[0028] **Figure 10** shows a two-dimensional view of the typical metal cover **100B**, which is part of the typical metal profile and metal cover **100.**

[0029] **Figure 11** shows a two-dimensional view of the typical metal profile and metal cover **100**.

[0030] **Figure 12** shows a two-dimensional view of the mono core wires **101** with both Hooked Ends **104** in horizontal & vertical directions.

[0031] **Figure 13** shows a two-dimensional view of the typical metal lock screw, which is part of the typical metal lock nut/screw and lock washer **105.**

[0032] **Figure 14** shows a two-dimensional view of the typical metal lock nut, which is part of the typical metal lock nut/screw and metal lock washer **105.**

[0033] **Figure 15** shows a two-dimensional view of the typical metal lock washer, which is part of the typical metal lock nut/screw and metal lock washer **105.**

[0034] **Figure 16** shows a two-dimensional view of the typical metal profile with the track slide **103**.

[0035] **Figure 17** shows a two-dimensional view of the typical hollow metal bar **102** for the movable sliding, openable casement & bi-fold frame Diamond Grille System A & B.

[0036] **Figure 18** shows a two-dimensional view of the typical frame bar **106** for the movable sliding Diamond Grille System A & B.

[0037] **Figure 19** shows a two-dimensional view of the typical folding window hinge **108** for the openable casement & bi-fold frame Diamond Grille System A & B.

[0038] **Figure 20** shows a two-dimensional view of the typical bi-fold frame bar **110** for the openable bi-fold frame Diamond Grille System A & B.

DETAIED DESCRIPTION OF THE INVENTION

[0039] The preferred embodiments of the present invention relate to an improvement of the window grille system in the market. This invention is not only for use in residential building, but also for use in business and commercial environments.

[0040] The Diamond Grille System uses mono core wires **101**. Due to its small outer diameter, it provides a clearer view of the outside environment as compared to the traditional metal window grilles.

[0041] The mono core wires **101**, unlike the Invisible Grille in the market, do not require any plastic membrane to protect the wires from environmental corrosion nor to prevent wire splitters from injuring the consumers.

[0042] The mono core wires **101** have a smooth surface finish and is made from corrosion-resistant alloy that prevent it from rusting even in severe corrosive environment. The mono core wires **101** in the Diamond Grille System do not have any membrane protection, and it will not catch fire. Unlike the Invisible Grille in the market, the mono core wires **101** in the Diamond Grille System cannot be cut by any kitchen scissors, garden scissors, handheld sized wire cutters, thus enhancing the safety features from the outside environment.

[0043] The configuration of the mono core wires **101** provide an independent fail safe system. In the event if a mono core wire **101** is loose or even breaks, unlike the invisible grille system, it will not affect the rest of the mono core wires **101.**

[0044] The Hooked Ends **104** construction on both the end of the mono core wires **101**, this special construction act as a redundancy failure prevention system in case the metal lock nut(s)/screw(s) and metal lock washer(s) **105** are loosened due to thermal expansion or vibration. The Hooked Ends **104** will be hooked onto the metal lock nut(s)/screw(s) and metal lock washer(s) **105,** prevent the mono core wires **101** from falling off entirely**.**

Assembly Process

[0045] The Diamond Grille System can be either a fixed or movable system, and includes of either a fixed grille frame as shown in **Figure 1** and **Figure 2**, a movable sliding grille frame in **Figure 3** and **Figure 4**, openable casement grille frame in **Figure 5** and **Figure 6**, and openable bi-fold frame **Figure 7** and **Figure 8.**

[0046] In **Figure 1,** this is the fixed vertical frame Diamond Grille System. Two sides of the metal profile and metal cover **100** are fixed onto the walls or vertical supports of the required barrier location. Holes are drilled into both walls or vertical supports and metal profile **100A**, which will be secured together by conventional metal screws and wall plugs. The length of the metal profile and metal cover **100B** will be customised accordingly to the area of barrier, and multiple lengths of the metal profile and metal cover **100** may be added onto to cover the area of barrier.

