

SEALER

The invention relates to a sealer for bonding together a cover foil and a support foil, in particular in a thermoshaping machine, with an upper tool and a lower tool that are movable relative to each other by a drive to carry out the seal operation and between which the cover foil and the deck foil are guided.

Thermoshaping machines are widely used in practice wherein supply rolls feed the cover foil and the support foil through several upstream treatment stations, namely an heater and a shaper for forming blisters in the support foil. The blisters are filled, and downstream there is a sealer as for example described in German 2,608,777 that closes them with a cover foil so that in a downstream stamper the bonded together cover foil and support foils can be subdivided. According to actual application the format with respect to length and width dimension of the foil in the sealer varies, with an irregular sealing pattern with large sizes that not only is difficult to see, but that also makes it hard to seal uniformly with the considerable disadvantage that pharmaceutical products are not packed accurately.

It is an object of the invention to provide a sealer of the above-described type that makes it possible to influence the pressure distribution between the upper and lower tools in order to obtain a uniform sealing pattern.

This object is attained according to the invention in a sealer of the above-described type in that between the drive and the respective upper tool or lower tool there is an intermediate plate in which is formed a plurality of pressurizable chambers connectable via pressure lines with a pressure source.

This sealer has the advantage that in a simple manner it is possible to vary the surface area over which the pressure from the drive is transmitted to the respective tool, so that the two tools push flatly together. It is particularly preferred when there are two intermediate plates with both the upper tool and the lower tool bearing on a respective intermediate plate so that it is possible, depending on the size of the foil sections to be sealed together, to pressurize in the two intermediate plates chambers of the exact same size in the same regions of the tools.

It is further preferable that the first chamber is in the center of the intermediate plate and has a surface area corresponding to the minimal seal area so that at least this first chamber is pressurized during every sealing operation.

It is further within the scope of the invention when the second chamber flanks the first chamber parallel and/or transverse to a travel direction since this makes it possible to extend the foil section in both directions in the plane of the foil.

Further expansion is made possible in a simple manner in that the second chamber is in turn flanked parallel and/or transverse to the travel direction by other chambers.

In order to selectively pressurize the chambers, the pressure lines are provided with shutoff valves. The provision of

pressure reducers in the pressure lines allows the pressure in the chambers to be controlled and the specific sealing pressure to be set in the chambers independently of the format size.

With respect to simple relationships it is preferred that the chambers in the upper intermediate plate and in the lower intermediate plate are of the same size so as always to ensure that the same foil sections are subjected to the sealing pressure. This is helped when the chambers in the upper intermediate plate and lower intermediate plate are interconnected via lines so that the same pressure is present in paired chambers.

According to a preferred embodiment the drive is an eccentric drive and acts on the lower intermediate plate while the upper intermediate plate is mounted with the upper tool on an upper frame, so that only one of the tools is moved while the other tool is stationary in the sealer. It is also of course possible to operate the upper intermediate plate with the drive or to operate the two tools independently of each other with respective drives, in particular to free the foil in the sealer.

It is further possible within the scope of the invention to provide a rigid pusher in the intermediate plate for direct transmission of force from the drive so that the pressure from the rigid pusher is ideally distributed according to the pressure in the chambers. The pressure source preferably supplies oil-free air under pressure, although in theory other fluids could be used.

In the following the invention is more closely described with reference to an embodiment shown in the drawing; therein:

FIG. 1 is a schematic front view of a sealer with upper and lower tools between two intermediate plates;

FIG. 2 is a variation on the FIG. 1 embodiment; and

FIG. 3 is a top view of an intermediate plate.

