TRANSACTION CARD WITH PARTIAL GLASS LAYER

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims priority to U.S. Provisional Application Ser. No. 63/107,698, filed October 30, 2020, titled TRANSACTION CARD WITH PARTIAL GLASS LAYER, incorporated herein by reference.

BACKGROUND OF THE INVENTION

Credit card issuers continue to seek transaction cards comprising materials that having a desirable weight and appearance, with optimal performance. In recent years various types of conformable or high-strength glass have been developed that have strong break and scratch resistance, and add weight and a modern appearance to a card. However, glass members may still be somewhat weaker or prone to damage than other types of materials, and thus the field is in need of constructions that minimize the risk of damage, optimize functionality, and maximize the overall look and feel of the card.

SUMMARY OF THE INVENTION

One aspect of the invention is defined in the independent claim. Some optional features of the invention are defined in the dependent claims.

An exemplary arrangement includes a transaction card having lateral dimensions that define an outer periphery and an area. The transaction card has a partial glass layer including an interior glass member connected to a non-glass frame. The glass member may be conformable glass. The frame defines opposite planar surfaces and has a frame outer periphery coextensive with the outer periphery of the card, and a frame inner periphery spaced radially inward from the frame outer periphery. The frame inner periphery defines an interior area occupied by the glass member. The transaction card further includes at least one additional layer having a periphery coextensive with the periphery of the card, and a payment module configured for contactless operation or dual interface contact/contactless operation.

The additional layer may include a pair of opposite capping layers, such as formed of: polymeric materials, ceramic, or glass, wherein the partial glass layer is disposed between the pair of opposite capping layers. The additional layer may have printed information or graphics.

In some embodiments, the frame defines a first width between the frame outer periphery and the frame inner periphery for at least a first portion of the frame, and a tab defining a second width greater than the first width for at least a second portion of the frame, wherein the payment module is embedded in the tab.

In some embodiments, the glass member may have a first thickness, with the frame having a second thickness greater than the first thickness. In such embodiments, the may further have a layer of adhesive in a region bordered by the glass member, the frame, and the at least one additional layer of the transaction card.

non-stepped refers to a geometry that does not include a step, but may have a geometry other than straight.

In other embodiments, such as in cards 600 and 601 depicted in FIG. 6A and 6B, and particularly useful for embodiments with a metal frame, the inner periphery of the frame 606 defines a stepped edge 609 between the top planar surface 607 and the bottom planar surface 608 of the frame. The stepped edge 609 defines a ledge 650 or overhang 651 intermediate the top planar surface and the bottom planar surface of the frame, which ledge or overhang interfaces with a surface of the glass member 604. As depicted in FIGS. 6A and 6B, ledge 650 or overhang 651 defines a planar surface facing the glass layer parallel to the top planar surface and the bottom planar surface of the frame, but the ledge is not limited to such a construction, and the glass layer may be contoured to mate with a contoured surface of the ledge or overhang. As depicted in FIGS. 6A and 6B, glass member 604 has a first thickness T1 in the Z direction and the frame 606 has a second thickness T2 greater than the first thickness, and ledge 650 or overhand 651 have a thickness T3 equal to the difference (T2-T1) between the first thickness and the second thickness. Volume 605 may comprise an unfilled volume, or may be filled, such with an adhesive or other type of flowable or curable filler, such as a transparent or translucent filler, or may comprise a pre-formed layer, such as another layer of glass or a non-glass transparent material. The materials of volume 605 may comprise any other material known in the art.

Although the invention is illustrated and described herein with reference to specific embodiments, the invention is not intended to be limited to the details shown. Rather, various modifications may be made in the details within the scope and range of equivalents of the claims and without departing from the invention.