[0047] In **Figure 1,** during assembly of the product, x numbers of the mono core wires **101** are installed across the fixed grille frame shown in **Figure 1.** The distance between each mono core wires **101** will ranges, depending on the End User's requirements. X numbers of holes are made onto the metal profile **100A**, running parallel to each hole.

[0048] In **Figure 1,** both ends of the mono core wires **101** are bent into a hooked shape. Both ends of the Hooked Ends **104** on the mono core wires **101** will be clamped with metal lock nut(s)/screw(s) and metal lock washer(s) **105**, the metal lock nut(s)/screw(s) and metal lock washer(s) **105** will be secured onto the metal profile **100A**.

[0049] In **Figure 1,** after the installation of all the required mono core wires **101** onto the metal profile **100A,** the same length of metal covers **100B** are installed onto the metal profile **100A.** The metal covers **100B** will prevent public access to the metal lock nut(s)/screw(s) and metal lock washer(s) **105**.

[0050] In **Figure 2,** this is the fixed horizontal frame Diamond Grille System. Two sides of the metal profile and metal cover **100** are fixed onto the ceiling, floor or horizontal supports of the required barrier location. Holes are drilled into the ceiling, floor or horizontal supports

and metal profile **100A**, which will be secured together by conventional stainless screws and wall plugs. The length of the metal profile and metal cover **100B** will be customised accordingly to the area of barrier, and multiple lengths of the metal profile and metal cover **100** may be added onto to cover the area of barrier.

[0051] In **Figure 2,** during assembly of the product, x numbers of the mono core wires **101** are installed across the fixed grille frame shown in **Figure 2.** The distance between each mono core wires **101** will ranges, depending on the End User's requirements. X numbers of holes are made onto the metal profile **100A**, running parallel to each hole.

[0052] In **Figure 2,** both ends of the mono core wires **101** are bent into a hooked shape. Both ends of the Hooked Ends **104** on the mono core wires **101** will be clamped with metal lock nut(s)/screw(s) and metal lock washer(s) **105**, the metal lock nut(s)/screw(s) and metal lock washer(s) **105** will be secured onto the metal profile **100A**.

[0053] In **Figure 2,** after the installation of all the required mono core wires **101** onto the metal profile **100A,** the same length of metal covers **100B** are installed onto the metal profile **100A.** The metal covers **100B** will prevent public access to the metal lock nut(s)/screw(s) and metal lock washer(s) **105**.

[0054] In **Figure 3,** the movable sliding Diamond Grille System A, in which the mono core wires **101** are positioned in horizontal direction. The movable sliding Diamond Grille System A can be open by sliding the grilles apart. The metal profile with the track slide **103** sit onto the frame bar **106** to achieve sliding motion.

[0055] In **Figure 3,** the length and height of the frame bar **106** will be customised accordingly to the area of the barrier, and number of grille frames will be calculated accordingly to cover the area of the barrier. The grille frames will be lockable using the window grille lock **107**. Location of the window grille lock **107** can be customised accordingly to the End User's preference.

[0056] In **Figure 3,** during assembly of the product, the metal profile with the track slides **103** are fixed up onto the hollow metal bars **102** to form the frame. The metal profiles **100A** are secured on the hollow metal bars **102**

[0057] In **Figure 3,** x numbers of the mono core wires **101** are installed across the grille frame shown in **Figure 3.** The distance between each mono core wires **101** will ranges, depending on the End User's requirements. X numbers of holes are made onto the metal profile **100A**, running parallel to each hole.

[0058] In **Figure 3,** both ends of the mono core wires **101** are bent into a hooked shape. Both ends of the Hooked Ends **104** on the mono core wires **101** will be clamped with metal lock nut(s)/screw(s) and metal lock washer(s) **105**, the metal lock nut(s)/screw(s) and metal lock washer(s) **105** will be secured onto the metal profile **100A**.

