# Final Diploma

Patent Examination Board

## FD2 Drafting of Specifications

## Thursday 15 October 2020

## 10:00 to 14:00 UK British Summer Time (GMT + 1 hour)

## Total time allowed: 4 hours 40 minutes

Starting from the time when you download the question paper, you have 4 hours 40 minutes in which to:

- Print this question paper (if wished)
- Answer the questions
- Take three screen rest breaks of 5 minutes each
- Save your Answer document and to your hard drive as a pdf
- Scan any hand-annotated drawings and save them to your hard drive as a pdf
- Upload your answer document to the PEBX system.

### INSTRUCTIONS TO CANDIDATES

1. The whole assessment task is to be attempted.
2. The marks to be awarded are given at the end of the assessment task.
3. The total number of marks available for this paper is 100.
4. You must use the Answer document for your answers.
5. Do not attempt to change the font style, font size, font colour, line spacing or any other pre-set formatting.
6. Start each part of your answer on a new page. Press the control key and the enter key simultaneously to begin a new page.
7. Do not state your name anywhere in the answers.
8. **Candidates who have been granted approval to handwrite their answers**: Instructions on what to do at the end of the examination are on the Candidate Cover Sheet.
9. This question paper consists of **12 sheets**, including this sheet, and comprises:
   Assessment task (1 sheet)
   Client letter (4 sheets)
   Doc A – Client drawings 3 sheets)
   A spare set of Doc A – Client drawings for you to annotate and include in your answer if you wish (3 sheets).

### AT THE END OF THE EXAMINATION

10. Save your Answer document and any hand-annotated drawings to your hard drive. Then follow the instructions for uploading your document onto the PEBX system.

**Assessment Task**

Your client sends you the correspondence listed on the Instructions to Candidates sheet regarding a new idea.

**Your task is to prepare a complete patent specification that is ready for filing at the UK Intellectual Property Office. The specification should be drafted with a view to obtaining a UK patent.**

Note the following:

a) You should assume that the client's description of the prior art in the field is complete.

b) You should not make use of any other prior art or special knowledge that you may have of the subject matter concerned.

c) You should also assume that the client's description of the device and its operation is accurate, i.e. that the device works as described.

**Allocation of marks**

**Introduction and Description: 46 marks**
**Claims: 50 marks**
**Abstract: 4 marks**
**Total: 100 marks**

Please would you prepare and file a UK patent application for my invention. It needs to be filed today because I plan to show it at the World Cup Show 2020, tomorrow.

My idea is a lid for a mug that turns a favourite mug into one that can be portable, like these so-called ‘reusable’ cups that you see everywhere. Figure 1 shows a travel mug that I have been using for a while.

My lid needs to be flexible to some extent to fit over a cup, like the lid of my travel mug. The lid of my travel mug seems to be a bit smaller than the circumference of the mug, so it is a tight fit. However, the issue I have is that today’s favourite mug may not be tomorrow’s and so I would like my lid to be able to fit onto a variety of sizes of mug. You’ll see from the travel mug in Figure 1 that, unlike normal mugs, it has a lip that the lid has to be forced over. Because the lid is made of silicone, it flexes outwards and then pops back to its original shape and grips the lip.

So, my lid needs to include some system or mechanism to change its size so it can fit different mugs of various sizes. Of course, the change in size needs to be reversible so the lid can be removed from one receptacle and then used with another receptacle of a different size. I would really like the lid to be sealed so tightly that no liquid escapes, regardless of the orientation of the mug. This may be a tall order, but a seal of some sort is needed.

Tupperware® have covers that fit on to containers of all sorts of shapes and sizes, circular, square, rectangular, etc. I have included a picture of their lidded drinking vessel as Figure 2. The lid is silicone and has a peripheral tab. Pulling the tab (with the opposite side already placed on the vessel) stretches the lid and increases its circumference so the lid can then be placed over or removed from the container. When covering a container, release of the tab results in the lid snapping back to its resting shape and size, and the peripheral edge of the lid then grips the container. To remove the lid, the tab is gripped and pulled outwards to expand the circumference of the lid, which can then be removed.

As I am sure you are aware, silicone is a resilient material and can be used to grip as well as assisting securing the lid to the vessel. So, making my lid from silicone or a similarly resilient food grade material of some sort seems to be a sensible idea, not least because these materials deform when a force is applied, flex out of shape and then return to their original shape when the force is removed.

I don’t see why my lid wouldn’t work on other receptacles that have an opening that you want to close and/or seal. The key thing is that the cover needs to have a circumference or peripheral portion that engages in some way with the wall of the receptacle, so an integral system that allows the dimensions of the lid to be adjusted is important. In other words, unlike the Tupperware® lid, my lid is not already made to fit the receptacle.

