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(54) Title: METAL ROOFING SHINGLE STOCK AND METHOD FOR MAKING IT

(57) Abstract: This invention relates to a method for embedding a multiplicity of discrete masses of material in a resinous coating on a sheet of metal in a coil coating system. The sheet is coated, the masses are embedded in the wet resinous coating, and the coating is dried in a one-pass system. The resinous coating and the embedded masses are preferably resistant to ultra-violet radiation. The wet resinous coating, therefore, is preferably a liquid fluorocarbon resin. The discrete masses comprise pigmented particulate minerals and resins in the form of granules, beads, vesiculated beads, pellets, flakes, platelets, cylinders, coating powders, and coating powder precursor chips. The minerals include glass, quartz, mica, pebbles, and ceramics. The particulate resins include polyesters, acrylics, nylons, polyurethanes, polycarbonates, solid fluorocarbon resins, and solid mixtures of a fluorocarbon resin and an acrylate or methacrylate polymer or copolymer. Sheet metal decorated in such a manner is useful as stock in the manufacture of metal roofing shingles simulating the appearance of traditional asphalt shingles.

METAL ROOFING SHINGLE STOCK AND METHOD FOR MAKING IT

FIELD OF THE INVENTION

This invention relates to a method for embedding a multiplicity of discrete masses of material in a resinous coating on a sheet of metal in a coil coating system. More particularly, it relates to a one-pass system wherein the sheet is coated, the masses are embedded in the wet resinous coating, and the coating is dried. It further relates to a coil of metal decorated with said embedded masses. It relates particularly to the decoration of sheet metal so that it is useful as stock in the manufacture of metal roofing shingles simulating the appearance of traditional asphalt shingles. To that end, this invention relates to coil coated sheet metal to which the coating adheres sufficiently well to permit post-coating forming, molding, bending, and shaping of the metal without delamination or flaking of the coating. It further relates to coil coated sheet metal on which the resinous coating is resistant to ultra-violet radiation and the embedded masses are ultra-violet resistant color bodies of various hues. The surface of the coating may be substantially free of protrusions but at least a portion of the discrete masses may protrude above the surface of the coating to impart slip resistance to shingles made from the coated stock.

BACKGROUND OF THE INVENTION

Mineral covered asphalt sheets, by far the most commonly used shingles, are sold with guarantees of from 15 to 30 years depending on the weight per 100 square feet. The mineral granules are gradually dislodged by wind and rain to expose the asphalt binder to the destructive effects of ultra-violet light. Because of an increasing desire to replace the asphalt with a substrate that has a much longer useful life - on the order of about 60 to 80 years - the development of metal roofing shingles has become more and more important. STONECREST Steel Shingles having multilayered coatings are made from a combination of steel, aluminum, and zinc by Metal Works of Pittsburgh. The cost of simulating the appearance of mineral covered asphalt shingles by forming shingles from coated sheet metal stock may in part be reduced to a commercially acceptable level by reducing the number of coating steps and the corresponding time.

In a conventional coil coating system, paint is picked up by a roller rotating in a paint pan and transferred to an applicator roller and a coil of sheet metal is uncoiled as the metal is pulled through a series of rollers, one or more of which is a paint applicator roller, at up to 1000 feet per minute. The coated metal is then passed through an oven for drying or curing and coiled again. The sheet is passed through the system each time a separate coating layer is to be applied.

To the knowledge of the instant inventors, none of the many patents directed to coil coating teach the coating of a face of sheet metal with a resinous composition and embedment of a second coating material in the wet surface of that coating in a single pass of the metal through a coil coating system. Several patents teach the coating of moving flexible substrates with two materials. The principal substrates are sheets of asphalt, PVC and fabric but metal is often mentioned as a potential substrate. U.S. Patent 5,827,608, for example, teaches the electrostatic fluidized bed application of a coating powder (e.g., a blend of two distinct, chemically incompatible resins) onto the underside of a vinyl sheet being drawn from a coil at about 4 feet per minute, heating the powder and pressing it to fuse and bond it to the vinyl, and rewinding the coated sheet into a coil.

SUMMARY OF THE INVENTION

It is an object of this invention, therefore, to provide a coil of sheet metal having a resinous coating on one face and a multiplicity of discrete masses of material embedded in said coating.

It is another object of this invention to provide metal roofing shingle stock having a resinous coating on one face and a multiplicity of discrete masses of material embedded in said coating.

It is a related object of this invention to provide metal roofing shingle stock having a multiplicity of discrete color bodies embedded in a resinous coating.

It is another object of this invention to provide a method for coating one face of sheet metal with a resinous composition and embedding a particulate coating material in the wet surface of that coating during one pass of the metal through a coil coating system.

These and other objects of this invention which will become apparent from the appended drawings and the following description are achieved in one embodiment of the invention by a method for coating sheet metal which comprises unwinding the sheet metal from a coil thereof and directing the sheet metal through a series of rollers, one or more of which is an applicator roller, placing a liquid resinous coating composition in a paint pan, picking up said resinous coating composition on a rotating roller in the pan and and transferring it to an applicator roller; thenceforth transferring it as a protective coating to the moving sheet metal, distributing discrete masses of material uniformly on the liquid or at least plastic protective coating and causing at least a portion of them to submerge at least partially in said protective coating, drying said protective coating, and rewinding the coated metal sheet into a take-up coil. The method of this invention is characterized by distributing the discrete masses to form a discontinuous field coextensive with the area of

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