The drawing schematically a sealer 1 of the type typically used in a thermoshaping machine. The sealer 1 serves for bonding together a cover foil and a support foil, the cover foil and support foil being guided between an upper tool 2 and a lower tool 3. A drive 4 can move the upper tool 2 and the lower tool 3 relative to each other, in the drawing the drive 4 being an eccentric drive bearing on the lower tool 3 while the upper tool 2 is fixedly mounted in an upper frame 5. There is an intermediate plate 6 between the drive 4 and the lower tool 3 and between the upper frame 5 and the upper tool 2. Each intermediate plate 6 is formed with a plurality of pressurizable chambers 7, 9, 10, 11, and 15 that can be connected via lines 8 with a pressure source. As in particular visible in FIG. 3, the first chamber 9 is in the center of the plate 6 and has an area equal to the minimum seal area, while the second chamber 10 flanks the first chamber 9 in the travel direction of the cover and support foils. In the embodiment illustrated in the drawing the third chamber 7 flanks the second chambers 10 and the chambers 7 so as to make it possible to increase the surface area acted on by the intermediate plate 6 by means of the chambers 7, 9, 10, 11, and 15 in the intermediate plate 6. In order to be able to vary as much as possible the pressures in the chambers 7, 9, 10, 11, and 15 the lines 8 are provided with shutoff valves or pressure reducers. It is further

notable that the chambers 7, 9, 10, 11 and 15 in the upper intermediate plate 6 and the lower intermediate plate 6 are of the same size and are interconnected by lines 12 so that it is easy to ensure that the same pressure is present in the pairs of chambers 7, 9, 10, 11, and 15.

FIG. 1 shows an embodiment that is particularly suited for operation with the pressure in the chambers 7, 9, 10, 11, and 15 always constant, while in the FIG. 2 embodiment the chambers 7, 9, 10, 11, and 15 are only pressurized with air when the tools 2 and 3 are pressed against the cover foil and support foil. Here the eccentric drive can remain in the upper dead point while with the FIG. 1 embodiment the eccentric drive continues to rotate since the air cushion 13 provided here has the function of a pressure reservoir so as to make the stroke uniform.

Patent claims:

1. A sealer for bonding together a cover foil and a support foil, in particular in a thermoshaping machine, having an upper tool (2) and a lower tool (3) that are movable relative to each other by a drive (4) to carry out the seal operation and between which the cover foil and the deck foil are guided, characterized in that between the drive (4) and the respective upper tool (2) or lower tool (3) there is an intermediate plate (6) in which is formed a plurality of pressurizable chambers (7) connectable via pressure lines (8) with a pressure source.

2. The sealer according to claim 1, characterized in that there are two intermediate plates (6) with both the upper tool (2) and the lower tool (3) bearing on a respective intermediate plate (6).

3. The sealer according to claim 1 or 2, characterized in that the first chamber (9) is in the center of the intermediate plate (7) and has a surface area corresponding to the minimal seal area.

4. The sealer according to claim 3, characterized in that the second chamber (10) flanks the first chamber (9) parallel and/or transverse to a travel direction.

5. The sealer according to claim 4, characterized in that the second chamber (10) is in turn flanked parallel and/or transverse to the travel direction by other chambers (11).

6. The sealer according to one of claims 1 to 5, characterized in that the pressure lines (8) are provided with shutoff valves.

7. The sealer according to one of claims 1 to 6, characterized in that the pressure lines (8) are provided with pressure reducers.

8. The sealer according to one of claims 2 to 7, characterized in that the chambers (7) in the upper intermediate plate (6) and in the lower intermediate plate (6) are of the same size.

9. The sealer according to one of claims 2 to 8, characterized in that the chambers (7) in the upper intermediate plate (6) and lower intermediate plate (6) are interconnected via lines (12).

10. The sealer according to one of claims 1 to 9, characterized in that the drive (4) is an eccentric drive and acts on the lower intermediate plate (6).

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11. The sealer according to claim 10, characterized in that the upper intermediate plate (6) is mounted with the upper tool (2) on an upper frame (5).

12. The sealer according to one of claims 2 to 11, characterized in that a rigid pusher (14) is provided in the intermediate plate (6) for direct transmission of force from the drive (4).

13. The sealer according to one of claims 1 to 12, characterized in that the pressure source supplies oil-free air under pressure.