel”* (the spring 10 offsets some of the effects of gravity, allowing cover 10 to be more easily moved). The spring’s location within the inner cavity of annular covering housing 11 is shown in Figures 3 and 4 below:



*Id.*, Figs. 3, 4 (annotated).

## 2. Claim 2

Claim 2 depends on claim 1 and further requires:

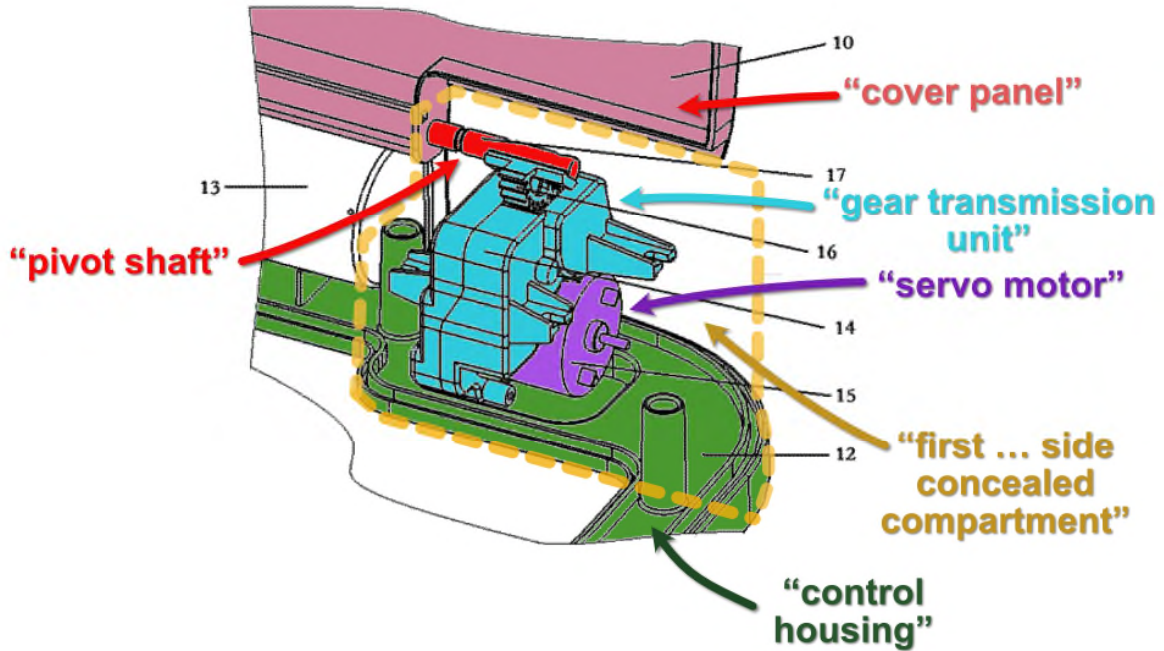
*“wherein said actuation unit comprises a servo motor supported in said first side concealed compartment of said control housing and a gear transmission unit operatively coupled between said first end portion of said pivot shaft and said servo*

*motor for transmitting a rotational power from said servo motor to said pivot shaft.”*

Wang explains that its trashcan includes both a “motor 15” and “transmission mechanism” located within the “inner cavity formed between the middle body seat 12 and the annular covering housing 11.” Wang, [0018]; *see also id.*, [0020] (noting that the “motor 15 is disposed on an inner rear side of the annular covering housing”). The motor is “transmission-connected to the sector gear” 16 attached to the end of shaft 17 “by using the transmission mechanism.” *Id.*; *see also id.*, [0004] (similarly noting that the “motor is transmission-connected to the sector gear” via “the transmission mechanism”). The “transmission mechanism” is a “gear transmission” that allows for “stable transmission, reliable operation, high transmission efficiency, small space occupied,” and “a long service life.” *Id.*, [0021]. The “motor 15” “rotate[s]” to “drive[] ... open” the cover via the transmission mechanism 14, sector gear 16, and rotating shaft 17. *Id.*, [0020]-[0023].

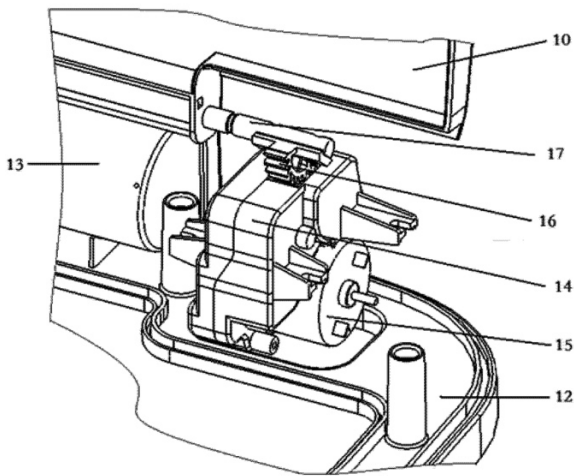
So, in sum, Wang includes an “**actuation unit**” with a “**motor**” (the motor 15) and “gear transmission unit” (the gear transmission and sector gear 16). These components are “**supported in said first side concealed compartment**” (they are all located within the inner cavity in annular covering housing 11). And the “**gear transmission unit**” is “**operatively coupled between said first end portion of said pivot shaft and said serve motor**” to “**transmit[] ... rotational power**” from the motor to the shaft (the motor’s power is transmitted to the shaft 17 via the gear

transmission and sector gear 6.) These components—and their location in Wang’s housing 11—are shown in Figure 5 below:

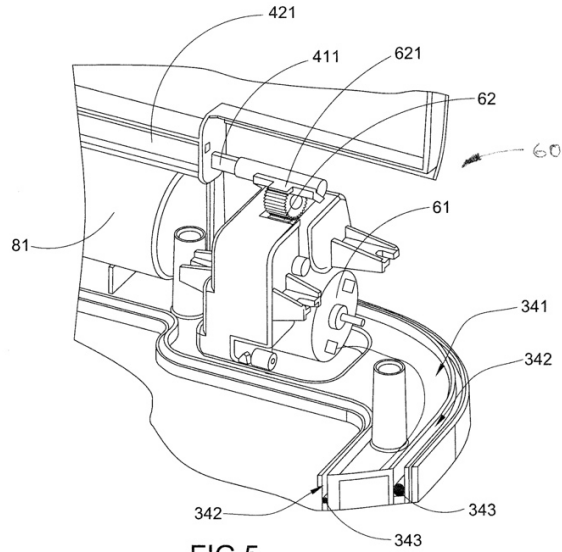


*Id.*, Fig. 5 (annotated).

