Although it is foreseen in this prior art to actuate the vertical drive for the aperture ring also during the coating operation, the aperture ring nevertheless always remains between the evaporation crucible and the substrate holder and, accordingly, provides a shadowing effect for at least a part of the substrates all the time. Therefore, any further coating steps to be carried out in this coating unit without screening effect to fully impinge on the whole area of the substrates facing the evaporation crucible, such as antireflection (AR) coating steps or the like, require that the vacuum in the vacuum chamber be released and the vacuum chamber be opened to remove the aperture ring before the vacuum chamber can be closed again so as to generate a vacuum for the desired non-screened coating steps. This procedure however is time-consuming and as such not desirable to be conducted in the mass production of spectacle lenses.

SUMMARY OF THE INVENTION

Embodiments of the present invention, starting from the prior art as represented by document US 7,311,939 B2 for instance, provide a box coating apparatus for vacuum coating of substrates, in particular spectacle lens blanks, in which vacuum coating steps both with and without screening effect for layer thickness or color variations can be carried out in a more efficient manner so that the box coating apparatus is especially suitable to be deployed within the frame of large-scale production of gradient spectacle lenses.

According to an aspect of the present invention, there is provided a box coating apparatus for vacuum coating of substrates, in particular spectacle lens blanks, including a vacuum chamber which contains an evaporation source and a substrate holder for holding a plurality of substrates, said substrate holder being formed as a dome disposed vis-à-vis to said evaporation source and rotatable by a dome rotary drive about an axis of rotation that passes through said evaporation source, so that substrates held by said substrate holder can be moved on circular paths about said axis of rotation with a respective constant spacing relative to said evaporation source, wherein a masking arrangement is located in said vacuum chamber between said evaporation source and said substrate holder for

partially shadowing the substrates held by said substrate holder relative to said evaporation source, characterized in that said masking arrangement included a fixed masking portion that is stationary in said vacuum chamber, and a plurality of gradient sector portions each carrying gradient shields assigned to the substrates held by said substrate holder, for forming a gradient mask, wherein said gradient sector portions can be rotated about said axis of rotation between a gradient mask open position in which said gradient sector portions are stored behind said fixed masking portion, and a gradient mask closed position in which said gradient sector portions are spread like a fan between said evaporation source and said substrate holder.

Embodiments of the invention provide a box coating apparatus for vacuum coating of substrates, in particular spectacle lens blanks, which comprises a vacuum chamber that contains an evaporation source and a substrate holder for holding a plurality of substrates, wherein the substrate holder is formed as a dome disposed vis-à-vis to the evaporation source and rotatable by a dome rotary drive about an axis of rotation that passes through the evaporation source, so that substrates held by the substrate holder can be moved on circular paths about the axis of rotation with a respective constant spacing relative to the evaporation source, and which further has a masking arrangement located in the vacuum chamber between the evaporation source and the substrate holder for partially shadowing the substrates held by the substrate holder relative to the evaporation source - the masking arrangement comprises a fixed masking portion that is stationary in the vacuum chamber, and a plurality of gradient sector portions each carrying gradient shields assigned to the substrates held by the substrate holder, for forming a gradient mask, wherein the gradient sector portions can be rotated about the axis of rotation between a gradient mask open position in which the gradient sector portions are stored behind the fixed masking portion, and a gradient mask closed position in which the gradient sector portions are spread like a fan between the evaporation source and the substrate holder.

Accordingly, within the vacuum chamber of the box coating apparatus, the masking arrangement can selectively assume two different states, namely either a screening or shading state

(gradient mask closed position) or a non-screening or non-shading state (gradient mask open position). In the screening or shading state of the masking arrangement the gradient sector portions are swung out from behind the fixed masking portion so that the evaporated material which is emitted from the evaporation source impinges on and has to pass the gradient shields in a defined manner before it hits the substrates held by the rotating substrate holder. By contrast, in the non-screening or non-shading state of the masking arrangement, the gradient sector portions are swiveled into their storage space behind the fixed masking portion so that the evaporated material - beside or outside the area covered by the fixed masking portion - freely and directly impinges on the substrates circulated via the substrate holder. According to embodiments of the invention, it is therefore possible to carry out *in situ* coating steps both with and without shadowing effect for layer thickness or color variations. In doing so the individual coating steps can be conducted in direct succession under the same vacuum conditions. In other words, according to embodiments of the invention, it is not required to open and close the vacuum chamber, i.e. to release and build up again the vacuum in the vacuum chamber between the individual coating steps with and without shadowing effect. As a result, the overall process of coating, in particular, gradient spectacle lenses with coating layer thickness and/or color variations can be performed with considerable time savings and thus in a very efficient manner.

In principle, it is possible to provide the masking arrangement with four or more movable gradient sector portions, also of different size and shape, as required. With respect to low complexity and expenditure it is, however, preferred if the masking arrangement comprises three gradient sector portions which are about the same size and shape and can be stored behind the fixed masking portion in a stacked arrangement. The provision of three gradient sector portions only further has the advantage that the differences in free distance between the individual gradient shields carried by the respective gradient sector portion and the assigned substrates held by the substrate holder are small only from one to the other gradient sector portion so that the shadowing effects of the gradient sector