The adjustment to the lid size could be made by way of a balloon and a pump mechanism – there would be a bladder fitted inside the rim of the lid, as well as a resealable valve that can be used to add air to or remove air from the balloon. A button could either be pulled or pushed to activate the pump and draw or push air into the bladder.

**Cont…**

The movement mechanism I have used to adjust the size of my lid is well known and based on Rawlplugs®. I am sure you know about Rawlplugs®, but essentially the plug has a number of flexible legs. When a screw is threaded into the tapered central bore of the plug, the screw pushes the legs apart (i.e. forcing them outwards) so they grip the surrounding material.

Taking this concept, the idea of 'leg' movement of the Rawlplug® is used to move the edges of a flexible covering in and out to increase and decrease the peripheral dimensions of the lid. In this case, the Rawlplug® concept is used in what I call an actuator mechanism. I like the idea of using a tapered screw to engage the actuator, but the actuator and screw would both need to include a thread, i.e. the actuator needs an inner bore that is threaded.

As a result, my actuator has an expander that stretches the lid so it is large enough to fit around the outside of a mug. The operator then unwinds the actuator and the lid's own tension enables the lid to reduce in size and grip the mug. This is where having a resilient material is useful. Have a look at Figure 3, which shows parts of the mechanism exploded so you can see the component parts. Basically, the expander moves the peripheral walls of the cover and what drives the mechanism is the tapered screw in combination with the expander having a threaded bore to receive the tapered screw.

As you can see, the expander has two sets, inner and outer, of upright circular walls that are connected by radial struts. Both sets of walls are made up of a number of discrete, unconnected partial walls, but each inner wall is connected to a corresponding outer wall by a radial strut. The bottom edge of each inner wall can be connected to the adjacent inner wall, which may provide some stability to the system. Of course, any number of walls greater than two would be possible, but I found that four worked quite well.

The inner walls make up the inner bore and this part is tapered. Each set of walls forms a circle when viewed from above, except for the breaks between them. This arrangement means that winding a threaded screw downwards into the bore moves the inner walls radially outwards, which, in turn, causes the radial struts to push the outer walls outwards, pushing the peripheral wall of the lid outwards. Of course, this means the expander is housed in the lid, i.e. it is integral. Turning the actuator mechanism clockwise causes an increase in the dimension of the cover so that its circumference exceeds that of the opening. The lid as a whole is then placed over the side wall of the mug and the mechanism turned anticlockwise to decrease the diameter so that the peripheral wall of the cover engages with the outer surface of the vessel and the lid is secured in place. Naturally, there are a variety of ways in which the expansion can be effected and not necessarily solely by using a twisting action – see my balloon variant above.

Because the mechanism reduces the amount of effort needed to fit the lid over the mug, a stronger, possibly less flexible material can be used. In turn, this means a stronger bias can be exerted by the inwardly facing surface of the peripheral part of the lid when it is moved out of its resting position compared with the silicone material used by the reusable cup of Figure 1. Because the bias exerted against the mug is mechanically adjustable, the strength of the seal about the mug is also controllable and selectable.

**Cont…**

With the balloon variant that I described earlier, as the balloon is filled with air, it pushes the walls of the lid outwards and expands the lid diameter. Similarly, removal of the air from the balloon (e.g. via the release valve) contracts the lid until the diameter is reduced and the lid is engaged with the outer surface of the mug.

Looking again at my travel mug that I've shown you in Figure 1, the travel mug lid has an interesting lid with a tongue that can be rotated in the plane of the lid. The free end of the tongue includes an indentation that fits into a drinking hole. To drink from the cup, the indentation is lifted out of the hole, the tongue is rotated and the indentation is located in a complementary indentation in the lid that mirrors the shape of the drinking hole and which holds the tongue in place so it doesn't fall off, flap in your face or get in the way of drinking from the hole. The thing with this lid is it only fits on its designated, insulated cup, which is great when I want to keep my tea hot and not wander around with a flask. So, the figure at the top of Figure 1 shows the tongue 'parked' for drinking and the lower figure shows the tongue sited in the drinking hole.

I like the feel of the silicone and how easy it is to stretch quite a lot to cover a range of larger circumferences, but there is no way I can shrink my travel lid to fit smaller diameter mugs whilst keeping a sufficiently strong, leak-proof seal. Also, a lid that is smaller than the opening of a cup would simply fall straight into your coffee. However, a lid or covering with a radially extending skirt or flange that allows the lid to sit on top of the rim of the receptacle could be useful to stop the lid from falling in before it is expanded – have a look at Figure 4.

