

**PAPER A: PREPARATION OF A PATENT SPECIFICATION**

**5 October 2009, Monday  
1330 – 1730 hrs**

Maximum Time: 4 Hours (includes reading time)

Maximum Marks: 100



INTELLECTUAL PROPERTY  
OFFICE OF SINGAPORE

**INSTRUCTIONS TO CANDIDATES**

1. This Paper consists of 9 pages, including this cover page.
2. Write your answers in English. Answers in any other language will not be marked. Answers in illegible handwriting will not be taken into consideration.
3. Two copies of the question paper are provided, one is for your reading and the other is for your use (optional) when answering the question(s) in the Answer Booklet(s).
4. Only your answers and/or drawings to the question(s) written or glued in the Answer Booklet(s) provided by the Examination Secretariat will be considered. You are to write on one side of each sheet in the Answer Booklet(s).
5. Information provided in the question(s) may be obtained from actual situations or modified therefrom for the purpose of this examination. You should accept the facts given in the paper. Assume also that the prior art given is exhaustive.
6. The document provided in this question is:

Document A – Client's write-up of his invention (4 pages of description including question and 4 pages of drawings).

End

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**Document A – Client's write-up of his invention (1/8)**

Your client writes:

Our company manufactures billboards for displaying advertising material. A known billboard is  
5 shown in Fig. 1. It is a structure 1 attached to the sidewall 2 of a building such as a bank. The  
structure 1 has a flat, vertical surface 3 onto which one or more paper sheets carrying  
advertising are pasted. In some billboards, the surface 3 has an area of only a single square  
metre, so it can be covered by a single paper sheet. In other billboards, the surface 3 has an  
area of many square metres, so that many paper sheets, each carrying different patterning,  
10 must be pasted onto the surface 3 to cover the whole surface 3. The set of sheets together form  
a mosaic, collectively carrying a single advert. A protective transparent sheet (not shown) can  
be mounted against the surface 3, sandwiching the paper between the transparent sheet and  
the surface 3.

15 We have come up with the concept of a "moving advertisement" billboard. We have two  
prototype devices 10 and 30. They are shown in Figs. 2 to 6. Our customers are advertising  
agencies, who buy the devices 10, 30 from us, and use them to display their own clients'  
adverts.

20 Our first new device 10 is shown in Fig. 2. It has a cuboidal casing 11, which is opaque but  
includes a rectangular gap which defines a window 12, through which advertising material will  
be viewed, as described below. The window 12 is typically filled with a transparent sheet.

Fig. 3 is a view of device 10 as if the casing 11 were transparent. It depicts the casing 11 and  
25 the outline of the window 12 by dashed lines. The device 10 includes two rollers 14, 15 which  
are parallel and mounted at either end of the window 12. Each roller is arranged to rotate about  
its longitudinal axis. An actuator is provided in the form of motors 16a, 16b which respectively  
drive the rollers 14, 15 under the control of a controller 13. The controller 13 controls the motors  
16a, 16b such that they always turn the rollers 14, 15 in the same angular direction and through  
30 the same angular amount (in an alternative embodiment, there may be just one motor which  
turns one of the rollers directly, and a mechanical linkage between the rollers 14, 15 which  
ensures that the other roller is turned in same angular direction and by the same angular  
amount).

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**Document A – Client's write-up of his invention (2/8)**

Our customer uses device 10 as follows. First, as shown in Fig. 4(a) they prepare advertising material in the form of three conventional paper sheets 18a, 18b, 18c carrying respective adverts. The sheets 18a, 18b, 18c each have height h. Then as shown in Fig. 4(b), they join the three sheets 18a, 18b, 18c end-to-end into a loop 19 (thus, the loop 19 has a circumference 3h). Then, as shown in Fig. 4(c), they place the loop around the rollers 14, 15 of device 10. The height h and the spacing of the rollers 14, 15 are such that the loop 19 just fits over the rollers 14, 15 (this means a spacing between the rollers of about  $3/2h$ ). Thus, the rollers 14, 15 function as support devices for supporting the advertising material, with a portion of it in register with the window.

Fig. 4(d) is a schematic view of part of the device 10 looking from the direction marked as A in Fig. 4(c). At this time a single one of the sheets (shown as 18a in Fig. 4(d)) is visible through the window 12. After a pause (which allows a passer-by 20 to read the advert on sheet 18a) the controller 13 controls the motors 16a, 16b to rotate the rollers 14, 15 incrementally by an angular amount which means that the loop advances by a distance h, thereby bringing the next of the adverts into view through the window 12. The motors 16a, 16b repeatedly advances the rollers 14, 15 incrementally by the same amount, each time bringing a different one of the sheets 18a, 18b, 18c into the position at which it can be viewed through the window 12 for a few seconds. This process continues indefinitely. Optionally, a light (not shown in the figures) may be located directly between the rollers 14, 15. This light generates illumination passing through loop 19 and outward towards the passer-by 20 through the window 12, creating a pleasing "back-light" effect.

