Claims

1. Optical beam former for generating an emerging light beam from an incident light beam, the optical beam former comprising:

a condenser lens array for receiving the incident light beam, wherein the condenser lens array comprises a plurality of condenser lenses; and

a projection lens array arranged parallel to the condenser lens array for emitting the emerging light beam, wherein the projection lens array comprises a plurality of projection lenses,

wherein the condenser lens array comprises at least one cluster of condenser lenses, wherein each condenser lens of the cluster comprises an aperture adapted to a subarea of an overall pattern projected by the optical beam former to provide, for the projection lens array, part of the incident light beam associated with the subarea of the overall pattern; wherein a combination of the apertures of the condenser lenses is adapted to the overall pattern;

wherein the overall pattern is a graphic to be illustrated; wherein each subarea images a subgraphic of the overall pattern;

wherein the aperture of the condenser lens is a boundary of the condenser lens and is formed geometrically similar to outer boundaries of the respective subarea.

2. Optical beam former according to claim 1, which is formed as a maskless character projector; and/or is formed without a buried slide structure.

3. Optical beam former according to claim 1, wherein an intermediate area between apertures of adjacent condenser lenses of the cluster is configured as a light-scattering area.

4. Optical beam former according to claim 3, wherein the light-scattering area is configured as diffuser, as concave lenslet and/or as statistical surface scatterer.

5. Optical beam former according to claim 4, wherein the light-scattering area is a first light-scattering area in a segment of the cluster; and the cluster comprises a second light-scattering area between two adjacent condenser lenses of the cluster in the segment, wherein optical properties of the first light-scattering area and the second light-scattering area for scattering light are different from each other.

6. Optical beam former according to claim 5, wherein the first light-scattering area and the second light-scattering area are formed as segmented light-scattering areas.

7. Optical beam former according to claim 6, wherein the first light-scattering area comprises a first Fresnel lens structure and wherein the second light-scattering area comprises a second Fresnel lens structure; and Fresnel trailing edges of the second Fresnel lens structure are arranged offset with respect to the first Fresnel lens structure to adjust the different optical property.

8. Optical beam former according to any one of claims 3 to 7, wherein several intermediate areas of the condenser lens array are equally distributed or symmetrically arranged within a tolerance range in at least one of a segment of the cluster, in the cluster or in a group of several clusters.

9. Optical beam former according to any one of claims 3 to 8, wherein a filling factor of the condenser lenses in the cluster and/or in the condenser lens array is at least 70% and an area proportion of intermediate areas between adjacent apertures is at most 30%.

10. Optical beam former according to any one of claims 3 to 9, wherein a condenser lens of the cluster comprises an aperture area and the aperture area is filled to a channel area by means of an intermediate area at least partially surrounding the aperture area; and a plurality of channel areas are combined in the cluster in an area-filling arrangement.

11. Optical beam former according to any one of the preceding claims, wherein a filling factor of the projection lenses in the projection lens array is at least 90%.

12. Optical beam former according to any one of the preceding claims, wherein a condenser lens aperture is arranged offset with respect to a vertex of a projection lens

associated with the condenser lens to adjust a direction of a projection effected through the projection lens.

13. Optical beam former according to claim 12, wherein an aperture of the projection lens is arranged opposite to the aperture of the condenser lens, and the projection lens comprises a decentered lens element configured to at least partially provide the direction.

14. Optical beam former according to claim 12 or 13, wherein the condenser lens comprises a decentered lens segment.

15. Optical beam former according to any one of the preceding claims, wherein the cluster comprises a segment with a plurality of condenser lenses whose respective aperture is adapted to the same subarea of the overall pattern.

16. Optical beam former according to any one of the preceding claims, wherein the cluster comprises a plurality of condenser lenses, and each subarea of the overall pattern is projected multiple times through the cluster; wherein the condenser lenses of the cluster are arranged parqueted in the condenser lens array.

17. Optical beam former according to claim 16, for adjusting a brightness of the subareas, wherein different subareas of the overall pattern are projected by a mutually different number of condenser lenses in the condenser lens array.

18. Optical beam former according to any one of the preceding claims, wherein the cluster comprises a plurality of segments arranged adjacent to each other, and each segment comprises a plurality of condenser lenses configured for projecting an identical subarea of the overall pattern; and adjacent segments are formed in the cluster for projecting different subareas of the overall pattern, wherein light-scattering areas are arranged between condenser lenses of the condenser lens array for a uniform scattered light distribution in the projected pattern.