While Wang does not label its motor 15 as a “*servo*” motor, this is the type of motor it employs. Figures 5 of Wang and the ’165 patent are reproduced below. As shown, both employ structurally indistinguishable motors (labeled 15 in Wang and 61 in the ’165 patent):



**Wang, Fig. 5**



**'165 patent, Fig. 5**

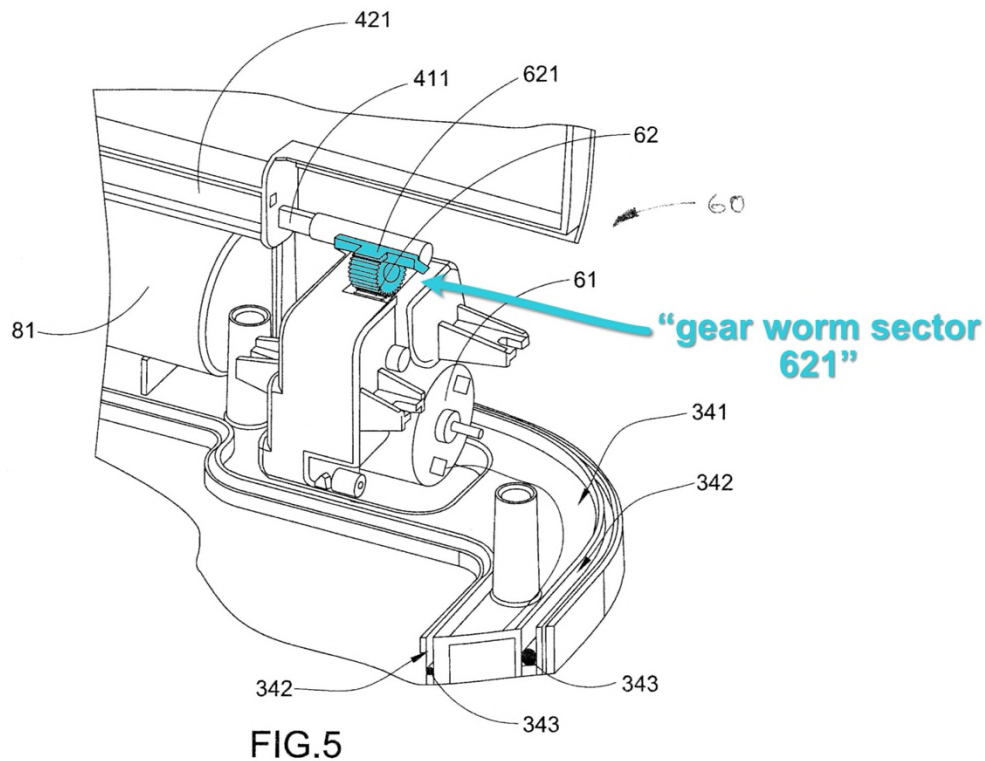
The '165 patent labels this motor—which is present in identical form in Wang—as a “servo motor 61.” Ex. 1001, 7:6-12. Moreover, not only do Wang and the '165 patent depict the use of the same motor but they also describe the operation of this motor in the same way. Wang’s “motor 15” “rotate[s]” to “drive[] ... open” the trashcan cover. Wang, [0020], [0023]. The motor’s rotation is passed to shaft 17 via a “gear” “transmission mechanism.” *Id.*, [0018], [0020]. The '165 patent similarly explains that its “motor 61” generates “rotational power” that is “transmitted through ... gear transmission unit 72” to a “pivot shaft 62” for purposes of “mov[ing]” a “cover panel” to an “opened position.” Ex. 1001, 7:13-23. Given these similarities in form and function, Wang plainly employs the same type of “servo motor” used by the '165 patent in its example and required by the claims.

### 3. Claim 3

Claim 3 depends on claim 2 and further requires:

***“wherein said gear transmission unit comprises a gear worm sector affixed at said first end portion of said pivot shaft to operatively coupled with said servo motor.”***

The '165 patent explains that its Figure 5 depicts “a gear worm sector 621 affixed at the first end portion 411 of the pivot shaft 41 to operatively coupled with the servo motor 61 via a gear seat.” Ex. 1001, 7:38-41. This component is highlighted below:



*Id.*, Fig. 5 (annotated).

Wang includes an identical component. A “sector gear” 16 is “fixedly connected” to “one end of the rotating shaft 17.” Wang, [00018]; *see also id.*, [0004]



to the motor 15” while the “final gear of the reducer 14” is “transmission-connected” to the “sector gear 16.” *Id.* The reducer allows for “stable transmission” of movement from the motor to the rotating shaft (and attached trashcan cover) and allows for “reliable operation” and “high transmission efficiency.” *Id.* It also operates to “reduce[] a speed” of the “can cover 10” as it is “driven to open” by the motor. *Id.*, [0021], [0023].

This is exactly what this limitation requires. Wang includes a “*decelerating gear unit for controllably lifting up and dropping down said cover panel*” (a reducer 14 that reduces the motor speed when opening/closing the cover). The unit moves the cover “*at a speed determined by gear ratios*” (the reducer 14 includes multiple gears, including a primary and final gear, to reduce the motor’s rotational speed applied to the shaft/cover). And the unit allows the cover to open/close in a “*hydraulic manner*” (by reducing the motor speed applied to the shaft and cover, the reducer 14 allows for more stable and reliable cover opening/closing operation).