What is Claimed:

1. A transaction card, the transaction card having lateral dimensions that define an outer periphery and an area, the transaction card comprising:

a partial glass layer comprising an interior glass member connected to a non-glass frame, the frame defining opposite planar surfaces, a frame outer periphery coextensive with the outer periphery of the card, and a frame inner periphery spaced radially inward from the frame outer periphery, the frame inner periphery defining an interior area occupied by the glass member;

at least one additional layer having a periphery coextensive with the periphery of the card; and

a payment module configured for contactless operation or dual interface contact/contactless operation,

wherein the outer periphery of the transaction card is defined by a plurality of straight edges and corner regions, wherein the frame defines a plurality of frame widths between the frame outer periphery and the frame inner periphery along the respective plurality of straight edges, including a first frame width between the frame outer periphery and the frame inner periphery along a first edge that defines a card length, a second frame width between the frame outer periphery and the frame inner periphery along a second edge that defines a card width perpendicular to the card length, a third frame width between the frame outer periphery and the frame inner periphery along a third edge parallel to and opposite the first edge, and a fourth frame width between the frame outer periphery and the frame inner periphery along a fourth edge parallel to and opposite the second edge, wherein at least one of the plurality of frame widths is uniform along an entirety of the respective straight edge.

2. The transaction card of claim 1, wherein the glass member comprises conformable glass.

3. The transaction card of claim 1, wherein the at least one additional layer comprises a pair of opposite capping layers, wherein the partial glass layer is disposed between the pair of opposite capping layers.

4. The transaction card of claim 3, wherein the opposite capping layers comprise materials selected from the group consisting of: polymeric materials, ceramic, and glass.

5. The transaction card of any one of the foregoing claims, wherein the at least one additional layer comprises printed information or graphics.

6. The transaction card of any one of the foregoing claims, wherein the glass member has a first thickness and the frame has a second thickness greater than the first thickness.

7. The transaction card of claim 6, further comprising a layer of adhesive in a region bordered by the glass member, the frame, and the at least one additional layer of the transaction card.

8. The transaction card of any one of the foregoing claims, wherein the frame comprises metal.

9. The transaction card of claim 8, wherein the metal of the frame includes at least one discontinuity defining a gap extending from the outer periphery of the frame to the inner periphery of the frame.

10. The transaction card of claim 9, comprising a non-metal filler disposed within the gap defined by the discontinuity.

11. The transaction card of claims 9 or 10, wherein the metal frame having the at least one discontinuity comprises a booster antenna physically or inductively coupled to the payment module.

12. The transaction card of claim 8, wherein the at least one additional layer comprises a booster antenna layer comprising a booster antenna physically or inductively connected to the payment module.

13. The transaction card of claim 12, wherein the at least one additional layer further comprises at least a non-metal base layer and one or more printed layers.

14. The transaction card of claims 12 or 13, further comprising a non-RF-impeding layer between the booster antenna and the metal frame.

15. The transaction card of any one of claims 8-14, wherein the glass member has a first thickness and the frame has a second thickness greater than the first thickness, wherein the partial glass layer constitutes an outermost layer of the transaction card, and the frame defines a greater elevation on the surface of the card relative to the at least one additional layer than an elevation defined by the glass member.

16. The transaction card of claim 1, wherein the frame comprises a non-metal material.

17. The transaction card of claim 16, wherein the non-metal material comprises a material selected from the group consisting of: epoxy, FR4 ceramic, carbon fiber, and a plant-based material.

18. The transaction card of claims 16 or 17, further comprising a booster antenna physically or inductively coupled to the payment module, wherein the

frame comprises at least one groove, and the booster antenna comprises a winding disposed within the at least one groove.

19. The transaction card of claim 16, wherein the frame defines an outer peripheral edge, a top surface, and a bottom surface, and the at least one groove is disposed on the top surface, the bottom surface, or a combination thereof, and radially inset from the outer peripheral edge.

20. The transaction card of claims 18 or 19, further comprising a filler disposed over the booster antenna in the groove.

21. The transaction card of any one of the foregoing claims, wherein the inner periphery of the frame defines a non-stepped edge between the top planar surface and the bottom planar surface of the frame.

