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Sacks

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(54) **BIRD FEEDER WITH SHIELD**

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(52) **U.S. Cl.**
CPC ***A01K 39/0113*** (2013.01)

(58) **Field of Classification Search**
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USPC 119/51.01, 51.03, 57.8, 57.9, 61.3, 119/61.57, 468, 469
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2,799,244	A *	7/1957	Dorsey	A01K 31/08 119/461
3,086,499	A	4/1963	Dilley	
3,399,650	A *	9/1968	Goodman	A01K 39/0113 119/51.03
3,515,098	A *	6/1970	Thurmond	A01K 5/0233 119/51.01
3,948,220	A *	4/1976	Fiedler	A01K 39/014 119/51.03
3,977,363	A	8/1976	Fisher, Jr.	
5,086,730	A *	2/1992	Figley	A01K 39/0113 119/51.01
5,361,723	A	11/1994	Burleigh	
5,377,617	A *	1/1995	Harwich	A01K 53/00 119/57.8
5,377,619	A *	1/1995	Katz	A01K 31/06 119/461
D381,135	S	7/1997	Hochlan, Jr.	
5,791,286	A	8/1998	Taussig et al.	
D452,048	S *	12/2001	Colwell	D30/119
6,986,322	B2	1/2006	Lumpkin	
7,017,517	B2 *	3/2006	Paquette	A01K 39/014 119/51.01
7,353,774	B2 *	4/2008	Bradeen	A01K 39/0106 119/52.3
7,861,670	B2 *	1/2011	Berns	A01K 39/012 119/429
2011/0271910	A1 *	11/2011	Baynard	A01K 39/0206 119/51.5

OTHER PUBLICATIONS

Cubie, Doreen, "Thwarting Backyard Thieves," National Wildlife (World Edition); Oct./Nov. 2013; vol. 51, Issue 6, pp. 38-41.
"Woodlink Audubon 6" Torpedo Steel Squirrel Baffle"; Wayfair.com, http://www.wayfair.com/Audubon-6-Torpedo-Steel-Squirrel-Baffle-NATORPEDO-WDL1040.html, printed Jun. 23, 2015.

* cited by examiner

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(57) **ABSTRACT**

A ground-mounted bird feeder includes a shield to prevent squirrels from accessing the feeder portion of the bird feeder. The ground-mounted bird feeder may include a post and a feeder mounted on the post, and a shield may be placed below a bottom of the feeder, and may also be above the feeder.