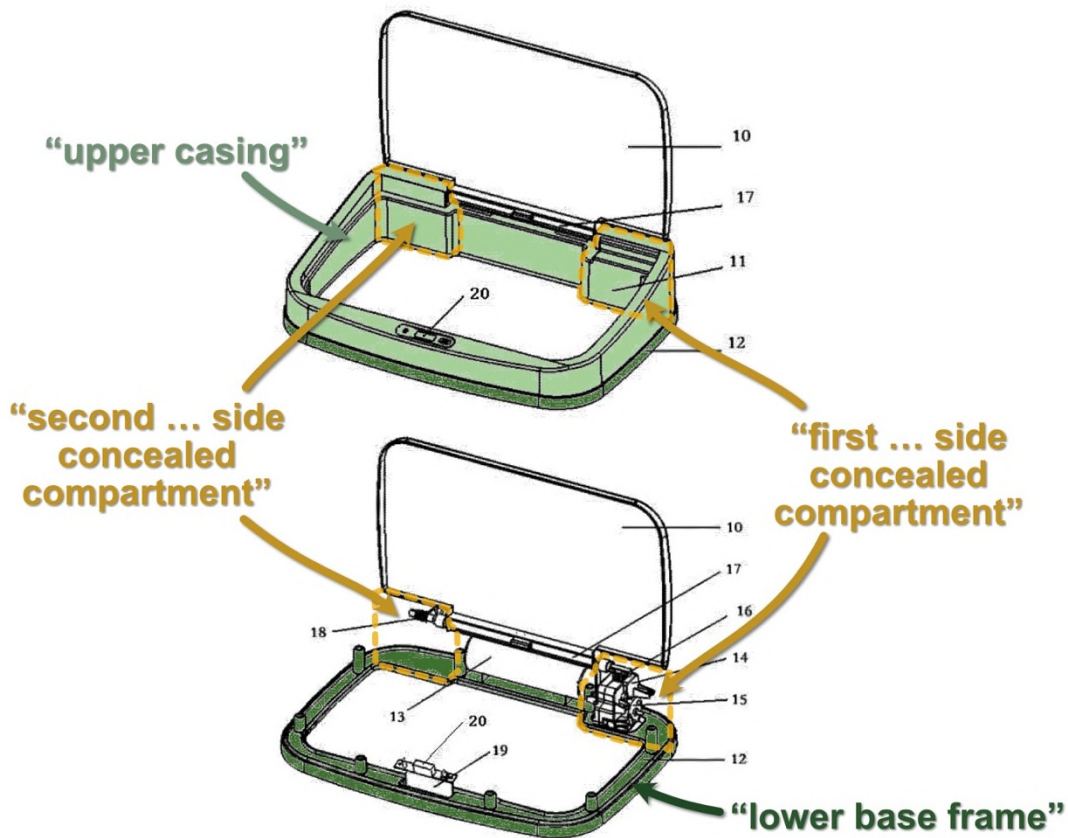
## 5. *Claims 5 and 11*

Claims 5 and 11 respectively depend on claims 3 and 1. Both further require:

***“wherein said control housing comprises a lower base frame detachably coupled at said container opening of said container body, and an upper casing sealed and coupled at said lower base frame to define said first and second side concealed compartments therebetween.”***

Wang explains that its “upper can body 1” “includes an annular middle body seat 12” that is “buckled on a lower can body 2” along with an “annular covering

housing 11” that is “buckled on the middle body seat 12.” Wang, [0018]; *see also id.*, [0004] (similarly referencing the “body seat” and “annular covering housing”). The “annular covering housing 11” includes an internal “inner cavity” that holds the “sensing opening-closing apparatus” in a “waterproof, moisture-proof, and corrosion-proof” manner. *Id.*, [0018]. Thus, the trashcan includes both a “*lower base frame detachably coupled at said container opening*” (the middle body seat 12) and “*an upper casing sealed and coupled at said lower base frame*” (the waterproofing annular covering housing 11). These components “*define first and second side concealed compartments therebetween*” (the inner cavities within housing 11). This is all shown in Figures 3 and 4 below:



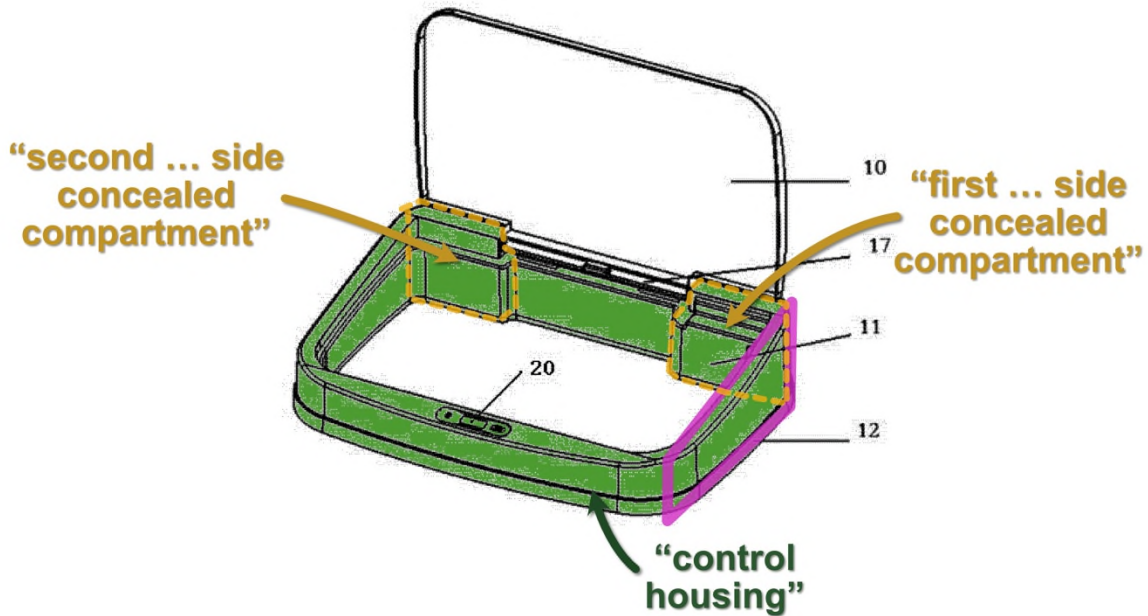
*Id.*, Figs. 3, 4 (annotated).