19. Optical beam former according to any one of the preceding claims, wherein an aspect ratio between a largest expansion and a smallest expansion of the aperture of each condenser lens comprises a value of at most 4.

20. Optical beam former according to one of the preceding claims, wherein condenser lenses of the cluster differ from each other by a factor of at most 5 with respect to a maximum expansion of the aperture.

21. Optical beam former according to any one of the preceding claims, wherein the condenser lens array comprises a plurality of clusters arranged in a parqueted manner.

22. Optical beam former according to any one of the preceding claims, wherein the plurality of projection lenses have a mutually equal aperture.

23. Optical beam former according to any one of the preceding claims, wherein the plurality of projection lenses each have an aperture whose geometry is independent of a geometry of the overall pattern and/or is different from a geometry of an aperture of an opposing condenser lens.

24. Optical beam former according to any one of the preceding claims, wherein each condenser lens of the condenser lens array is associated with a projection lens, and the associated projection lens has an individual decentering with respect to the associated condenser lens for superimposing the partial images to image the overall pattern in the hyperfocal region.

25. Projector comprising:

an optical beam former according to any one of the preceding claims; and

a light source for providing the incident light beam.

26. Projector according to claim 25, wherein the light source comprises a collimated light source.

27. Projector according to claim 25 or 26, wherein the plurality of projection lenses have an aperture whose shape is adapted to a far-field distribution of the light source.

28. Projector according to claim 26 or 27, comprising focusing optics or individual projection lens decentering for focusing the overall pattern or correct superposition of channel images into an imaging plane.

29. Method for providing an optical beam former for generating an emerging light beam from an incident light beam, the method comprising:

providing a condenser lens array for receiving the incident light beam, such that the condenser lens array comprises a plurality of condenser lenses; and

arranging a projection lens array set up to emit the emerging light beam parallel to the condenser lens array, such that the projection lens array comprises a plurality of projection lenses,

such that the condenser lens array comprises at least one cluster of condenser lenses, wherein each condenser lens of the cluster comprises an aperture adapted to a subarea of an overall pattern projected by the optical beam former to provide, for the projection lens array, part of the incident light beam associated with the subarea of the overall pattern; such that a combination of the apertures of the condenser lenses is adapted to the overall pattern;

such that the overall pattern is a graphic to be illustrated; such that each subarea images a subgraphic of the overall pattern;

such that the aperture of the condenser lens is a boundary of the condenser lens and is formed geometrically similar to outer boundaries of the respective subarea.

30. Method for configuring a condenser lens array with a plurality of condenser lenses for an optical beam former, comprising:

splitting an overall area of an overall pattern to be projected, which is a graphic to be illustrated, into a plurality of subareas as a subgraphic of the graphic to be illustrated;

adapting a respective aperture of a condenser lens of the condenser lens array to one of the plurality of subareas; to project each of the plurality of subareas with at least one adapted condenser lens;

such that the aperture of the condenser lens is a boundary of the condenser lens and is formed geometrically similar to outer boundaries of the respective subarea;

positioning the plurality of condenser lenses in the condenser lens array.

31. The method according to claim 30, wherein the condenser lenses are configured such that an aspect ratio between a largest expansion and a smallest expansion of the aperture of each condenser lens comprises a value of at most 4.

32. Method according to claim 30 or 31, wherein the condenser lenses are configured such that condenser lenses of the cluster differ from one another by a factor of at most 5 in relation to a maximum expansion of the aperture.

33. Method according to any one of claims 30 to 32, wherein positioning comprises parqueting the condenser lenses in at least one cluster with at least one segment and a light scattering area is provided in intermediate areas of adjacent apertures in the parqueting.

34. Method according to any one of claims 30 to 33, wherein adapting the apertures is performed such that a cluster of condenser lenses of the condenser lens array comprises a plurality of adjacent segments and light-scattering intermediate areas between apertures of the condenser lenses of one segment are arranged with low repetition in relation to at least one other segment in relation to the local arrangement.

35. Method according to any one of claims 31 to 34, further comprising:

manufacturing the condenser lens array.