24 Claims, 8 Drawing Sheets

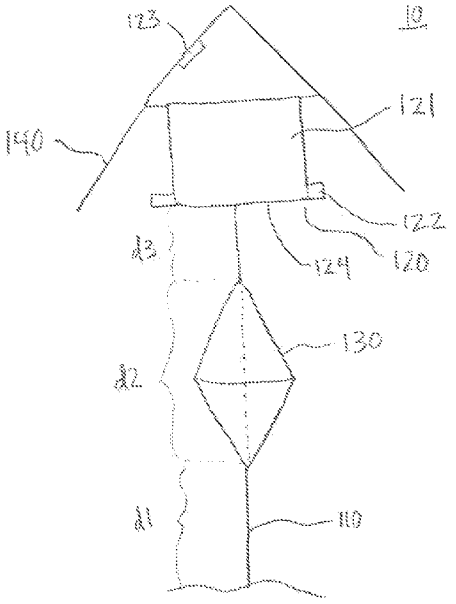


Fig. 1

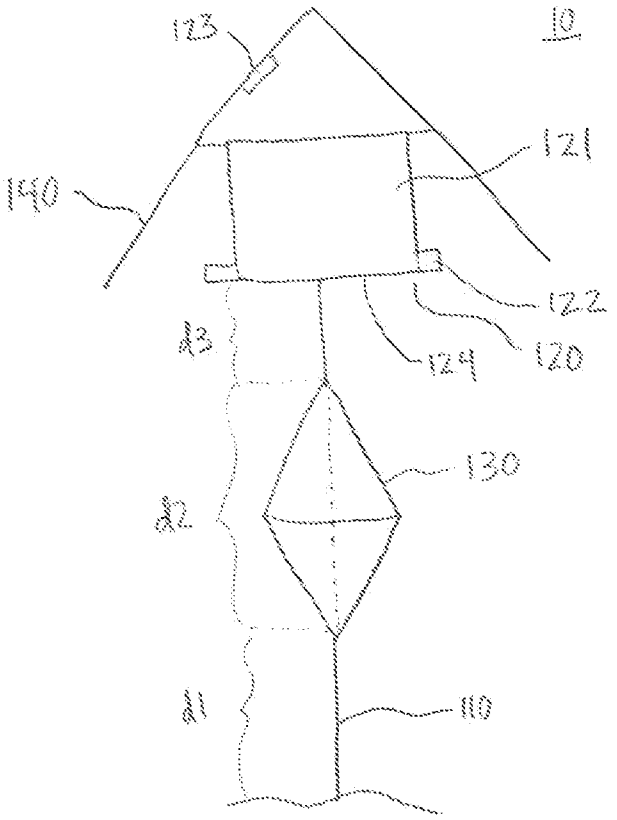


Fig. 2A

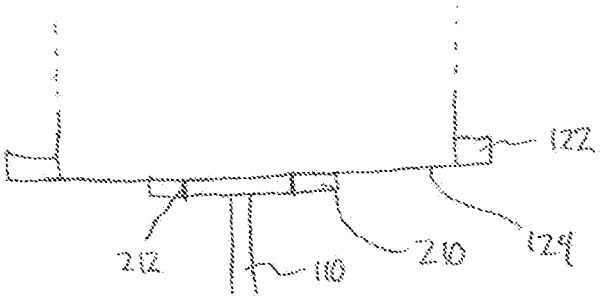


Fig. 2B

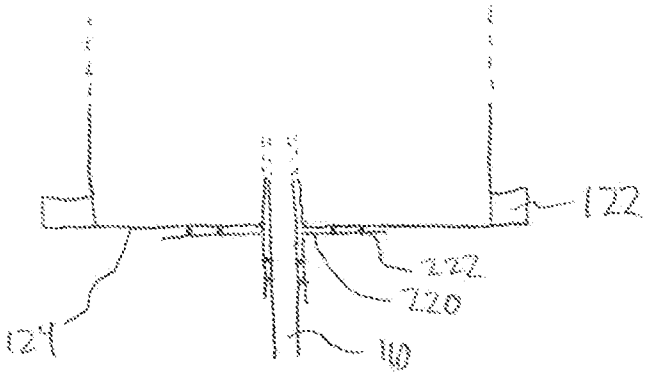


Fig. 3a

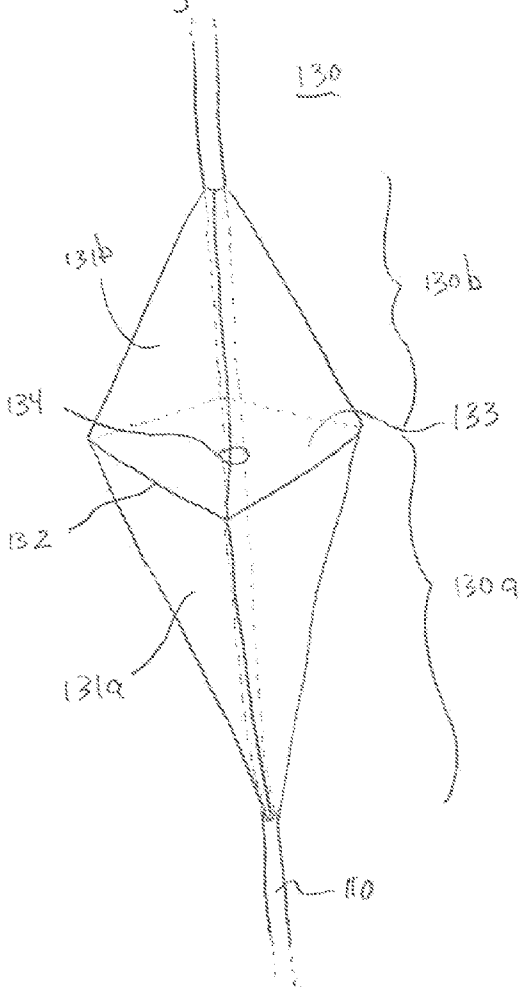


Fig. 3b

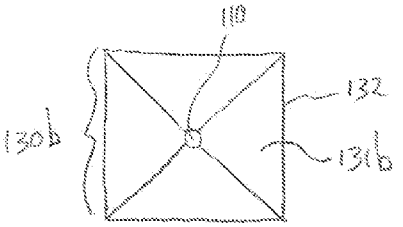


Fig. 4A

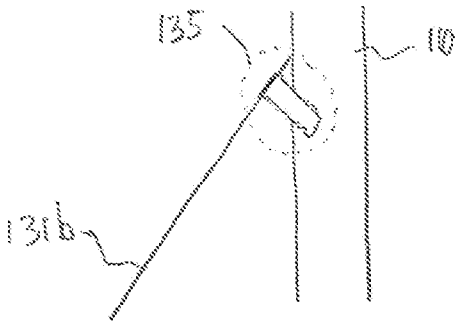


Fig. 4B

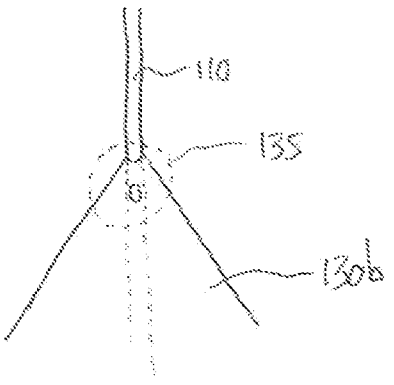


Fig. 5A

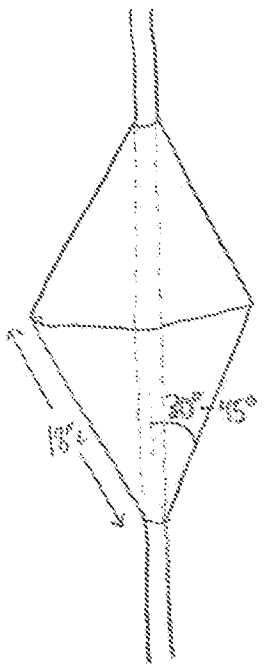


Fig. 5B

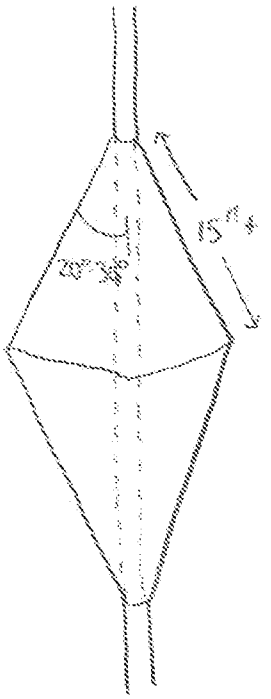


Fig. 6A

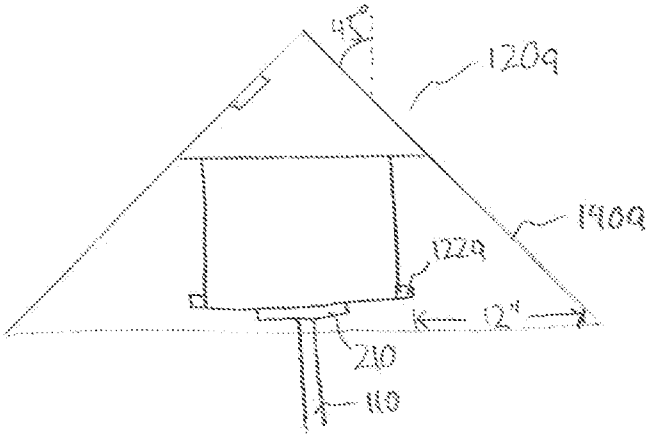


Fig. 6B

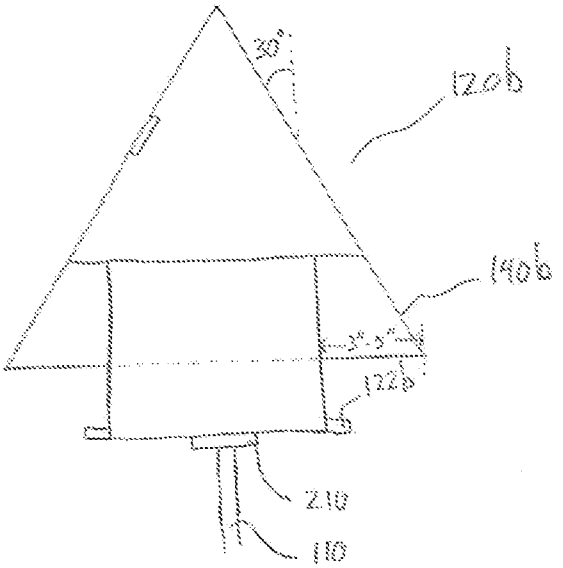


Fig. 6C

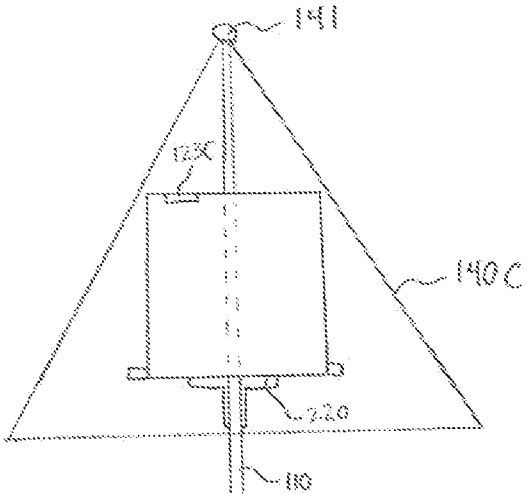
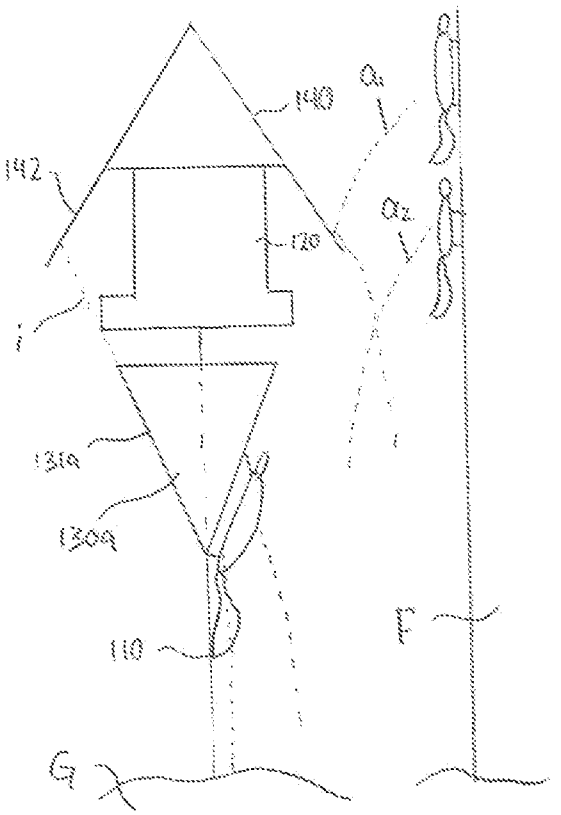


Fig. 7



BIRD FEEDER WITH SHIELD

BACKGROUND

Bird feeders are under constant attack by squirrels and other non-aviary, uninvited free-riders who find ways to access the food placed in the bird feeder. There have been numerous attempts to prevent animals such as squirrels from accessing bird feeders. For example, U.S. Pat. Nos. 3,977,363, 5,086,730, 5,361,723, 5,791,286, and 6,986,322 describe various bird feeder designs intended to deter squirrels from accessing the bird feeder. Some of these include baffles placed above or below a location where bird feed can be accessed. Other deterrent methods include squirrel-repellant such as chili powder, grease, or other substances that make it difficult or undesirable for a squirrel to approach the bird feeder.

Some squirrel-resistant bird feeders are intended for hanging from a tree or other structure. Other bird feeders are intended to be mounted on the ground, for example on a post that may be placed on or in the ground. For ground-mounted bird feeders, some include a post made of a material that does not permit a squirrel to dig its claws into the material, such as metal. Though this may be helpful, for smaller-sized posts (e.g., having a diameter of less than about 4 inches), squirrels can often still climb up the post from the ground by clasping their paws together and shimmying up the post. Some deterrents have been explored, including baffles placed on the pole. However, though these baffles may have a shape that deters some squirrels from reaching the feeder from below, they typically have no effect in preventing squirrel access from the side of from above, and may even assist the squirrels in reaching the feeder from the side or from above, such as from a nearby tree or fence.

As such, a shield that prevents squirrels and other land animals from accessing bird feed in a ground-mounted bird feeder from the side, above, and/or the ground would be highly useful.

SUMMARY

The disclosed embodiments describe a new bird feeder that includes a shield to prevent squirrels from accessing a bird feeder, particularly for a ground-mounted bird feeder. In certain embodiments, a ground-mounted bird feeder includes a post and a feeder mounted on the post, and a shield is placed below a bottom of the feeder, and may also be above the feeder.

According to some embodiments, a ground-mounted bird feeder includes a post, a feeder mounted on the post, and a shield attached to the post and mounted below the feeder. The shield, which may be referred to as a lower shield, may include a first, lower portion having first walls that diverge from each other from bottom to top, a second, upper portion having second walls that converge toward each other from bottom to top, and an interface where the first lower portion of the shield meets the second upper portion of the shield. A size and shape of the first walls at the interface may be the same as the size and shape of the second walls at the interface. An additional shield may be included above the feeder. The additional shield may have third walls that converge toward each other from bottom to top, and overhang at least a portion of the feeder to prevent squirrels from reaching