22. The transaction card of claim 21, wherein the non-stepped edge comprises a straight edge perpendicular to the top planar surface and the bottom planar surface.

23. The transaction card of claim 21, wherein the glass member defines a non-stepped outer peripheral edge aligned with and adhesively connected to the non-stepped edge defined by the inner periphery of the frame.

24. The transaction card of any one of claims 1-20, wherein the inner periphery of the frame defines a stepped edge between the top planar surface and the bottom planar surface of the frame, the stepped edge defining a ledge intermediate the top planar surface and the bottom planar surface of the frame, wherein a surface of the glass member is supported by the ledge.

25. The transaction card of claim 24, wherein the ledge defines a planar surface parallel to the top planar surface and the bottom planar surface of the frame.

26. The transaction card of claim 25, wherein the glass member has a first thickness and the frame has a second thickness greater than the first thickness.

27. The transaction card of claim 26, wherein the ledge has a thickness equal to a difference between the first thickness and the second thickness.

28. The transaction card of any one of claims 24-27, wherein the ledge defined by the frame is disposed between the glass member and the at least one additional layer having the periphery coextensive with the periphery of the card.

29. The transaction card of claim 28, further comprising an intermediate layer having a periphery defined by an inner periphery of the ledge disposed between the glass member and the at least one additional layer having the periphery coextensive with the periphery of the card.

30. The transaction card of claim 29, wherein the intermediate layer comprises an adhesive layer.

31. The transaction card of claim 29, wherein the intermediate layer comprises a transparent layer.

32. The transaction card of claim 31, wherein the intermediate layer comprises glass.

33. The transaction card of any one of claims 24-27, wherein the glass member is disposed between the at least one additional layer and the ledge defined by the frame.

34. The transaction card of claim 33, wherein the partial glass layer constitutes an outermost layer of the transaction card.

35. The transaction card of claim 33, wherein the partial glass layer has an outer protective layer adhered thereto that constitutes an outermost layer of the transaction card.

36. The transaction card of claim 33, wherein the frame consists of a metal material.

37. The transaction card of any of claims 1-33, further comprising at least one protective layer over the partial glass layer.

38. The transaction card of claim 1, wherein at least one of the plurality of frame widths is uniform along an entirety of the respective straight edge except in at least one tab portion that has a greater width between the frame outer periphery and the frame inner periphery than in a remainder of the entirety of the respective straight edge.

39. The transaction card of claim 38, comprising one or more electronic components disposed in the at least one tab portion.

40. The transaction card of claim 39, wherein the at least one tab portion consists of a singular tab portion on one edge and the one or more electronic components consists of a payment module.

41. The transaction card of claim 38, wherein the plurality of frame widths comprise a plurality of tab portions and the one or more electronic components are selected from the group consisting of: a payment module, a display screen, and a biometric sensor.

42. The transaction card of claim 1, wherein at least one of the frame widths has a variable width along the respective straight edge.

43. The transaction card of claim 1, wherein the card length is greater than the card width.

44. The transaction card of claim 43, wherein the corner regions are rounded and have a radius.

45. The transaction card of claim 44, wherein each of the plurality of frame widths has a respective uniform width along an entirety of the respective straight edge except in an optional tab portion that has a greater width between the frame outer periphery and the frame inner periphery than in a remainder of the entirety of the respective straight edge.

46. The transaction card of claims 45, wherein the respective uniform width of at least one of the plurality of frame widths is different than the respective uniform width of at least another of the plurality of frame widths.

47. The transaction card of claim 45, wherein the respective uniform width of the first frame width and the respective uniform width of the third frame width are equal, and the respective uniform width of the second frame width and the respective uniform width of the fourth frame width are equal.

48. The transaction card of claim 45, wherein the respective uniform width of the first frame width, the respective uniform width of the second frame width, the respective uniform width of the third frame width, and the respective uniform width of the fourth frame width are equal.