**6. Claims 6, 8, and 14**

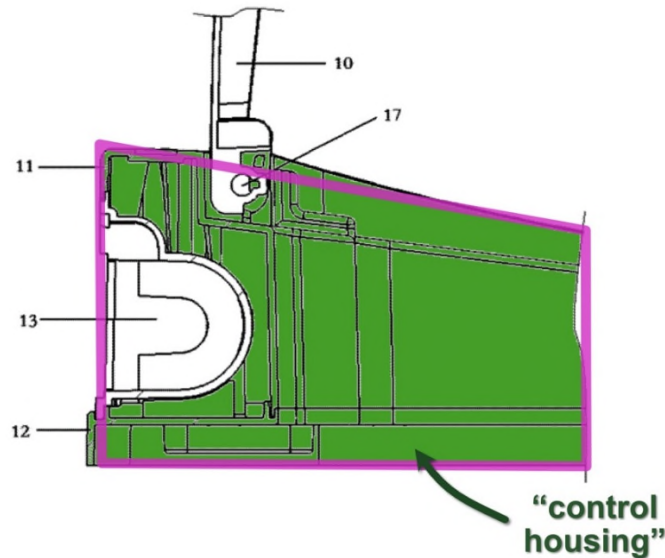
Claims 6, 8, and 14 respectively depend on claims 3, 5, and 1. They all further require:

***“wherein said control housing has a trapezoid cross section that a height of said front portion of said control housing is shorter than that of said rear portion thereof to maximize a size of each of said first and second side concealed compartments.”***

As shown in Figures 3 and 7 below, Wang’s ***“control housing”*** (its upper can body 1 and associated housing 11 and seat 12) has a ***“trapezoid cross section”*** with ***“front portion”*** with a ***“height”*** that is ***“shorter”*** than the ***“rear portion”***:



*Id.*, Fig. 3 (annotated).



*Id.*, Fig. 7 (annotated). Further, because Wang’s “*concealed compartments*” (the inner cavities in annular covering housing 11) are located at the rear portion of its body 2, this cross-sectional shape operates to “*maximize a size of each of*” these “*compartments.*”

#### 7. Claims 7, 16, and 23

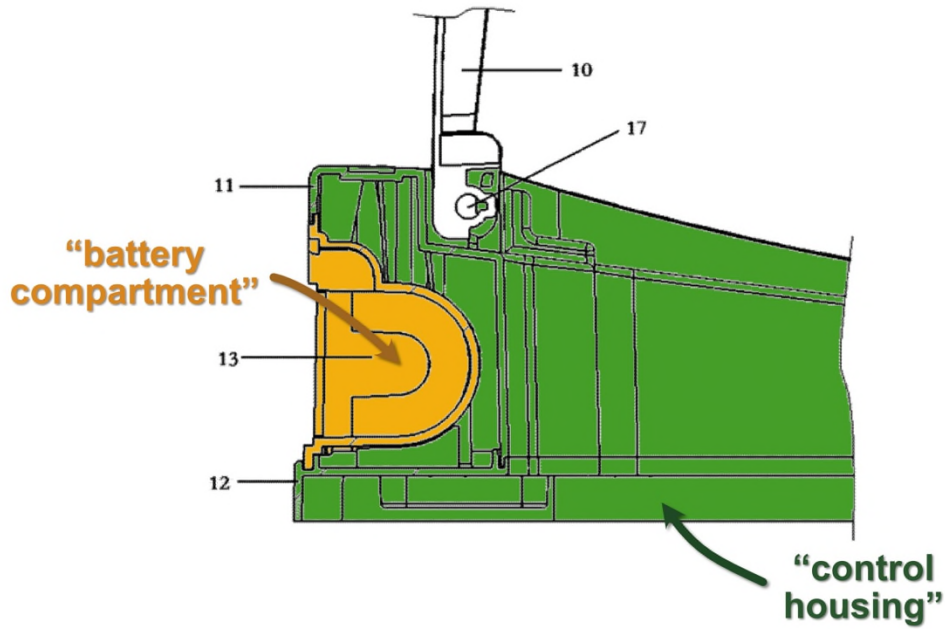
Claims 7, 16, and 23 respectively depend on claims 3, 15, and 1. They all further require:

***“further comprising a power supply unit for electrically connecting with said automatic driving arrangement, wherein said power supply unit comprises a battery compartment formed within said rear portion of said control housing and a battery compartment cover detachably coupled at a rear wall of said control housing to enclose said battery compartment.”***

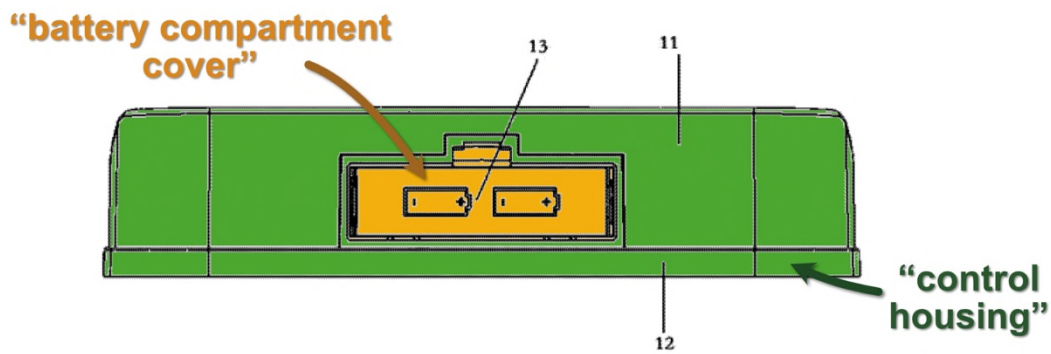
According to Wang, its trashcan includes a “battery box 13” that is “electrically connected to” a “circuit board 19” for purposes of supplying power to the motor. Wang, [0018], [0020]. The box includes “metal electrodes” that contact



*Id.*, Figs. 3, 4 (annotated).



*Id.*, Fig. 7 (annotated). And, as shown in Figure 6, the compartment's opening employs a standard "*detachably coupled*" (*i.e.*, removable) "*cover*" that can be removed/opened to replace the two batteries stored inside:



*Id.*, Fig. 6 (annotated).

## 8. Claims 9, 12, and 15

Claims 9, 12, and 15 respectively depend on claims 2, 11, and 1. They all further require:

***“wherein said means comprises a resilient element concealed in said second side concealed compartment of said control housing and coupled at said second end portion of said pivot shaft to apply an urging force as an initial force towards said cover panel for initially pushing up said cover panel simultaneously when said cover panel is started to move from said closed position and as a weight supporting force for partially offsetting a weight of said cover panel when said cover panel is started to move from said opened position.”***

Wang includes the claimed ***“resilient element”*** for the same reasons explained in connection with the final ***“element”*** limitation of claim 1: its trashcan includes a “torsion spring 18” that “offset[s] some of the gravity of the can cover 10” allowing the motor to more easily open the trashcan. Wang, [0022]; *see also supra* discussion of limitation [1-2-C-3].