the feeder from above the feeder or from the same height as the feeder. The different walls of the upper and lower shield may have particular angles that prevent squirrels from accessing the feeder. For example, for the lower shield, a bottom of the first walls may connect to the post at a first vertical height on the post, and a minimal distance between the bottom of the first walls and a top of the first walls may be greater than a maximum reach distance of a squirrel. The various walls may be formed of a hard, smooth material whose surface prevents squirrels from gripping the walls. From a top-down view, the area covered by the walls of the upper shield at the bottom of the upper shield may surround the area of the first walls at a top of the first portion of the lower shield. The combination of the lower shield and the upper shield can prevent squirrels from accessing the feeder from above, beside, or below the feeder.

BRIEF DESCRIPTION OF THE FIGURES

The accompanying drawings are included to provide a further understanding of the disclosed embodiments, and are incorporated in and constitute a part of this specification. The drawings, together with the description, illustrate exemplary embodiments, and are not intended to limit the scope of the invention to any particular example given. Certain aspects of the invention are depicted in different figures, and certain aspects are omitted from certain figures. Therefore, the figures should be taken as a whole as examples disclosing various aspects and embodiments of the invention. In the drawings, the size and relative sizes of objects and portions of objects may be exaggerated for clarity. Like numbers refer to like elements throughout. In the drawings:

FIG. **1** illustrates a bird feeder, according to certain exemplary embodiments;

FIG. **2**A illustrates an exemplary mounting area of a post where a feeder of a bird feeder may be mounted, according to one exemplary embodiment;

FIG. **2**B illustrates an exemplary mounting area of a post where a feeder of a bird feeder may be mounted, according to another exemplary embodiment;

FIG. **3**A illustrates a shield for placing on a post of a bird feeder, according to certain exemplary embodiments;

FIG. **3**B is an exemplary overhead view of a portion of a shield for a bird feeder, according to certain exemplary embodiments;

FIGS. **4**A and **4**B are exemplary views showing an exemplary coupling assembly for connecting a shield to a post of a bird feeder;

FIG. **5**A is a cross-sectional example of a shield such as shown in FIG. **2**A, including exemplary dimensions according to certain exemplary embodiments;

FIG. **5**B is a cross-sectional example of a shield such as shown in FIG. **2**A, including exemplary dimensions according to certain exemplary embodiments;

FIGS. **6**A-**6**C illustrate exemplary feeders including supplemental shields, according to certain exemplary embodiments.

FIG. **7** illustrates a bird feeder, according to certain exemplary embodiments.

DETAILED DESCRIPTION

The present disclosure now will be described more fully hereinafter with reference to the accompanying drawings, in which various embodiments are shown. The invention may, however, be embodied in many different forms and should not be construed as limited to the example embodiments set forth herein. These example embodiments are just that—examples—and many implementations and variations are possible that do not require the details provided herein. It should also be emphasized that the disclosure provides

details of alternative examples, but such listing of alternatives is not exhaustive. Furthermore, any consistency of detail between various examples should not be interpreted as requiring such detail—it is impracticable to list every possible variation for every feature described herein. The language of the claims should be referenced in determining the requirements of the invention.