[0059] In **Figure 3,** after the installation of all the required mono core wires **101** onto the metal profile **100A,** the same length of metal covers **100B** are installed onto the metal profile **100A.** The metal covers **100B** will prevent public access to the metal lock nut(s)/screw(s) and metal lock washer(s) **105**.

[0060] In **Figure 3,** the movable sliding Diamond Grille System A will be secured onto the area of barrier required.

[0061] In **Figure 4,** the movable sliding Diamond Grille System B, in which the mono core wires **101** are positioned in the vertical direction. The movable sliding Diamond Grille System B can be open by sliding the grilles apart. The metal profile with the track slide **103** sit onto the frame bar **106** to achieve sliding motion.

[0062] In **Figure 4,** the length and height of the frame bar **106** will be customised accordingly to the area of the barrier, and number of grille frames will be calculated accordingly to cover the area of the barrier. The grille frames will be lockable using the window grille lock **107**. Location of the window grille lock **107** can be customised accordingly to the End User's preference.

[0063] In **Figure 4,** during assembly of the product, the metal profile with the track slides **103** are fixed up onto the hollow metal bars **102** to form the frame. The metal profiles **100A** are secured on the hollow metal bars **102**

[0064] In **Figure 4,** x numbers of the mono core wires **101** are installed across the grille frame shown in **Figure 4.** The distance between each mono core wires **101** will ranges, depending on the End User's requirements. X numbers of holes are made onto the metal profile **100A**, running parallel to each hole.

[0065] In **Figure 4,** both ends of the mono core wires **101** are bent into a hooked shape. Both ends of the Hooked Ends **104** on the mono core wires **101** will be clamped with metal lock nut(s)/screw(s) and metal lock washer(s) **105**, the metal lock nut(s)/screw(s) and metal lock washer(s) **105** will be secured onto the metal profile **100A**.

[0066] In **Figure 4,** after the installation of all the required mono core wires **101** onto the metal profile **100A,** the same length of metal covers **100B** are installed onto the metal profile **100A.** The metal covers **100B** will prevent public access to the metal lock nut(s)/screw(s) and metal lock washer(s) **105**.

[0067] In **Figure 4,** the movable sliding Diamond Grille System B will be secured onto the area of barrier required.

[0068] In **Figure 5,** the openable casement frame Diamond Grille System A, fixed with mono core wires **101** in horizontal direction. The openable casement frame Diamond Grille System A can be open by opening the grilles apart through the window hinge **108**. The window hinges **108** connect the hollow metal bars **102** to archive opening motion. Multiple window hinges **108** will be used depending on the area of barrier.

[0069] In **Figure 5,** the length and height of the hollow metal bars **102** will be customised accordingly to the area of the barrier, and number of grille frames will be calculated accordingly to cover the area of the barrier. The grille frames will be lockable using the window grille lock **109**. Location of the window grille lock **109** can be customised accordingly to the End User's preference.

[0070] In **Figure 5,** during assembly of the product, multiple hollow metal bars **102** are fixed up to form the frames. The metal profiles **100A** are secured on the hollow metal bars **102.**

[0071] In **Figure 5,** x numbers of the mono core wires **101** are installed across the grille frame shown in **Figure 5.** The distance between each mono core wires **101** will ranges, depending on the End User's requirements. X numbers of holes are made onto the metal profile **100A**, running parallel to each hole.

[0072] In **Figure 5,** both ends of the mono core wires **101** are bent into a hooked shape. Both ends of the Hooked Ends **104** on the mono core wires **101** will be clamped with metal lock nut(s)/screw(s) and metal lock washer(s) **105**, the metal lock nut(s)/screw(s) and metal lock washer(s) **105** will be secured onto the metal profile **100A**.

[0073] In **Figure 5,** after the installation of all the required mono core wires **101** onto the metal profile **100A,** the same length of metal covers **100B** are installed onto the metal profile **100A.** The metal covers **100B** will prevent public access to the metal lock nut(s)/screw(s) and metal lock washer(s) **105**.

[0074] In **Figure 5,** the openable casement frame Diamond Grille System A will be secured onto the area of barrier required.