## 9. Claims 10, 13, and 24

Claims 10, 13, and 24 respectively depend on claims 2, 11, and 1. They all further require:

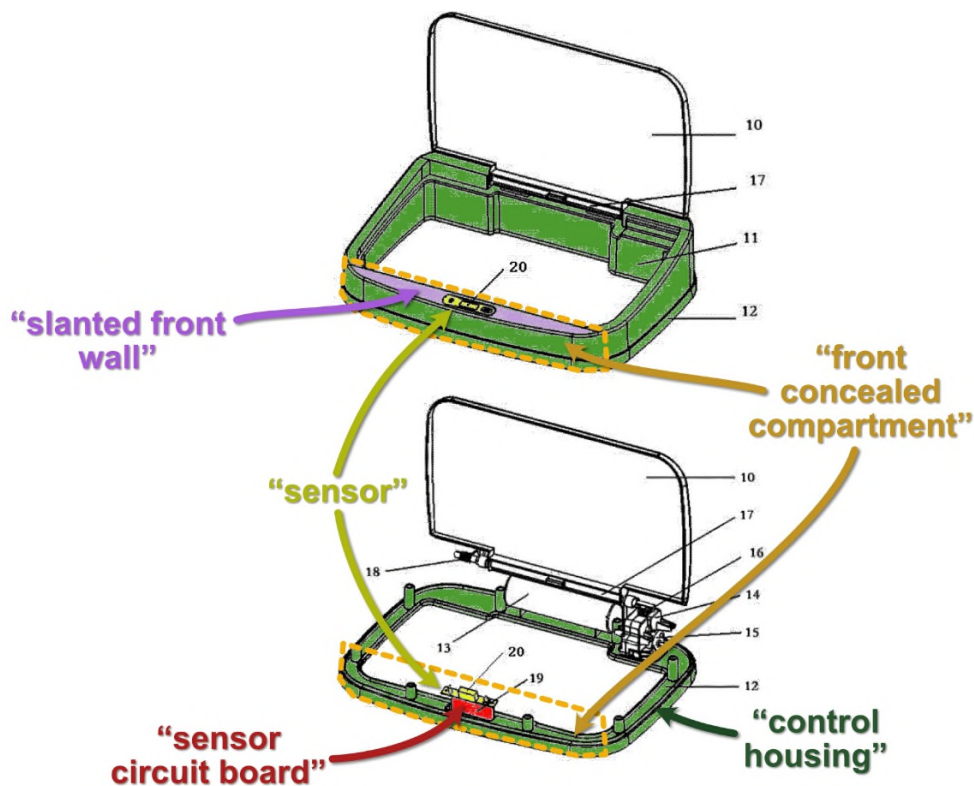
***“wherein said control housing has a front concealed compartment defining a slanted front wall, wherein said sensor unit comprises sensor circuit board concealed in said front concealed compartment and a sensor supported at said slanted front wall of said control housing to operatively linked to said sensor circuit board, such that said sensor is located in front of said cover panel to maximize said detecting range of said sensor at said approaching direction for detecting said target movement.”***

This claim limitation references a ***“front concealed compartment”*** with a ***“slanted front wall”*** where a ***“sensor”*** is ***“supported.”*** The ’165 patent explains



they are located in the cavity formed below the housing 11 but nonetheless “protrude upward” out of the cavity. *Id.*; see also *id.*, [0005]-[0006] (similarly discussing the location of the “sensor” and “circuit board”).

Thus, Wang’s trashcan includes a “*front concealed compartment*” (the portion of the inner cavity between housing 11 and body seat 12 at the trashcan front). Because the back of Wang’s housing 11 is taller than its front, the “*front concealed compartment*” has the same “*slanted front wall*” as the ’165 patent. A “*sensor unit*” (the sensor 20 and circuit board 19) with a “*sensor circuit board*” (board 19) is “*concealed in said front concealed compartment*” and “*supported at said slanted front wall*” (the sensor is mounted in and protrudes out of hole in the slanted top of the housing 11). This is shown in Figures 3 and 4 below:



*Id.*, Figs. 3, 4 (annotated).

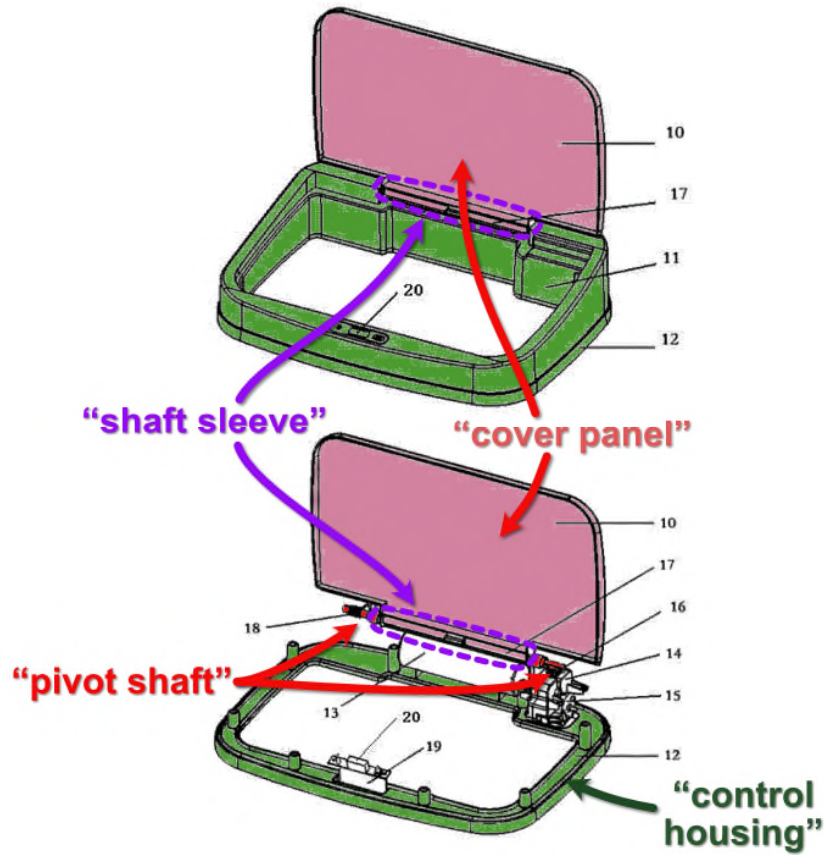
Next, Wang explains that during trashcan operation, “sensor 20 sends a signal” to “circuit board 19” when “a hand approaches the sensing trash can.” *Id.*, [0023]. Thus, Wang’s “*sensor*” (sensor 20) is “*operatively linked to said sensor circuit board, such that said sensor is located in front of said cover panel to maximize said detecting range of said sensor at said approaching direction for detecting said target movement*” (due to its location at the trashcan front, the sensor will send a signal to circuit board 19 when a hand approaches this can front area).