The terminology used herein is for the purpose of describing particular embodiments only and is not intended to be limiting of the invention.

As used herein, the singular forms "a", "an" and "the" are intended to include the plural forms as well, unless the context clearly indicates otherwise. As used herein, the term "and/or" includes any and all combinations of one or more of the associated listed items and may be abbreviated as "/".

Further, it will be understood that, although the terms first, second, third etc. may be used herein to describe various objects, components, and sections, these objects, components, and/or sections should not be limited by these terms. Unless the context indicates otherwise, these terms are only used to distinguish one object, component, or section from another object, component, or section, for example as a naming convention. Thus, a first object, component, or section discussed below in one section of the specification could be termed a second object, component, or section in another section of the specification or in the claims without departing from the teachings of the present disclosure. In addition, in certain cases, even if a term is not described using "first," "second," etc., in the specification, it may still be referred to as "first" or "second" in a claim in order to distinguish different claimed elements from each other.

It will be further understood that the terms "comprises" and/or "comprising," or "includes" and/or "including" when used in this specification, specify the presence of stated features, regions, integers, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, regions, integers, steps, operations, elements, components, and/or groups thereof.

It will be understood that when an element is referred to as being "connected" or "coupled" to or "on" another element, it can be directly connected or coupled to or on the other element or intervening elements may be present. In contrast, when an element is referred to as being "directly connected" or "directly coupled" to another element, there are no intervening elements present. Other words used to describe the relationship between elements should be interpreted in a like fashion (e.g., "between" versus "directly between," "adjacent" versus "directly adjacent," etc.). However, the term "contact," as used herein refers to direct contact (i.e., touching) unless the context indicates otherwise.

Embodiments described herein will be described referring to plan views and/or cross-sectional views by way of ideal schematic views. Accordingly, the exemplary views may be modified depending on manufacturing technologies and/or materials. Therefore, the disclosed embodiments are not limited to those shown in the views, but include modifications in configuration formed on the basis of manufacturing processes and construction variations. Therefore, regions exemplified in figures may have schematic properties, and shapes of regions shown in figures may exemplify specific shapes of regions of elements to which aspects of the invention are not limited.

Spatially relative terms, such as "beneath," "below," "lower," "above," "upper" and the like, may be used herein for ease of description to describe one element's or feature's relationship to another element(s) or feature(s) as illustrated in the figures. It will be understood that the spatially relative terms are intended to encompass different orientations of the device in use or operation in addition to the orientation depicted in the figures. For example, if the device in the figures is turned over, elements described as "below" or "beneath" other elements or features would then be oriented "above" the other elements or features. Thus, the term "below" can encompass both an orientation of above and below. The device may be otherwise oriented (rotated 90 degrees or at other orientations) and the spatially relative descriptors used herein interpreted accordingly. However, with respect to a ground-mounted device, orientations such as "up" and "down" should be considered with respect to the ground.

Terms such as "same," "equal," "planar," or "coplanar," as used herein when referring to orientation, layout, location, shapes, sizes, amounts, or other measures do not necessarily mean an exactly identical orientation, layout, location, shape, size, amount, or other measure, but are intended to encompass nearly identical orientation, layout, location, shapes, sizes, amounts, or other measures within acceptable variations that do not substantially affect operation or usage of the components or devices being described and that may occur, for example, due to manufacturing processes. The term "substantially" may be used herein to reflect this meaning. Terms such as "approximately," or "about" may reflect measures or amounts that are nearly the same and within an amount of variation that does not substantially affect operation or usage of the components or devices being described.

Unless otherwise defined, all terms (including technical and scientific terms) used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this disclosure belongs. It will be further understood that terms, such as those defined in commonly used dictionaries, should be interpreted as having a meaning that is consistent with their meaning in the context of the relevant art and/or the present application, and will not be interpreted in an idealized or overly formal sense unless expressly so defined herein.

FIG. **1** illustrates an exemplary bird feeder **10** according to certain embodiments. As shown in FIG. **1**, bird feeder **10** includes a post **110**, a feeder **120**, and a shield **130**, also referred to as a lower shield. Bird feeder **10** may additionally include a shield **140**, also referred to as an upper shield. In certain instances, shields **130** and **140** may be referred to together as a shield (e.g., including a lower shield portion **130** and upper shield portion **140**). However, each of shields **130** and **140** may also be referred to individually as shields. These shields may also be referred to as baffles, or squirrel deterrent structures or ground animal deterrent structures.

In certain embodiments, post **110** has a linear shape, and is configured to be mounted on the ground. However, the post **110** need not have a linear shape, and can be curved or angled to some degree (e.g., to a degree that still makes it difficult for a squirrel to climb it). In one embodiment, a bottom of the post **110** may have a pointed shape in order to be driven into the ground and partly buried therein. However, other configurations for the bottom of post **110** are possible, that allow it to be mounted in or on the ground (e.g., a screw-type bottom, or other shapes that can be placed in a ditch and covered with earth). In certain embodiments, the post **110** for a ground-mounted birdfeeder may be configured for placement on a horizontal surface, such as a deck, patio, or roof. Thus, the term "ground-mounted" need

not refer to an earth-type ground, but can refer to other surfaces that can serve as a ground or floor on which land animals can walk.

Post **110** may have one of various different cross-sectional shapes. For example, it may be a square-shaped post, or a circular post. Post **110** may have a width, for example, in the range of about 1 inch wide to about 4 inches wide, and may have the same width throughout, or may have a slightly increasing or decreasing width.

In one embodiment, post **110** is made of a material that provides a smooth, hard surface that assists in preventing squirrels or other ground animals from climbing the post. For example, the material may prevent a squirrel from digging its claws into the post **110**. Post **110** may be formed to avoid including substantial protrusions capable of supporting a squirrel or other animal's foot as a stepping or gripping point. Post **110** may be made of metal or plastic, for example. In other examples, however, post **110** may be made of wood, and even if a squirrel can climb the post, as described in greater detail below, the squirrel will be thwarted from reaching the feeder **120** by the shield **130** and optional shield **140**.

Post **110** may include one or more mounting areas that allow components, such as a lower shield **120**, feeder **130**, and upper shield **140** to be mounted on and attached to the post **110**. These mounting areas will be described in greater detail below.

Feeder **120** may be one of many types of feeders capable of being mounted on post **110**, holding bird feed (hereinafter referred to as "food"), and providing a perch and a tray or other accessible component to allow birds access to the food. For example, feeder **120** may include a container **121** for filling with food, and or more trays **122**, which allow a small amount of the food to be accessed at one time by birds. The trays **122** may double as perches, or additional perches may be included. In one embodiment, the trays **122** are at a location near the bottom of the container **121** to allow the food in the container **121** to automatically dispense to the trays **122**. The feeder **120** may have different shapes, such as a typical "house" shape, a simple box shape, or a cylinder shape, for example. In certain embodiments, feeder **120** has radial symmetry. Also, though only two exemplary trays **122** are shown, additional trays may be included. Also, alternative or additional trays may be included at different vertical levels of the feeder **120**.

