

POLISHING APPARATUS

The invention relates to polishing apparatus.

The invention relates more particularly to polishing (and lapping) apparatus particularly for finishing planar surface of various materials such as quartz, ceramics, ferrite, piezoelectric elements semi-conductor wafers, oxide wafers, carbon, metals and super-hard compounds. Typically, the polishing apparatus comprises a lower circular flat disc and an upper opposing circular flat disc that is relatively rotated about a common axis. The opposing surfaces are covered or coated with cloth or other similar material and the components that are to be polished supported in a carrier that is arranged to be rotated in planetary fashion by the relative rotation of the discs. Such an arrangement is well-known.

During polishing, particles removed from the surfaces of the components and residue of polishing pastes or other fluids is deposited onto the cloth surfaces of the discs. It is known to provide a bristled carrier, to replace the component carrier, that serves to clean the polishing surface of the discs. At present the bristled carrier has a plurality of clumps of bristles protruding beyond each its surfaces, the top and bottom surfaces, of the carrier disposed in a spiral array. As the polishing apparatus is operated, the bristled carrier is driven in

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planetary fashion to brush-clean the clothed surfaces of the discs. The bristles are permanently attached to the carrier and when the bristles wear down or become otherwise non-serviceable, the bristled carrier has to be discarded in toto. This makes replacing the carriers relatively expensive and, as it is sometimes desirable to have different cleaning bristles for different applications, (i.e. harder/stronger bristles are sometimes required), this means that each of the present bristled carriers have minimum versatility.

It is an object of the invention to overcome or at least reduce this problem.

According to the invention there is provided a bristle carrier for a polishing apparatus having an upper and lower polishing disc that are arranged to be relatively rotated about a common central axis and to normally drive therebetween a component carrier in planetary fashion for polishing the components, in which the bristle carrier has a geared peripheral edge and radial slots, each slot being arranged to receive an elongate sub-frame with a central longitudinal axis and having mounted thereto bristles separated and distributed generally along the longitudinal axis, and in which some of sub-frames are mounted to an upper surface of the bristle carrier and others of the sub-frames are mounted to a lower surface of the bristle carrier.

The sub-frames are preferably releasably held in the radial slots.

The sub-frames may be held in the radial slots by integrally formed spring clips.

5 A polishing apparatus bristle carrier according to the invention will now be described by way of example with reference to the accompanying drawings in which :-

Figure 1 is an isometric diagrammatic view of a known polishing apparatus;

10 Figure 2 is a plan view of the bristle carrier of the present invention;

Figure 3 is a top isometric view of the carrier showing only bristles on the top side;

15 Figure 4 is dual sectioned side view of a sub-frame of the carrier;

Figure 5 is a plan view of a different bristle carrier; and

Figure 6 is a sectional view of the different bristle carrier.

Referring to the drawings, a polishing apparatus comprises an upper circular disc 10 and a lower circular disc 11. This discs are relatively rotatable about a common axis 12. A component carrier 13 has a geared
5 peripheral edge that is engaged by an internal gear 14 and a sun gear 15. When the polishing apparatus is operated, the carrier 13 is moved in planetary fashion so that planar surfaces of components in the carrier are polished by clothed opposing surfaces of the upper and
10 lower discs. Such a polishing apparatus are well-known.

In Figure 2, a plastics bristle carrier 16 has a geared peripheral edge 17 and a plurality of radial slots 18 that each receive an elongate frame member 19. Each frame carries one or more arrays of bristles 20, in this
15 embodiment three arrays, that are separated and extend generally along or parallel to a central longitudinal axis of each frame. That is to say, the arrays of bristles generally lie along a respective radius of the carrier 16. Half the slots 18 have frame members with
20 their bristles "facing" upwards and the other have bristles "facing" downwards (and not visible in Figure 2), so that in the assembled bristle carrier, the bristles face upwards and downwards in a symmetrical manner. However, in Figure 3 for convenience only an
25 upper surface of the carrier is shown and slots for the downward facing sub-frames have been omitted.

In Figure 4, two integrally formed clips 21 are provided towards each end of the sub-frame 19 that releasably hold the sub-frame in a respective radial slot 18 of the carrier 16.

5 The bristle carriers of the invention can therefore be re-used because when the bristles wear down or become otherwise unserviceable, the sub-frames 19 can be replaced with sub-frames having new bristles. Also, the same carrier 16 can be used with bristles having
10 different characteristics, when desired, by simply replacing the sub-frames with sub-frames having suitably different types or characteristic bristles.

It will also be noted that the arrays of bristles 20 are positioned in use to extend in use along respective radii
15 of the carrier 16. In the prior art, the bristles are supported in concentric arrays. The radial disposition has been found to provide more even and satisfactory cleaning of the polishing cloths or pads of the discs 10 and 11.

20 In Figures 5 and 6, a different bristle carrier 22 has additional narrow slots 23, one additional slot extending along one side of each slot 18. The slots 23 are provided to locate and to hold a respective squeegee 24 (see Figure 6) made of suitable material such as NEOPRENE
25 or EVA. Normally, the squeegees can be dropped or slid

into their respective slots and held in position when the frames 19 are clipped into the slots 18, as described earlier. Only the slots on an upper side of the bristle carrier can be seen in Figure 5 and only an upper
5 illustrative bristle and squeegee shown in Figure 6. Normally, squeegees are mounted on upper and lower sides of the bristle carrier.

The squeegees are typically 4 mm wide with a somewhat pointed top edge and stand about 9 mm proud of the
10 surfaces of the bristle carrier 18. During normal use the squeegees 24 are pressed down towards the outer surfaces of the bristle carrier to be about the same effective height in use as the bristles 20. The squeegees serve to sweep debris off and further clean the
15 surfaces being polished.

The preferred arrangement is as described but it will be appreciated that not all the slots 23 may not be provided, or if provided need not all contain a squeegee during use. The squeegees can be fitted at either side
20 of the bristle carrier or one only one side if desired. In the described arrangement of Figures 5 and 6, the squeegee slots 23 are at the side of or could be part of each respective slot 18. It will be appreciated that the slot 23 could be spaced away from and quite separate from
25 the slots 18. Also, the slots 23 may be somewhat angled from the radial directions so that collected debris is

- 7 -

swept in a direction away from the central axis of the
bristle carrier during use.

CLAIMS

1. A polishing apparatus comprising an upper and lower polishing disc arranged to relatively rotate about a common central axis and to normally planetarily drive therebetween a component carrier for polishing components in said component carrier; and a bristle carrier comprising a carrier base having a geared peripheral edge and a plurality of radial slots, each said slot arranged to receive an elongate sub-frame having a central longitudinal axis, each of said sub-frames having bristles separated and distributed generally along said longitudinal axis; a first portion of said sub-frames mounted to an upper surface of said bristle carrier; and a second portion of said sub-frames mounted to a lower surface of said bristle carrier.

2. A polishing apparatus according to claim 1, wherein said sub-frames are releasably held in said radial slots.

3. A polishing apparatus according to claim 2, wherein said sub-frames are held in said radial slots by integrally formed spring clips.

4. A polishing apparatus according to claim 1, in which the carrier base has a plurality of additional radial slots and a squeegee in some or all of the additional slots.



5. A polishing apparatus according to claim 4, in which the additional slots are provided in both upper and lower surfaces of the carrier base.

5 6. A polishing apparatus according to claim 4, in which each additional slot is positioned closely adjacent a respective radial slot.

7. Polishing apparatuses substantially as herein described with reference to the accompanying drawings.