If a lid is too small, there also needs to be some way to have the lid engage inside the mug. In other words, the lid needs to be expanded to push outwardly against the inner mug wall and fit internally within the mug.

As you'll appreciate in this scenario, the body of the lid sits inside the mug with the skirt resting on the top edge of the mug so the lid cannot drop in. Turning the actuator moves the peripheral edge of the lid outwards so that the lid body expands to fill the circumference of the mug. In this case, the outwardly facing surface of the lid engages with the inner surface of the mug, which is in contrast to the lid that is too large and fits outside the vessel. Once the lid is fitted to the mug, I can twist the actuator further to make sure that a strong grip and tight seal is maintained.

The expander fits into a disc-shaped cover that, as you can see from Figure 3, includes a peripheral wall that hangs down. The cover is sized to fit over or into a perimeter of an open-topped receptacle so that the peripheral wall can engage with the receptacle. The cover is flexible enough to be expanded and returned to its original size. As a result, outward movement of the outer walls of the expander causes the peripheral wall of the cover to be pushed radially outwards. It goes without saying that there should be a hole in the top of the cover to allow for the actuation mechanism to be engaged, i.e. gripped by the user so the screw can be turned or the balloon inflated/deflated.

Specifically, with the tapered screw, the actuator can include an integrated screwdriver that can engage and drive the screw. Alternatively, the head of the screw is accessible for turning with a screwdriver or similar tool.

**Cont…**

I have also added an end cap on the actuator so that logos, advertising and/or use instructions can easily be included. This is in the embodiment with an integrated screwdriver.

Before I forget, I have recently incorporated a nozzle for the lid that can act as a straw and also be used as a handle to drive expansion. To enable this, the nozzle is integrated with the actuator. Drinking spouts and nozzles that flip up and fold down are well known so I don’t think any more detail is needed. Of course, the good thing is the nozzle can contribute to the water-tight seal when it is folded down.