Feeder **120** may additionally include a door **123** for filling the container **121** with food. In one embodiment, the feeder **120** includes a base portion **124**. The base portion **124** may be mounted on the post **110**, for example using one of various mounting components. For example, in one embodiment, a mounting area of the post where the feeder is to be mounted may have a platform shape, such as shown in FIG. **2**A, and the feeder may be mounted on the platform **210** using, for example, screws **212**, or other fasteners. Thus, a mounting assembly, such as a platform **210** may be included as part of the post **110** of the bird feeder **10**. The mounting assembly may be separately attachable to the post **110**, for example, using screws, nails, glue, and/or other fasteners.

In another embodiment, a mounting area of the post where the feeder is to be mounted may be outfitted with a mounting assembly such as brackets **220**, such as shown in FIG. **2**B. These brackets **220** may be attached to the post **110**, for example using a fastener such as nails, screws, and/or glue. A base **124** of a feeder may then be mounted on the brackets **220**, and attached thereto using additional fasteners, such as screws **222**, or other fasteners. In an embodiment such as shown in FIG. **2**B, the post **110** may extend through the feeder (e.g. through the base **124** of the feeder **120** to pass through an inside of the feeder **120**). In certain embodiment, as described further below, the post **110** may extend to pass through a top of the feeder **120** as well, such that an upper shield (e.g., **140**) can be mounted on the post **110** above the feeder **120**.

FIG. **3**A illustrates a shield **130** for placing on a post of a bird feeder, according to certain exemplary embodiments. FIG. **3**B illustrates an overhead view of the shield **130**.

As shown in FIG. **3**A and with reference to FIGS. **1**, **2**A, and **2**B, the shield may be placed below the feeder **120**. Additional description of the placement of the shield will be described further below.

In one embodiment, the shield **130** includes a first, lower portion **130***a* and a second, upper portion **130***b*. The lower portion **130***a* may have first walls **131***a* that diverge from each other from bottom to top. For example, the first walls **131***a* may be closer to each other at the bottom of the lower portion **130***a* than at the top of the lower portion **130***a*. These walls may be described as having a negative slope. In one embodiment, the lower portion **130***a* includes four walls **131***a* that form a pyramid shape. However, other configurations may be used. For example, a pyramid shape with three walls may be used. Or more than four walls may be used. In certain embodiments, the lower portion **130***a* may have a cone shape, for example having a circular rather than angled cross section when viewed from above. Though such a configuration may have one continuously curved surface, it may still be referred to as including a plurality of walls, or side walls—for example four side walls where two are opposite each other in a first direction and the other two are opposite each other in a second direction. The walls may form one continuous structure (e.g., without angles).

The upper portion **130***b* may have second walls **131***b* that converge from each other from bottom to top. For example, the second walls **131***b* may be further from each other at the bottom of the upper portion **130***b* than at the top of the upper portion **130***b*. These walls may be described as having a positive slope. In one embodiment, the upper portion **130***b* includes four walls **131***b* that form a pyramid shape. However, other configurations may be used. For example, as described with respect to the lower portion **130***a*, a pyramid shape with three walls may be used. Or more than four walls may be used. In certain embodiments, the upper portion **130***b* may have a cone shape, for example having a circular rather than angled cross section when viewed from above. Though such a configuration may have one continuously curved surface, it may still be referred to as including a plurality of walls, or side walls—for example four side walls where two are opposite each other in a first direction and the other two are opposite each other in a second direction. The walls may form one continuous structure (e.g., without angles).

In certain embodiments, as shown in FIG. **3**A, the lower portion **130***a* may have an upside-down pyramid shape or upside-down cone shape, and the upper portion **130***b* may have a right-side up pyramid shape or right-side up cone shape. The shapes may be matching.

In certain embodiments, the lower portion **130***a* meets the upper portion **130***b* at an interface **132**. The size and shape of the first walls **131***a* at the interface **132** may be the same as the size and shape of the second walls **131***b* at the interface **132**. As such, in certain embodiments, the size and shape of the top of the lower portion **131***a* may match the size and shape of the bottom of the upper portion **131***b* at the interface **132** between the two.

As shown in FIG. **3**A, the first walls **131***a* and second walls **131***b* may each surround the post **110**. FIG. **3**B shows an exemplary overhead view of the upper portion **130***b* and upper walls **131***b* surrounding the post **110**. An underbelly view of the lower portion **130***a* may be similar.

In certain embodiments, shield **130** includes a base portion **133** at the interface that forms a base of the upper portion **130***b* and of the lower portion **130***a*. This base portion **133** may have a hole **134** formed therein, which surrounds the post **110**. The base portion **133** may thus provide additional support for the shield **130** and may assist in more strongly connecting the shield **130** to the post **110**.

In certain embodiments, walls **131***a* and **131***b* are formed of a hard, smooth material having a surface substantially incapable of being gripped by a squirrel. For example, the walls may be formed of metal (e.g., sheet metal), or hard plastic. As discussed in greater detail below, the walls may have a size and shape that, combined with the hardness and smoothness of the material, both prevents a squirrel from digging its claws into the walls, and prevents the squirrel from being able to wrap its arms around the shield to grip the shield using opposing force from its limbs. For example, where a pyramid structure is used, the slopes of the walls may be steep enough, and the angles where sides meet may be obtuse enough to prevent a squirrel from holding on to the shield. In addition, a length of the sides may be long enough so that a squirrel is incapable of reaching from a bottom to top of a shield portion, or from one edge of one wall to an opposite edge of the wall as the walls get further away from each other. Or, where a cone shape is used that has continuously curved walls, there may be no angled portions for a squirrel to gain any grip.

Shield **130** may include a separate upper portion **130***b* from the lower portion **130***a*, which may be connected together using, for example hinges, glue, and/or other connection devices. Similarly, where separate, flat walls are used for each portion of the shield **130**, the walls may be connected to each other using, for example hinges, glue, or other connection devices. In certain embodiments, any connection devices used have no external protrusions, to avoid any gripping points on the external edges or surfaces of the walls. In certain embodiments, however, each portion of shield **130**, or the entire shield **130**, may be formed of a single continuous material (e.g., the shield **130** may be molded). Also, though examples are given that show the slopes of the walls being linear, the slopes may be curved, such that the walls are curved and even avoid angles at the interface **132** where the upper portion **130***b* meets the lower portion **130***a*. In certain embodiments, the shield **130** may be placed on the post **110** by sliding the post **110** through an opening in the top and bottom of the shield **130**. In other embodiments, the shield **130** may be placed on the post by having an opening and closing mechanism (e.g., a hinge on one side and an internal clip on the other) that allows the shield **130** to be opened and then be closed around the post **110**.

Different exemplary dimensions, angles, and connection assemblies that may provide for optimal deterrence are discussed below in connection with FIGS. **4**A, **4**B, **5**A, and **5**B.

FIGS. **4**A and **4**B are exemplary views showing an exemplary coupling assembly for connecting a shield to a post of a bird feeder.

