Claims

1. An alignment system (10) for a workpiece printing machine, comprising:

a stencil support (14) for supporting a substantially planar stencil (3) in use,
a workpiece support (4) for supporting a planar workpiece (15) in an X-Y plane in use, the X-Y plane being defined as that plane which includes orthogonal X and Y axes,
a planarity control mechanism comprising at least two actuators (22) arranged to effect relative rotation of the stencil support (14) and workpiece support (4) about both the X and the Y axis, characterised in that the alignment system (10) comprises first and second movable alignment clamps (20, 40, 50, 60, 70), each of the first and second movable alignment clamps (20, 40, 50, 60, 70) comprising a respective one of said at least two actuators (22), which is located at respective first and second spaced locations on an alignment frame.

2. The alignment system of claim 1, comprising a fixed alignment clamp (30) located at a third location on the alignment frame, such that the fixed alignment clamp (30) acts as a pivot for the alignment frame.

3. The alignment system of claim 1, comprising a third movable alignment clamp (20, 40, 50, 60, 70) located at a third location on the alignment frame.

4. The alignment system of any of the claims 1 to 3, further comprising an X-Y alignment mechanism in mechanical cooperation with the alignment frame for moving the alignment frame within the X-Y plane.

5. The alignment system of claim 4 when dependent on any of the claims 2 to 3, wherein each fixed (30) or movable alignment clamp (20, 40, 50, 60, 70) comprises a respective bearing (23, 51, 71), said fixed (30) or movable alignment clamp (20, 40, 50, 60, 70) in use mechanically cooperating with a respective external surface via said respective bearing (23, 51, 71) to enable movement of the alignment frame in the X-Y plane; optionally each actuator (22) is operative to move the alignment frame relative to, and in reaction against, the respective external surface; optionally each fixed (30) or movable alignment clamp (20, 40, 50, 60, 70) comprises a clamping actuator (24) operable to clamp said fixed (30) or movable alignment clamp (20, 40, 50, 60, 70) to the respective external surface.

6. The alignment system of any of the claims 1 to 5, wherein the alignment frame comprises either the stencil support (14) or the workpiece support (4).

7. The alignment system of claim 5, wherein the planarity control mechanism comprises a clamp assembly, the clamp assembly comprising:

first and second mutually opposed clamping surfaces for clamping a rigid structure therebetween, the first clamping surface is mounted on said clamping actuator (24) operative to switch the clamp assembly between a first, unclamped state and a second, clamped state in which clamped state said rigid structure is clamped between the first and second clamping surfaces, said switching being effected by the clamping actuator (24)

moving the first clamping surface along a clamping axis towards the second clamping surface, and a positioning actuator, optionally a linear actuator, mechanically connected to the second clamping surface, for moving part of the clamp assembly relative to the second clamping surface, along the clamping axis; optionally the clamp assembly comprises a curved bearing and a linear actuator for driving the curved bearing in use,

wherein at least one of the first and second clamping surfaces comprises a bearing (23, 51, 71), such that the rigid structure is movable relative to said clamping surface via said bearing (23, 51, 71) when the clamp assembly is in the first, unclamped state, the positioning actuator of the clamp assembly being arranged to effect rotation of the alignment frame.

8. The alignment system of claim 7, wherein one of the first and second clamping surfaces comprises a bearing (23, 51, 71), and the other one of the first and second clamping surfaces comprises a domed or swivelling frictional element, such that the rigid structure may be clamped along the clamping axis to be held at an inclined angle to the clamping axis.

9. A printing machine comprising the alignment system of any of the claims 1 to 8; optionally comprising a supporting structure, the supporting structure comprising a plurality of lugs (21) projecting therefrom, and the planarity control mechanism mechanically cooperates with the supporting structure via said lugs (21); the printing machine optionally further comprising a sensor arrangement for measuring the distance of a plurality of points of the stencil (3) relative to the X-Y plane, when the stencil (3) is supported by the stencil support (14).

10. A method for printing a planar workpiece with a conductive medium, comprising the steps of:

i) providing a printing machine in accordance with claim 9,

ii) loading a substantially planar stencil (3) into the stencil support (14),

iii) measuring the distance of a plurality of points of the substantially planar stencil (3) relative to the X-Y plane,

iv) rotating the stencil support (14) relative to the workpiece support (4) about at least one of the X and Y axes until the substantially planar stencil (3) is at a required orientation to the X-Y plane,

v) loading a workpiece onto the workpiece support (4) such that it is located below the substantially planar stencil (3), and

vi) printing conductive medium onto the workpiece via the substantially planar stencil (3).