#### 10. *Claim 17, 19, and 21*

Claims 17, 19, and 21 all depend on claim 1 and further require:

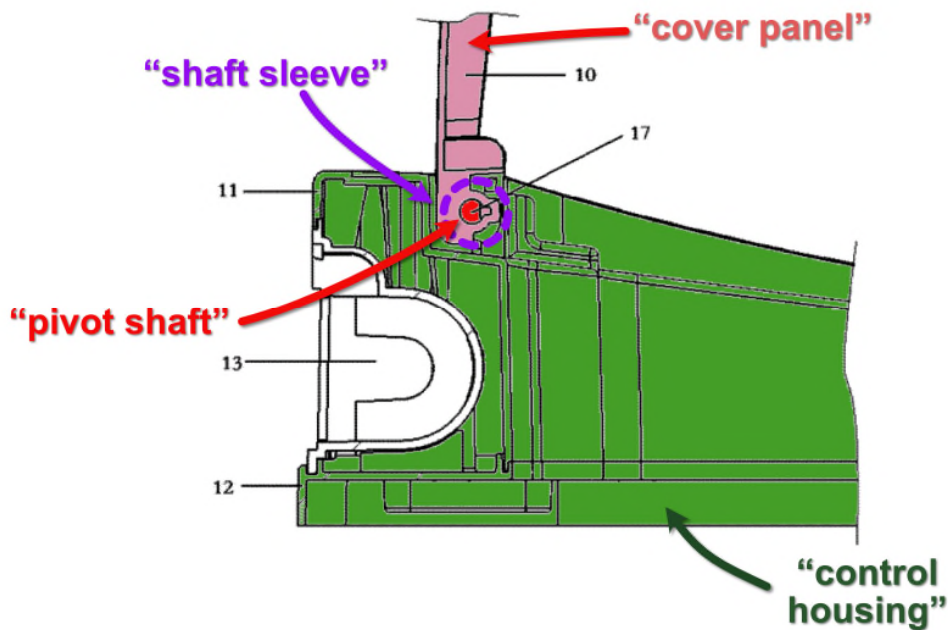
***“wherein said cover panel comprises a shaft sleeve formed along a folding edge thereof, wherein an exposed portion of said pivot shaft between said two end portions thereof is received in said shaft sleeve to conceal said exposed portion of said pivot shaft so as to prevent said pivot shaft from exposing to said container opening of said container body, wherein when said pivot shaft is driven by said actuation unit to rotate, said shaft sleeve is driven by said pivot shaft to rotate, so that said cover panel is pivotally moved between said opened position and said closed position.”***

According to Wang, its “rotating shaft 17” is “fixedly connected under the can cover 10.” Wang, [0018]. As shown in Figures 3 and 4, the bottom end of Wang’s cover 10 includes an integrated sleeve-like structure through which the shaft 17 passes. This sleeve-like structure protects the portion of the shaft 17 that does not extend into Wang’s inner cavities from the trashcan interior:



*Id.*, Figs. 3, 4 (annotated). Figure 7 provides a “partial sectional view.” *Id.*, [0015].

This figure also shows rotating shaft 17 passing through the sleeve-like structure at the bottom of Wang’s cover 10:



*Id.*, Fig. 7 (annotated). This structure causes Wang’s cover 10 to open when the “rotating shaft 17” is driven by motor 15. *Id.*, [0020], [0023].

In sum, Wang includes the claimed “*shaft sleeve*” (the sleeve-like structure at the end of its cover 10). This sleeve is located at the “*folding edge*” of Wang’s can cover (the end that rotates to open/close the cover). The “*pivot shaft ... is received in said shaft sleeve*” to protect it from the “*opening of said container body*” (the shaft 17 passes through the sleeve-like structure and is not exposed to garbage). Further, “*when said pivot shaft is driven by said actuation unit to rotate, said shaft sleeve is driven by said pivot shaft to rotate, so that said cover panel is pivotally moved between said opened position and said closed position*” (because Wang’s shaft 17 is located within the sleeve-like structure, and because this sleeve-like structure is integrated into Wang’s cover 10, the shaft, sleeve-like structure, and

cover 10 will all rotate together when Wang's cover is driven open/closed by the motor 15).

### 11. *Claims 18, 20, and 22*

Claims 18, 20, and 22 respectively depend on claims 17, 19, and 21. They all further require:

***“wherein said exposed portion of said pivot shaft has a non-circular cross section and said shaft sleeve has a corresponding non-circular cross section to fit said exposed portion of said pivot shaft, such that said cover panel is pivotally moved between said opened and closed positions along with a rotation of said pivot shaft.”***

As shown in Figure 7 both Wang's “pivot shaft (rotating shaft 17) and its “*shaft sleeve*” (the sleeve-like structure at the end of cover 10) have a “***non-circular cross section.***” See Wang, Fig. 7. Further, as discussed above in connection with claim 17, these structures allow Wang's cover to be “***pivotally moved***” between “***opened and closed positions***” when the shaft is rotated by motor 15. Wang, [0004], [0020], [0023]; see also *supra* discussion of claims 17, 19, 21. Moreover, because both the shaft and cover rotate together, their “***non-circular cross section[s]***” are “***corresponding.***” See *id.*

## IX. **GROUND 2: OBVIOUSNESS OVER WANG**

As explained above in Ground 1, Wang discloses all required limitations of and thus anticipates claims 1-24 of the '165 patent.

Wang also renders the claims obvious. “[A] disclosure that anticipates under § 102 also renders the claims invalid under § 103, for ‘anticipation is the epitome of

obviousness.” *Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1373 (Fed. Cir. 2019) (quoting *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 1548 (Fed. Cir. 1983) and *In re Fracalossi*, 681 F.2d 792, 794 (C.C.P.A. 1982).) Similarly, claims are rendered obvious by a single prior art reference when that reference “teaches all the limitations of the claims” when considered in view of concepts and information that would have been “well known” to “a person having ordinary skill in the art.” *Realtime Data*, 912 F.3d at 1374; *see also Game and Tech. Co. v. Activision Blizzard Inc.*, 926 F.3d 1370, 1381 (Fed. Cir. 2019) (similarly explaining that a single prior art reference can render claims obvious). This is exactly what Wang does here. As explained in Ground 1, there are no meaningful, substantive distinctions between Wang and the ’165 patent: both disclose the same trashcan with the same structure, features, and functionality. *See supra* discussion of Ground 1.