**Document A – Client drawings**

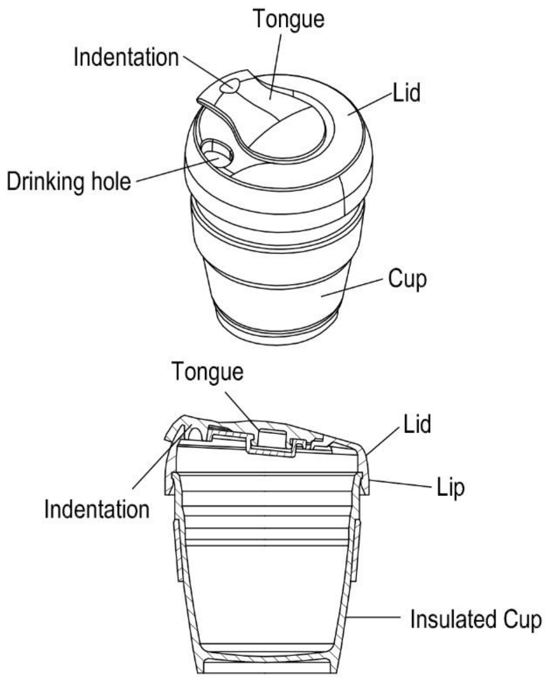


Figure 1

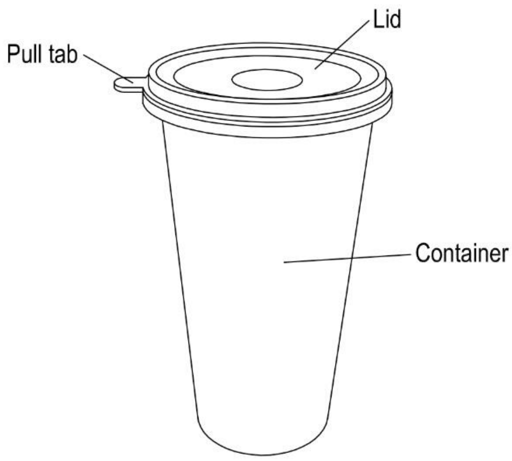


Figure 2

**Document A – Client drawings**

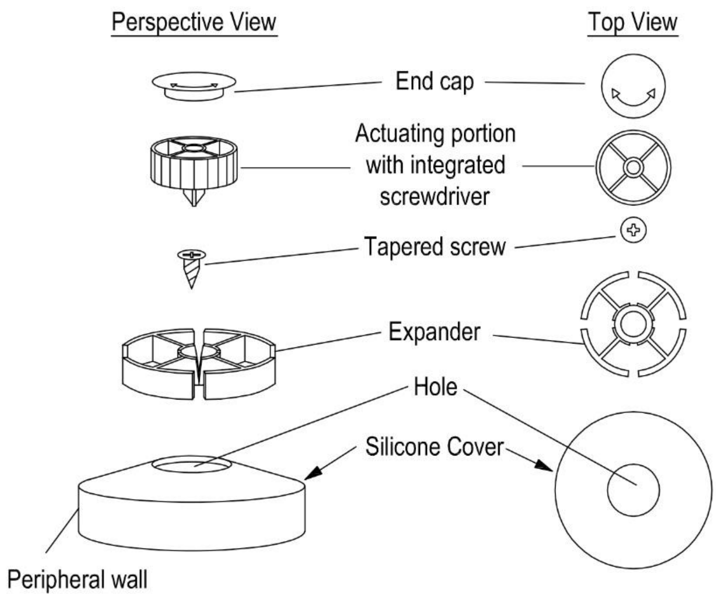


Figure 3

**Document A – Client drawings**

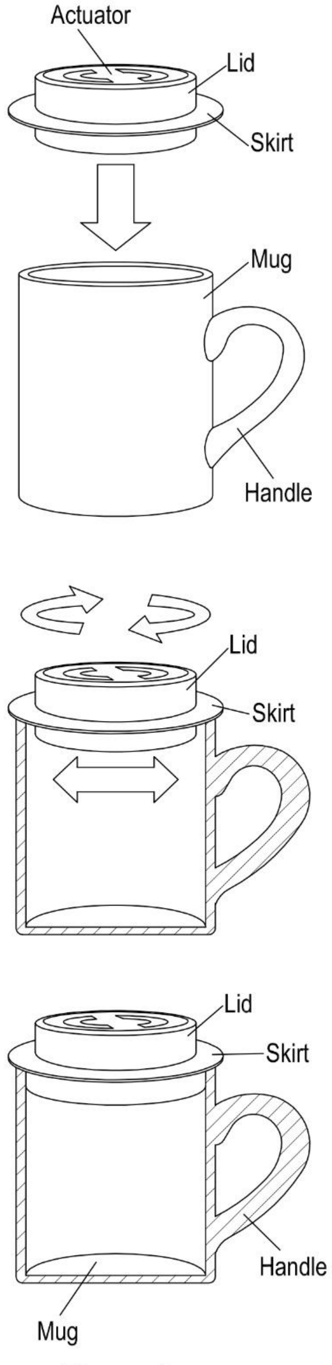


Figure 4

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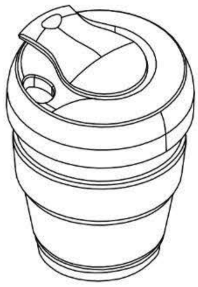
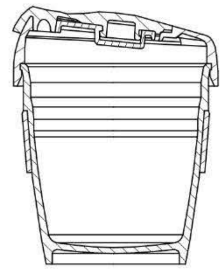
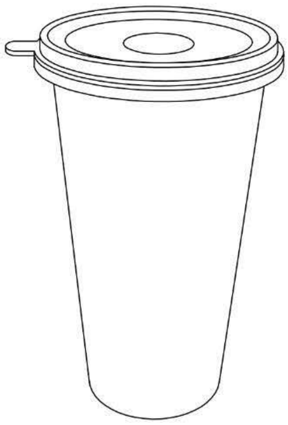
**Document A – Client drawings (unannotated)**







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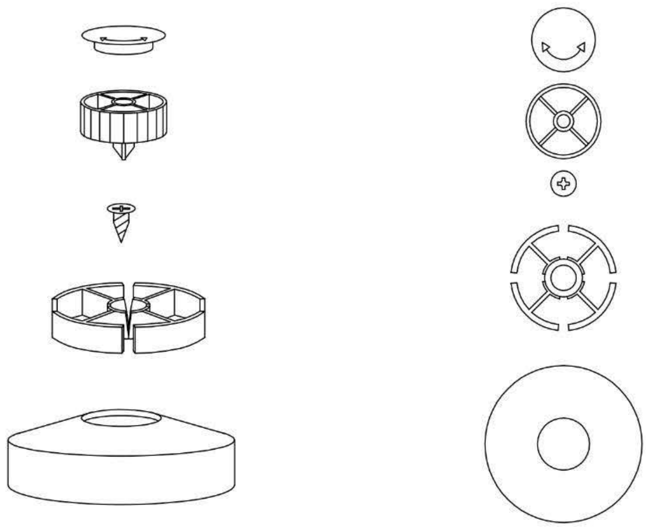
**Document A – Client drawings (unannotated)**



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**Document A – Client drawings (unannotated)**