As shown in FIGS. **4**A and **4**B, shield **130** may include a coupling assembly **135** for attaching and securing the shield **130** to the post **110**. The coupling assembly **135** may have various forms configured to provide for a secure attaching of the shield **130** to the post **110**. For example, in one embodiment, coupling assembly **135** may include a screw or nut, one or more washers, optional bolts, and a matching threaded section or bushing in the post **110**. The matching threaded section or bushing may be included in a mounting area of the post **110**. Different mounting areas of the post **110** may be located at different heights—for example, a first height above the ground for the lower portion **130***a* and a second height above the first height for the upper portion **130***b*. In certain embodiments the coupling assembly **135** may have a plurality of duplicate components, one set of components for each of a plurality of sides of the shield **130**. Or only one set of components may be used. In addition, both a bottom of the lower portion **130***a* and a top of the upper portion **130***b* of shield **130** may include coupling assemblies **135**.

In one embodiment, a coupling assembly **135** is used that provides for minimal or no protrusions on the outside of the shield **130**. As such, coupling assemblies **135** may be provided such that, when assembled, a first area where a first coupling assembly connects to a first mounting area of the post **110**, and/or a second area where a second coupling assembly connects to a second mounting area of the post **110**, are free from protrusions large enough to be gripped by a squirrel. As one example, a bolt or screw may be used that is flush with the surface of the shield **130** at the outside surface of the shield **130**.

FIG. **5**A is a cross-sectional example of a shield such as shown in FIG. **2**A, including exemplary dimensions according to certain exemplary embodiments. FIG. **5**B is a cross-sectional example of a shield such as shown in FIG. **2**A, including exemplary dimensions according to certain exemplary embodiments.

Various tests have been undertaken using different lengths and angles for the walls to determine optimal lengths of the walls **131***a* and **131***b*, as well as optimal angles of the walls with respect to a horizontal and vertical axis. In particular, a shield has been developed that deters squirrels both from below (e.g., the ground) and from above of the side. As such, this allows the ground-mounted bird feeder **10** to be placed near objects such as trees, bushes, fences, decks, etc., which may provide squirrels with potential access to the feeder **120** from below, the side, or above.

For example, it has been found that a length of at least about 18 inches for the first walls **131***a* prevents squirrels from accessing the bird feeder from below. This length is approximately the maximum length of the reach from foot to outstretched hand of a squirrel, such as a gray squirrel. For example, in certain embodiments, a minimum distance in a straight line along the first walls **131***a* between the interface **132** and a first area at a first vertical height on the post **110** where the post **110** coincides with a bottom of the first lower portion **130***a* of the shield **130** is at least 18 inches. As such, a minimal distance between the first area and the interface along 132 the first walls **131***a* may be greater than a maximum reach distance of a squirrel.

It has further been found that an angle with respect to the post **110** of between about 30 degrees and about 45 degrees for the first walls **131***a* best prevented squirrels from reaching the feeder **120** from below. The combination of a sufficiently negative slope (e.g., 30-45 degrees), long enough distance (e.g., longer than the reaching distance of a squirrel), and smooth and hard material incapable of being gripped by a squirrel can make it impossible for a squirrel to either climb the shield itself or to jump off of the post in a manner that would allow the squirrel to reach a top of the shield. In particular, because of the negative slope and length

of the walls, a squirrel cannot even attempt to jump upward to reach the feeder, but rather can only jump at an angle away from the post, which ultimately results in the squirrel falling to the ground.

It has been found that a length of at least about 15 inches for the second walls **132***a* prevents squirrels from accessing the bird feeder from the side or above. A length of 18 inches—for example, approximately the maximum length of the reach from foot to outstretched hand of a squirrel—may be effective as well, but a length of 15 inches prevented nearly all squirrels from reaching the feeder **120** from the side or from above. For example, a minimum distance in a straight line along the second walls **131***b* between the interface **132** and a second area at a second vertical height on the post **110** where the post **110** coincides with a top of the first upper portion **130***b* of the shield **130** may be at least 15 inches, or in certain embodiments, at least 18 inches.

It has further been found that an angle with respect to the post **110** of between about 20 degrees and about 30 degrees for the second walls **131***b* best prevented squirrels from reaching the feeder **120** from the side or from above. For example, even if squirrels reached the shield **130** from the side or above, they were unable to hold onto the shield **130** or to reach the post **110** upon landing, particularly when a hard smooth surface was used and the second walls **131***b* were at least 15 inches in length and at an angle of between about 20 degrees and about 30 degrees with respect to the post **110**.

The combination of angle ranges described above, along with the lengths is especially useful in that, where straight side walls are used, it provides for a fairly obtuse angle at the interface **132** at which, without any other protrusions, a squirrel will typically be unable to hold on to the interface. For example, due to the reverse angle at which the squirrel is forced to orient itself, combined with the distance between the post **110** at the bottom of the lower portion **131***a* and the interface **132**, the hard, smooth surface of the walls **131***a* and **131***b*, and the obtuse angle at the interface **132**, it is nearly impossible for a squirrel to reach the feeder from below. In some cases, because of this obtuse angle, side walls for the lower portion **131***a* may be slightly shorter than a squirrel's reach, and squirrels will still be prevented from getting past the lower shield **130**. In addition, due to the fairly steep angle of 60-70 degrees (with respect to the horizontal) of the top walls and the smooth and hard surfaces, again combined with the obtuse angle of the interface **132**, it is nearly impossible for a squirrel to hold on to the upper portion **131***b* even if it lands squarely on that portion from the side or above. As such, the squirrel will fall off of the shield onto the ground after attempting to climb toward the feeder **120**.

In certain embodiments, to even better protect the feeder **120** from squirrel attacks, a supplemental shield may be used at a top of the feeder **120**, that further prevents access to the feeder **120** from the side and from above. Such a shield may be formed as part of a roof of feeder **120**, or as an extension of a roof of feeder **120**, or may be separately formed. Examples of such a shield are depicted in FIGS. **6**A-**6**C. It should be noted that FIGS. **6**A-**6**C show only certain components of bird feeder **10**, and other components such as described in the various other figures may be omitted from the drawing of FIGS. **6**A-**6**C.

As shown in FIG. **6**A, a feeder **120** may be mounted on a post **110** in a manner such as shown in FIG. **2**A, for example, using a platform **210**. The feeder **120** may include, either as part of its roof, or as an extension of the roof or as a separate piece that can be placed on the roof and attached thereto (e.g., using a cap), a shield **140***a*. Shield **140***a*, which may be referred to as an additional shield, a second shield, or an upper or upper-mounted shield, may be formed, for example, of a hard, smooth material such as metal or plastic, similar to the types of material that can be used to form the first shield **140** described in connection with the figures discussed above, also referred to as a lower or lower-mounted shield.