There are a handful of minor differences in the language used by the ’165 patent and Wang. Again, a POSITA would not have considered any of this meaningful. Instead, reviewing Wang, a POSITA would have understood that Wang discloses (or at the very least teaches and renders obvious) the ’165 patent’s claimed subject matter. Wang’s disclosure itself—particularly when read in view of a POSITA’s background knowledge—would have led a POSITA to conclude that the ’165 patent’s claims are obvious. The obviousness of certain claim limitations is

discussed in further detail below. The remainder of the '165 patent's limitations are discussed in Ground 1:

**A. “[A]utomatic” “driving arrangement” (claim 1)**

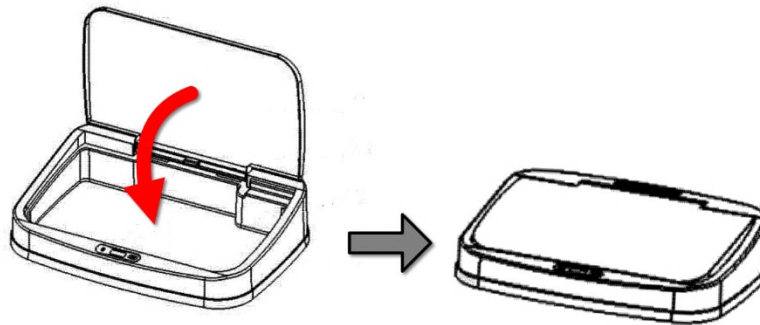
A POSITA would have readily understood that Wang's trashcan includes the “*automatic*” “*driving arrangement*” required by claim 1. Wang begins by explaining that it is meant to improve upon another existing “[i]ntelligent [a]utomatic [f]lip [g]arbage [c]an.” Wang, [0002]. A POSITA would have understood that Wang's can—like this existing can—is also meant to be automatic. *See* Ex. 1006, ¶¶ 129-131.

Further, a POSITA would have concluded that Wang's trashcan is “*automatic*” given how Wang describes the can's operation. Wang repeatedly explains that it is a “sensing trash can.” Wang, Abstract, [0001], [0004], [0008], [0018]. Per Wang, during operation the trashcan “detect[s]” when “a hand approaches the sensing trash can” and trigger—without further user intervention—the “can cover 10 ... to open.” *Id.*, [0023]. A POSITA would have considered this type of trashcan—one that opens automatically upon sensing a hand nearby—to employ an “*automatic*” “*driving arrangement.*” *See* Ex. 1006, ¶¶ 132-136.

**B. “[P]ivotally mov[ing]” cover (claim 1)**

Next, a POSITA would have understood that Wang obviously employs the same type of “*pivotally moving*” cover that claim 1 requires. According to Wang,

its trashcan includes a “rotating shaft fixedly connected under the can cover.” Wang, [0004]. This “rotating shaft” causes the can cover to be “hinged to the annular covering housing.” *Id.*; *see also id.*, [0018] (similarly referencing a “hinged” “can cover 10”). A POSITA would have understood that by describing its cover as “hinged,” Wang is referring to a cover that pivots (or rotates) along with rotating shaft 17 along that shaft’s longitudinal axis. *See* Ex. 1006, ¶¶ 137-143. An example demonstrative showing this cover pivoting operation is provided below:



*Id.*; *see also* Wang, Figs. 2, 3 (modified and annotated).

### C. “[S]ervo motor” (claim 2)

As explained when discussing claim 2, Wang employs the same motor as the ’165 patent. *See supra* discussion of claim 2. In the event it is determined that Wang’s motor—despite being depicted in Wang’s figures in a way that is substantively identical to the depiction in the ’165 patent—is for some reason not a “servo” motor, a POSITA would have considered it highly obvious to use this type of motor with Wang.

At the time the '165 patent was filed, servo motors were not only known and available but were routinely used as part of mechanisms that open/close the lid of a waste receptacle. *See, e.g.*, Ex. 1007, [0008] (discussing a “garbage-box” that employs a “servo motor” to “drive a transmission shaft” to open a trashcan “door”); Ex. 1008, [0056] (discussing use of an “electric driving unit ..., such as a servo motor” to provide “rotational power” needed to “controllably lift[] up” a container “cover panel”); Ex. 1009, [0008] (discussing a “waste receptacle” that uses a “servo motor to drive an “automatically operable lid”); Ex. 1010, [48] (discussing a “trashcan system 10” with a “lid 45” opened using an “electromechanical actuating device such as a servo motor”). Given their availability and routine use for similar purposes, a POSITA would have considered it highly obvious to employ a servo motor when implementing Wang. *See* Ex. 1006, ¶¶ 144-148. Similarly, a POSITA would have considered use of a servo motor—as opposed to some other type of motor—to be nothing more than a routine, obvious design choice. *See id.*, ¶¶ 148-149.

Next, not only were servo motors available, but a POSITA would have recognized that use of such a motor would have improved Wang’s trashcan. This also would have served as a motivation to use a servo motor with Wang. *See id.*, ¶¶ 150-156. Because they employ a built-in feedback device, servo motors provide excellent operational accuracy and repeatability over time. *See id.*, ¶¶ 151-153. The

feedback device allows a servo motor to produce the same positional movement despite changes in operating conditions such as increased friction. *See id.* A POSITA would have recognized that this type of operation would have been highly beneficial to a trashcan. Component wear, accumulated dirt or debris, or obstructions around the cover area of Wang’s trashcan all impact the amount of force needed to open/close the cover. *See id.*, ¶¶ 154-157. Use of a servo motor would allow Wang’s trashcan to account for these types of changes while ensuring proper operation. *See id.* A POSITA also would have recognized that use of a servo motor would have rendered Wang’s trashcan more energy efficient. Some types of motors—like stepper motors—employ idle or dwell currents when not in operation leading to higher power usage. *See id.*, ¶¶ 158-161. Servo motors, however, only use current when in operation resulting in reduced power usage and increased efficiency. *See id.*

**D. “[G]ear worm sector” (claim 3)**

As explained when discussing claim 3, Wang employs the same type of “gear worm sector” as the ’165 patent. *See supra* discussion of claim 3. In the event it is determined that Wang’s gear is not a “gear worm sector,” a POSITA would nonetheless have considered it obvious to employ this type of gear with Wang.