[0075] In **Figure 6,** the openable casement frame Diamond Grille System B, fixed with mono core wires **101** in vertical direction. The openable casement frame Diamond Grille System B can be open by opening the grilles apart through the window hinge **108**. The window hinges **108** connect the hollow metal bars **102** to archive opening motion. Multiple window hinges **108** will be used depending on the area of barrier.

[0076] In **Figure 6,** the length and height of the hollow metal bars **102** will be customised accordingly to the area of the barrier, and number of grille frames will be calculated accordingly to cover the area of barrier. The grille frames will be lockable using the window grille lock **109**. Location of the window grille lock **109** can be customised accordingly to the End User's preference.

[0077] In **Figure 6,** during assembly of the product, multiple hollow metal bars **102** are fixed up to form the frames. The metal profiles **100A** are secured on the hollow metal bars **102.**

[0078] In **Figure 6,** x numbers of the mono core wires **101** are installed across the grille frame shown in **Figure 6.** The distance between each mono core wires **101** will ranges, depending on the End User's requirements. X numbers of holes are made onto the metal profile **100A**, running parallel to each hole.

[0079] In **Figure 6,** both ends of the mono core wires **101** are bent into a hooked shape. Both ends of the Hooked Ends **104** on the mono core wires **101** will be clamped with metal lock nut(s)/screw(s) and metal lock washer(s) **105**, the metal lock nut(s)/screw(s) and metal lock washer(s) **105** will be secured onto the metal profile **100A**.

[0080] In **Figure 6,** after the installation of all the required mono core wires **101** onto the metal profile **100A,** the same length of metal covers **100B** are installed onto the metal profile **100A.** The metal covers **100B** will prevent public access to the metal lock nut(s)/screw(s) and metal lock washer(s) **105**.

[0081] In **Figure 6,** the openable casement frame Diamond Grille System B will be secured onto the area of barrier required.

[0082] In **Figure 7,** the openable bi-fold frame Diamond Grille System A, fixed with mono core wires **101** in horizontal direction. The openable bi-fold frame Diamond Grille System A can be open by opening the grilles apart through the window hinge **108** and bi-fold track catch **111**. The window hinges **108** connect the hollow metal bars **102** to archive opening motion. The openable bi-fold frame Diamond Grille System A will be able to open fully by pushing the bi-fold frames apart. Multiple window hinges **108** will be used depending on the area of barrier. Accordingly to End User's preference, the Bi-fold openable bi-fold frame Diamond Grille System A can be combine with openable casement frame Diamond Grille System A.

[0083] In **Figure 7,** the length and height of the hollow metal bars **102** and bi-fold track frame **110** will be customised accordingly to the area of the barrier, and number of grille frames will be calculated accordingly to cover the area of barrier. The grille frames will be lockable using the

window grille lock **109**. Location of the window grille lock **109** can be customised accordingly to the End User's preference.

[0084] In **Figure 7,** during assembly of the product, multiple hollow metal bars **102** are fixed up to form the frames. The metal profiles **100A** are secured on the hollow metal bars **102.**

[0085] In **Figure 7,** x numbers of the mono core wires **101** are installed across the grille frame shown in **Figure 7.** The distance between each mono core wires **101** will ranges, depending on the End User's requirements. X numbers of holes are made onto the metal profile **100A**, running parallel to each hole.

[0086] In **Figure 7,** both ends of the mono core wires **101** are bent into a hooked shape. Both ends of the Hooked Ends **104** on the mono core wires **101** will be clamped with metal lock nut(s)/screw(s) and metal lock washer(s) **105**, the metal lock nut(s)/screw(s) and metal lock washer(s) **105** will be secured onto the metal profile **100A**.

[0087] In **Figure 7,** after the installation of all the required mono core wires **101** onto the metal profile **100A,** the same length of metal covers **100B** are installed onto the metal profile **100A.** The metal covers **100B** will prevent public access to the metal lock nut(s)/screw(s) and metal lock washer(s) **105**

[0088] In **Figure 7,** the bi-fold track catches **111** are installed in the drilled and tapped holes on hollow metal bars **102.** The window hinges **108** are installed on the hollow metal bars **102** combining multiple window grilles frames as per required.