FIG. **6**B illustrates a similarly structured feeder **120** and shield **140***b*, but with different angles and dimensions. For example, in certain embodiments, as depicted in FIG. **6**A, a distance in a horizontal direction between an outer edge of a perch or feed tray **122***a* of feeder **120***a* and a bottom edge of shield **140***a* is at least about 12 inches, and an angle between a side wall of the shield **140***a* and a line parallel to the post **110** is about 45 degrees. In other embodiments, such as depicted in FIG. **6**B, if shield **140***b* only partly vertically covers the feeder **120***b*, a distance in a horizontal direction between an outer edge of feed tray **122***b* or a side of feeder **120***b*, and a bottom edge of shield **140***b* is at least about 3 inches (e.g., between about 3 inches and about 5 inches), and an angle between a side wall of the shield **140***b* and a line parallel to the post **110** is between about 20 and about 30 degrees (30 degrees is given as an example in FIG. **6**B). As such, in certain embodiments, a less steep slope and longer walls maybe used, and in other embodiments, a steeper slope and shorter walls may be used (e.g., slopes may vary between about 20 and 45 degrees, and wall lengths that permit between about 3 inches and about 12 inches between an edge of the shield **140** and an outside of the feeder **120** or feed tray **122** may be used). Aspects of the embodiments of FIGS. **6**A and **6**B may be combined. For example, for any angle used, the edges of the shield may extend to overhang below the bottom portion of the feeder **120**, or may extend to only partly vertically overlap with the feeder. In certain embodiments, the edge of the shield **140** extends vertically at least to be at a same vertical level as a bottom of the feeder. However, one optimal configuration determined based on significant experimentation is a 20-30 degree slope combined with at least about 3 inches of space between a bottom edge of the shield **140** and an outside of the feeder **120** or feed tray **122**, where the shield **140** extends only partly along the feeder **120** in a vertical direction (e.g., the edge of shield **140** is above a bottom of the feeder **120**). Such a configuration, as tested, had the effect of preventing squirrels from even attempting to jump to the feeder from an adjacent tree, while allowing birds at the feeder to be visible below a bottom of the shield **140** as they feed from the feeder **120**.

To avoid duplicative explanation, it should be noted that shields **140***a* and/or **140***b* can be constructed using similar materials and to have a similar structure as the upper portion **130***a* of shield **130** discussed previously (e.g., metal or plastic; pyramidal or cone shape; straight or curved sides; etc.).

FIG. **6**C illustrates a different embodiment, wherein the upper-mounted shield **140***c* is separately formed from the feeder **120** and attaches to the post **110**. In this embodiment, the feeder **120** may be mounted on a post **110** in a manner such as described above in connection with FIG. **2**B, and the post may pass entirely through feeder **120**. In this example, the upper-mounted shield **140***c* is attached directly to the post **110**. For example, it may be connected using a cap **141**, which may couple to a coupling assembly on the post **110**, such as a bolt and a threaded cap. In one embodiment, the cap can be both securely fastened and easily removed, in order to allow easy filling of the feeder, for example from a door **123***c*. Other construction, structure, and dimensions

and angles with respect to the feeder **120** may be the same or similar to those discussed above in connection with FIGS. **6**A and **6**B.

As discussed above, though some examples for the upper-mounted shield **140** depict the lower edge of the shield **140** extending vertically near or beyond a bottom of the feeder **120**, for example, where a feeding tray **122** may be located, these lower edges may be at a height above the bottom of the feeder **120**, as depicted in FIG. **6**B for example, to allow easier viewing of the birds feeding at the feeder **120**. As such, in some embodiments, the upper-mounted shield **140** overhangs part of feeder **120** to still add distance between a meddling squirrel and grippable portions of the feeder **120** in order to prevent the squirrel from reaching the feeder **120**. For example, a steep angle such as 30 degrees with respect to the vertical can be used in this case. Therefore, even though the shield **140** may not overhang below a bottom of the feeder **120**, it still may prevent squirrels from accessing the feeder from above or from a side jump.

In certain embodiments, such as depicted in FIG. **7**, the lower shield **130**, when combined with an upper shield **140**, may only include a first portion, such as the lower portion **130***a* depicted in FIG. **3**A. In such an embodiment, the upper shield **140** may be configured to prevent squirrels from reaching feeder **120** from above and from certain side locations. In addition, the lower shield **130** may include a portion having first walls **131***a* that diverge from each other from bottom to top, wherein a minimal distance between the bottom of the first walls and a top of the first walls is greater than a maximum reach distance of a squirrel (e.g., 18 inches). This may prevent squirrels from reaching the feeder **120** from below. The upper shield **140** may have second walls **142** that converge toward each other from bottom to top, and overhang at least a portion of the feeder **120** to prevent squirrels from reaching the feeder from above the feeder or from the same height as the feeder **120**. In certain embodiments, from a top-down view, the area covered by the second walls **142** at the bottom of the upper shield **140** surrounds the area of the first walls **131***a* at a top of the lower shield **130***a*.

If the lower shield **130** is placed at a distance close enough to the feeder **120**, then with such an arrangement, squirrels will be prevented from landing on a top of the lower shield **130**. Example arcs a**1** and a**2** are shown for unsuccessful attempts by squirrels to reach feeder **120** from an object such as a fence F or from the ground G. In some embodiments, the top of the lower shield **130** may abut the base of the feeder **120**. In other embodiments, the top of the lower shield **130** may be a certain distance below the base of the feeder **120** with squirrels still being prevented from landing on a top of the lower shield **130**. For example, in certain embodiments, the lower shield **130** may be placed at a distance so that an imaginary line i extending along one of the walls **130***a* intersects a portion of the upper shield **140**. The lower shield **130** may have a top surface, such as **133***a* shown in FIG. **3**A. In some embodiments, the surface may be substantially flat, but in other embodiments, the surface maybe rounded to have a curved shape.

Based on the various embodiments described above, the upper-mounted shield (e.g., **140**) and lower-mounted shield (e.g., **130**) may form a shield structure (also referred to together as a shield), that prevents squirrels from accessing a feeder (e.g., **120**) of a bird feeder (e.g., **10**). For example, the combined shield has been shown to be highly effective at preventing squirrels from accessing a feeder such as **120** from any direction (e.g., from the ground, from the side, or from above) even if the bird feeder **10** is placed in close proximity to a tree, fence, or other such structure. Particularly when an upper shield **140** has an angle between about 20 and 30 degrees with respect to the vertical and extends at least 3 inches horizontally from an outermost portion of feeder **120**, and the lower portion **130***a* of a lower shield **130** has an angle of between about 30 degrees and about 45 degrees with respect to the vertical and has a length greater than the reach of a squirrel, it has been observed that squirrels do not even attempt to jump onto or climb the bird feeder.

Turning back to FIG. **1**, the distances between the feeder **120**, shield **130**, and ground may vary. For example, in certain embodiments, a bottom of the shield **130** is at least a squirrel's-length distance from the ground, so that a squirrel cannot gain any traction from the ground in an attempt to jump up toward the shield **130**. The feeder **120** including a shield **140***a*, **140***b*, or **140***c* may be placed a particular distance above the shield **130**, such that in one embodiment, given the arc of a squirrel's jump from an adjacent object such as a tree or other vertical structure, there would be no entry point to the feeder **120** without being blocked by the shields. Exemplary ranges depicted in FIG. **1** can be, for example, 1-2 feet for the portion d**1** of the post **110** below the shield **130**, 2-3 feet for the portion d**2** of the post **110** covered by the shield **130**, and 1-2 feet for the portion d**3** between the top of the shield **130** and a bottom of the feeder **120**. But other distances may be used that accomplish the various goals and advantages of the embodiments disclosed above.