Wang already explains that its trashcan employs gears to transmit the rotational power generated by its motor to its rotating shaft 17 and on to attached

can cover 10. This includes both a “sector gear 6” and a “gear transmission” with a “gear reducer 14.” Wang, [0018], [0021]. Wang does not impose any limitations on the types of gears to be used in its trashcan. Thus, a POSITA would have considered the various, known types of gears that were generally available for use when implementing Wang. “Worm” gear sectors were one such known type of gear. Moreover, not only were “worm” gear sectors known, but this type of gear was specifically known to be useful for the opening/closing mechanism of a trashcan. *See, e.g.*, Ex. 1011, [0043]-[0044], [0081], Fig. 4 (referencing a “trash can” that includes an “actuator or motor” that opens lid via a “motor gear” that “can be, for example, a worm gear” that interfaces with a “rotary lifting gear” in the form of a sector); Ex. 1012 at 6, Fig. 2 (referencing a container with a “motor” that “rotates a worm gear” to interface with the “teeth” of “an arcuate edge of a quadrant” or sector gear to open the container’s “lid”). This would have motivated a POSITA to consider use such a gear with Wang: “worm” gear sectors were known to be both usable and structurally compatible with trashcan opening mechanisms. *See* Ex. 1006, ¶¶ 162-170. Moreover, a POSITA would have considered use of a worm gear sector, as opposed to some other type of gear, to amount to nothing more than a routine, obvious design choice. *See id.*, ¶¶ 171-173. A worm gear sector achieves the same result as any other gear: it transmits rotational force from one structure to another. *See id.*

**E. “[H]ydraulic” cover movement (claim 4)**

Wang does not use the word “hydraulic.” It does, however, explain that its trashcan includes a gear “transmission mechanism” that operates to “reduce[] a speed” of the “can cover 10” and ensure that the cover opens/closes in way that is “stable,” “reliable,” and “efficien[t].” Wang, [0021], [0023]. Another patent publication naming one of the same inventors as the ’165 patent explains that a trashcan’s cover can be considered to be driven “hydraulically” when there is a “generation of decelerating and torque enhancing force in a stable and controllable manner.” Ex. 1008, [0056]. This is how a POSITA would have understood Wang to operate. Per Wang, its “transmission mechanism” operates to (1) reduce the rotational speed of the motor before it is applied to the rotating shaft 17 and cover 10, and (2) simultaneously increase the applied torque. *See* Ex. 1006, ¶¶ 174-181. The transmission achieves this rotational speed reduction and torque increase through use of a “gear reducer 14” with differently sized “primary” and “final” “gear[s]” Wang, [0021]. A POSITA would have recognized that the desired cover speed and torque—and thus the degree of “*hydraulically driven*” operation—would be obtained by appropriately sizing the reducer’s various gears. *See* Ex. 1006, ¶¶ 182-183.

F. **“[D]etachably coupled” “battery compartment cover” (claim 7, 16, 23)**

As explained in Ground 1, Wang includes a “battery box 13” that supplies power to its sensing opening-closing apparatus. Wang, [0020]; *see also supra* discussion of claim 7. As also explained, Wang depicts “battery box 13” as having standard detachable cover for purposes of covering the box (and the batteries it contains) during normal operation. *See id.*

In the event it is for some reason determined that Wang lacks the claimed “*detachably coupled*” “*battery compartment cover*,” a POSITA would have considered it highly obvious to include such a cover. Wang’s battery box 13 is intended to house batteries. Wang, [0020]; *see also id.*, Fig. 6 (depicting batteries on the battery box cover). Further, per Wang, this battery box includes an “opening” (*see id.*, [0020]) that is covered with a cover (*see id.*, Fig. 6). A POSITA would have understood that this cover must be detachably coupled from the battery compartment. Otherwise, it would be impossible to access the interior of the battery box for purposes of replacing the batteries. *See Ex. 1006*, ¶¶ 184-190. As batteries do not last forever, a POSITA would have understood that Wang’s battery box cover is removable (like all battery box covers) so that the batteries in the box can be removed when they are no longer providing adequate power. *See id.*, ¶¶ 190-192. Consistent with this, the box cover depicted in Wang’s Figure 6 is shown as including

a small tab-like structure at its top that can be disengaged to remove the cover and access the stored batteries. *See* Wang, Fig. 6; *see also* Ex. 1006, ¶¶ 193-195.

**G. “[C]orresponding” “non-circular cross section[s]” (claim 18, 20, 22)**

Claims 18, 20, and 22 all require that the claimed “pivot shaft” and “shaft sleeve” associated with the can cover have “corresponding” “non-circular cross section[s].” As explained in Ground 1, Wang’s shaft and sleeve both have non-circular cross-sections. *See supra* discussion of claim 18. Further, as the shaft and sleeve rotate together, these cross-sections are “corresponding.”

To the extent it is determined that this limitation somehow requires that the shaft and sleeve have identical (or near identical cross sections), this would have been obvious to one of ordinary skill in the art. *See* Ex. 1006, ¶¶ 196-200. Again, Wang’s trashcan is designed such that the rotating shaft 17 and cover 10 rotate together as a single unit. *See* Wang, [0018]-[0023]. A POSITA would have understood that designing the shaft and the point of attachment between the shaft and cover to have identical (or near identical) cross sections would have minimized any slipping better ensuring proper trashcan opening operation. *See* Ex. 1006, ¶¶ 199-200.

**X. CONCLUSION**

For the foregoing reasons, Petitioner respectfully requests institution of IPR and cancellation of claims 1-24.

Respectfully submitted,

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Dated: July 16, 2025

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## **CERTIFICATE OF WORD COUNT**

The undersigned certifies that the foregoing PETITION FOR *INTER PARTES* REVIEW complies with the type volume limitation in 37 C.F.R. § 42.24. According to the utilized word-processing system's word count, the petition—excluding the caption, table of contents, table of exhibits, mandatory notices, certificate of word count, and certificate of service—contains 9,792 words.

Dated: July 16, 2025

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## CERTIFICATE OF SERVICE

The undersigned hereby confirms that the foregoing PETITION FOR IPR and associated exhibits were caused to be served on July 16, 2025 via overnight courier upon the following counsel of record for Patent Owner:

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