[0089] In **Figure 7,** the bi-fold track frame **110** will be cut and connected to the required length and height, the bi-fold window frames will be connected by the bi-fold track catch **111** onto the bi-fold track frame **110**. The ends of the bi-fold window frames will be connected onto the hollow metal bars **102** by the window hinges **108**, the hollow metal bars **102** will have drilled and tapped holes and secure using screws.

[0090] In **Figure 7,** the openable bi-fold frame Diamond Grille System A will be secured onto the area of barrier required.

[0091] In **Figure 8,** the openable bi-fold frame Diamond Grille System B, fixed with mono core wires **101** in vertical direction. The openable bi-fold frame Diamond Grille System A can be open by opening the grilles apart through the window hinge **108** and bi-fold track catch **111**. The window hinges **108** connect the hollow metal bars **102** to archive opening motion. The openable bi-fold frame Diamond Grille System B will be able to open fully by pushing the bi-fold frames apart. Multiple window hinges **108** will be used depending on the area of barrier. Accordingly to End User's preference, the Bi-fold openable bi-fold frame Diamond Grille System B can be combine with openable casement frame Diamond Grille System B.

[0092] In **Figure 8,** the length and height of the hollow metal bars **102** and bi-fold track frame **110** will be customised accordingly to the area of the barrier, and number of grille frames will be calculated accordingly to cover the area of barrier. The grille frames will be lockable using the window grille lock **109**. Location of the window grille lock **109** can be customised accordingly to the End User's preference.

[0093] In **Figure 8,** during assembly of the product, multiple hollow metal bars **102** are fixed up to form the frames. The metal profiles **100A** are secured on the hollow metal bars **102.**

[0094] In **Figure 8,** x numbers of the mono core wires **101** are installed across the grille frame shown in **Figure 8.** The distance between each mono core wires **101** will ranges, depending on the End User's requirements. X numbers of holes are made onto the metal profile **100A**, running parallel to each hole.

[0095] In **Figure 8,** both ends of the mono core wires **101** are bent into a hooked shape. Both ends of the Hooked Ends **104** on the mono core wires **101** will be clamped with metal lock nut(s)/screw(s) and metal lock washer(s) **105**, the metal lock nut(s)/screw(s) and metal lock washer(s) **105** will be secured onto the metal profile **100A**.

CLAIMS

What is claimed is:

1. The grille system relates to the technical field in windows, balconies, fences and similar structure assembly, in particular to a fixed and movable safety barriers or protective grilles use in buildings or structural for fall prevention, the grille system can be either a fixed or movable system, and includes of either a fixed grille frame or a movable sliding, casement or bi-fold grille frame, each fixed grille frame consists of 2 vertical frames or 2 horizontal frames, and each movable sliding, casement or bi-fold grille frame consists of 2 vertical frames and 2 horizontal frames in its outer frame, each fixed grille frame and movable grille frame uses plurality of hooked end configuration mono core wires clamped with metal lock nut(s)/screw(s) and metal lock washer(s) as a safety barriers or protective grilles, and are used in buildings or structural for fall prevention.

2. The grille system of claim 1 further comprises of the plurality hooked end mono core wire configurations which act as a redundancy failure prevention system, configure such that the metal lock nut(s)/screw(s) and the metal lock washer(s) are loosened due to thermal expansion or vibration, the hooked end configurations will hook onto the lock nut(s)/screw(s) even if the lock nut(s)/screw(s) are loosened, thus preventing people from accidentally falling out a building or structural even if with the lock nut(s)/screw(s) loosened.

3. The grille system of claim 2 further comprises of mono core wire which comes with the plurality of the hooked end configurations at both ends that are secured to the grille system independently, and thus each mono core wires has a pulling force transmitted

axially toward both ends which tighten the tension of the plurality of mono core wires individually.