Certain components of the bird feeder **10** described herein may be assembled by an end user, or may be pre-fabricated. For example, a bird feeder assembly may include one or more of the components **110**, **120**, **130**, **140**, and/or the subcomponents thereof, which may be formed into the assembled bird feeder either before or after being obtained by an end user.

The above description is only used for illustrating various embodiments of the present invention rather than limiting the present invention. Although the present disclosure has been described in detail with reference to the embodiments, those skilled in the art would understand that, without departing from the spirit and scope of the present disclosure, various combinations, alterations or substitutions can be made, which should be understood as included in the protective scope of the claims.

What is claimed is:

1. A ground-mounted bird feeder comprising:

a post;

a feeder mounted on the post; and

a shield attached to the post and mounted below the feeder, wherein the shield comprises:

a first, lower portion having first walls that diverge from each other from bottom to top;

a second, upper portion having second walls that converge toward each other from bottom to top; and

an interface where the first lower portion of the shield meets the second upper portion of the shield,

wherein a size and shape of the first walls at the interface is the same as the size and shape of the second walls at the interface.

2. The bird feeder of claim **1**, wherein:

the first and second walls of the shield are formed of a hard, smooth material having a surface incapable of being gripped by a squirrel.

3. The bird feeder of claim **2**, wherein:

the first and second walls are formed of sheets of metal or plastic.

4. The bird feeder of claim 3, wherein:
the first walls form an upside-down pyramid shape, and the second walls form a right-side-up pyramid shape.
5. The bird feeder of claim 4, further comprising:
a base portion at the interface that forms a base of the upside-down pyramid shape and/or a base of the right side up pyramid.
6. The bird feeder of claim 1, wherein:
the first walls have an angle with respect to the post of between 30 and 45 degrees.
7. The bird feeder of claim 6, wherein:
the second walls have an angle with respect to the post of between 20 and 30 degrees.
8. The bird feeder of claim 1, further comprising:
a first area at a first vertical height on the post where the post coincides with a bottom of the first lower portion of the shield,
wherein a minimal distance between the first area and the interface along the first walls is greater than a maximum reach distance of a squirrel.
9. The bird feeder of claim 8, wherein a minimum distance in a straight line along the first walls between the first area and the interface is at least 18 inches.
10. The bird feeder of claim 8, further comprising:
a second area at a second vertical height on the post above the first area and where the post coincides with a top of the second upper portion of the shield, wherein both the first area and second area are free from protrusions large enough to be gripped by a squirrel.
11. The bird feeder of claim 10, wherein a minimum distance in a straight line along the second walls between the interface and the second contact area is at least 15 inches.
12. The bird feeder of claim 1, wherein the feeder includes:
a base attached to the post at a location above the shield;
a container for holding bird food;
a feed tray receiving bird food from the container and from which birds can access the bird food.
13. The bird feeder of claim 12, further comprising:
an additional shield above the feeder, the additional shield having third walls that converge toward each other from bottom to top, and overhanging at least a portion of the feeder to prevent squirrels from reaching the feeder from above the feeder or from the same height as the feeder.
14. A ground-mounted bird feeder assembly comprising:
a post;
a feeder for mounting on the post; and
a shield for attaching to the post and mounting below the feeder, wherein the shield comprises:
a first, lower portion having pyramid shape or cone shape; and
a second, upper portion having a pyramid shape or a cone shape,
wherein when the first lower portion and the second upper portion are placed together to form an interface, the first lower portion forms an upside-down pyramid or cone shape, the second upper portion forms a right-side up pyramid or cone shape, and the shape and size of the top of the first lower portion matches the shape and size of the bottom of the second upper portion.
15. The bird feeder of claim 14:
wherein side walls of each of the first lower portion and the second upper portion are formed of a hard, smooth material, and when placed on the post, the side walls of the first lower portion have an angle with respect to the post of between 30 and 45 degrees.
16. The bird feeder of claim 14, further comprising:
a first mounting area at a first vertical height on the post for connecting a bottom of the first lower portion of the shield to the post; and
a first coupling assembly at the bottom of the first lower portion of the shield for connecting to the first mounting area,
wherein a minimal distance between the first coupling assembly and a top of the first lower portion of the shield is greater than a maximum reach distance of a squirrel.
17. The bird feeder of claim 16, further comprising:
a second mounting area at a second vertical height on the post above the first vertical height and for connecting a top of the second upper portion of the shield to the post; and
a second coupling assembly at the top of the second upper portion of the shield for connecting to the second mounting area,
wherein when assembled, both a first area where the first coupling assembly connects to the first mounting area, and a second area where the second coupling assembly connects to the second mounting area are free from protrusions large enough to be gripped by a squirrel.
18. The bird feeder of claim 16, further comprising:
an additional shield above the feeder, the additional shield formed of a hard smooth material and overhanging at least a portion of the feeder.
19. The bird feeder of claim 18, wherein the combination of the shield and the additional shield prevents squirrels from accessing the feeder from above, beside, or below the feeder.
20. A shield for mounting on a post below a feeder of a ground mounted bird feeder, the shield comprising:
a first, lower portion having first walls that diverge from each other from bottom to top;
a second, upper portion having second walls that converge toward each other from bottom to top;
an interface where the first lower portion of the shield meets the second upper portion of the shield; and
at least a first coupling assembly for attaching the shield to a bird feeder post,
wherein the first walls and second walls each are formed to surround a bird feeder post and are formed of a hard, smooth material whose surface prevents squirrels from gripping the walls.
21. A ground-mounted bird feeder comprising:
a post;
a feeder mounted on the post; and
a shield attached to the post, the shield including a lower shield below the feeder and an upper shield at least partly above the feeder, wherein:
the lower shield includes a first portion having first walls that diverge from each other from bottom to top, wherein a bottom of the first walls connect to the post at a first vertical height on the post, and a minimal distance between the bottom of the first walls and a top of the first walls is greater than a maximum reach distance of a squirrel, and
the upper shield has second walls that converge toward each other from bottom to top, and overhang at least a portion of the feeder to prevent squirrels from reaching the feeder from above the feeder or from the same height as the feeder,
wherein from a top-down view, the area covered by the second walls at the bottom of the upper shield sur-

rounds the area of the first walls at a top of the first portion of the lower shield.

22. The ground-mounted bird feeder of claim **21**, wherein the lower shield further includes:

a second portion having third walls that converge toward each other from bottom to top; and

an interface where the first portion of the lower shield meets the second portion of the lower shield,

wherein a size and shape of the first walls at the interface is the same as the size and shape of the third walls at the interface.

23. The ground-mounted bird feeder of claim **22**, wherein the first walls, second walls, and third walls are made of a hard, smooth material whose surface prevents squirrels from gripping the walls.

24. The ground-mounted bird feeder of claim **21**, wherein the first walls have an angle with respect to the post of between 30 and 45 degrees, and the second walls have an angle with respect to the post of between about 20 and 30 degrees.

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