In this way of using the device 10, the number of advertisements which can be displayed is limited. This is because the loop 19 can only be about twice as long as the spacing between the rollers 14, 15, and this spacing is in turn limited by the size of the casing 11. This disadvantage can be overcome by providing the rollers 14, 15 with means for attaching the rollers 14, 15 to one of the paper sheets. Fig. 5 shows how the device is used in this case. Our customer begins by preparing any number (let us call it "n") of conventional paper sheets carrying adverts. The sheets are shown in Fig. 5(a) as 28a, 28b, ...28n, each having a height h. They are joined end-to-end into a long ribbon 29, as shown in Fig. 5(b), having ends 29a, 29b. The ribbon 29 thus has length n times h.

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**Document A – Client's write-up of his invention (3/8)**

As shown in Fig. 5(c) (which is again a view looking in the direction A) the customer then attaches one end 29a of the ribbon 29 to the roller 14, and winds the rest of the ribbon 29 around the roller 15. At this time, the sheet 28a is stretched between the rollers 14, 15 and parallel to the window 12, so the advert on it is visible through the window 12. After a pause of a couple of seconds, the motors 16a, 16b rotate the rollers 14, 15 together, to wrap a length h of the ribbon 29 around the roller 14. As shown in Fig. 5(d), this unwinds a second of the sheets 28b from the roller 15, and brings it into the location where it is visible through the window 12. After a few seconds, this process repeats, and so on until all n sheets have been viewed. The process then reverses, with the motors 16a, 16b incrementally rotating the rollers 14, 15 in the opposite angular direction, to successively display the n sheets.

Our second new device 30 is shown in Fig. 6(a). Its appearance to a passer-by is actually much that same as that of the device 10 shown in Fig. 2, but Fig. 6(a) shows its internal construction. It has a casing 31 with a window 32 (these are identical to the casing 11 and window 12 in device 10). In contrast to the device 10 which just has two rollers, the device 30 has any number of rollers 34 (let us call the number of rollers "m"; Fig. 6(a) shows the case that m=4). The respective longitudinal axes of the rollers 34 are parallel to each other, and all are in the plane of the window 32. The rollers 34 are mounted so as to be rotatable about their respective longitudinal axes. They are driven by a motor 36 controlled by a controller 33. The motor 36 has a shaft 37. A drive mechanism (not shown) is provided to ensure that when the motor 36 rotates shaft 37, this rotates all the rollers 34 by the same angular amount and in the same angular direction. Each of these rollers 34 has the structure of Fig. 6(b). It includes a cylindrical portion (identical to the rollers 14, 15 of device 15) but mounted on it is a stiff elongate sleeve 35, having a triangular cross-section. Each sleeve 35 has three faces 35a, 35b, 35c directed away from the longitudinal axis of the sleeve.

An end view of the set of rollers 34 is shown in Fig. 6(c) (looking in the direction marked as A on Fig. 6(a)). The sleeves 35 appear as equilateral triangles. At the time depicted in Fig. 6(c), the faces 35a of the respective sleeves 35 all face towards the window 32. After a pause, the motor 36 turns the rollers 34 simultaneously through 120 degrees about their longitudinal axes (as shown in Fig. 6(d)), and so directs the faces 35b to face the window 32 (as shown in Fig. 6(e)).

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**Document A – Client's write-up of his invention (4/8)**

After another pause, the motor 36 turns the rollers 34 together by another 120 degrees about their longitudinal axes, thereby directing the faces 35c towards the window 32.

5 Our customer cuts a first sheet carrying an advert into m strips. They stick the m strips onto the faces 35a of respective ones of the m sleeves 35. They cut a second sheet into m strips, and stick the m strips onto the faces 35b of respective ones of the sleeves 35. Likewise, they cut a third sheet into m strips, and stick the m strips onto the faces 35c of respective ones of the sleeves 35. When all the faces 35a are directed towards the window 32, the first sheet is visible  
10 through the window 32. When the faces 35b are directed towards the window 32, the second sheet is visible through window 32. When the faces 34c are directed towards the window 32, the third sheet is visible through window 32.

Devices 10, 30 allow multiple advertisements to be displayed by a single device, thus  
15 multiplying the advertising revenue. Furthermore, the motion of the adverts makes them more interesting. Furthermore, several advertisements on a linked theme can be displayed successively, e.g. respective adverts for the economy-class, business-class and first-class cabins of an airline.

20 Device 10 is cheapest to make, but the time taken to switch between adverts is longest (motors 16a, 16b cannot be driven fast without snapping the loop 19 or ribbon 29). Device 30 is most expensive.

Device 30 can display no more than 3 adverts. Note that if the sleeves 35 of device 30 are  
25 replaced by sleeves having a cross-section which is a polygon with more than 3 sides, the device 30 would not work. In the case of a square, this is because the sleeves 35 would collide when they rotate, unless the rollers 34 are mutually spaced so far apart that the gaps between them degrade the appearance of the adverts. In the case of a pentagon (or hexagon, etc.), this is because more than one face of the sleeve 35 would be visible to a passer-by at any time.

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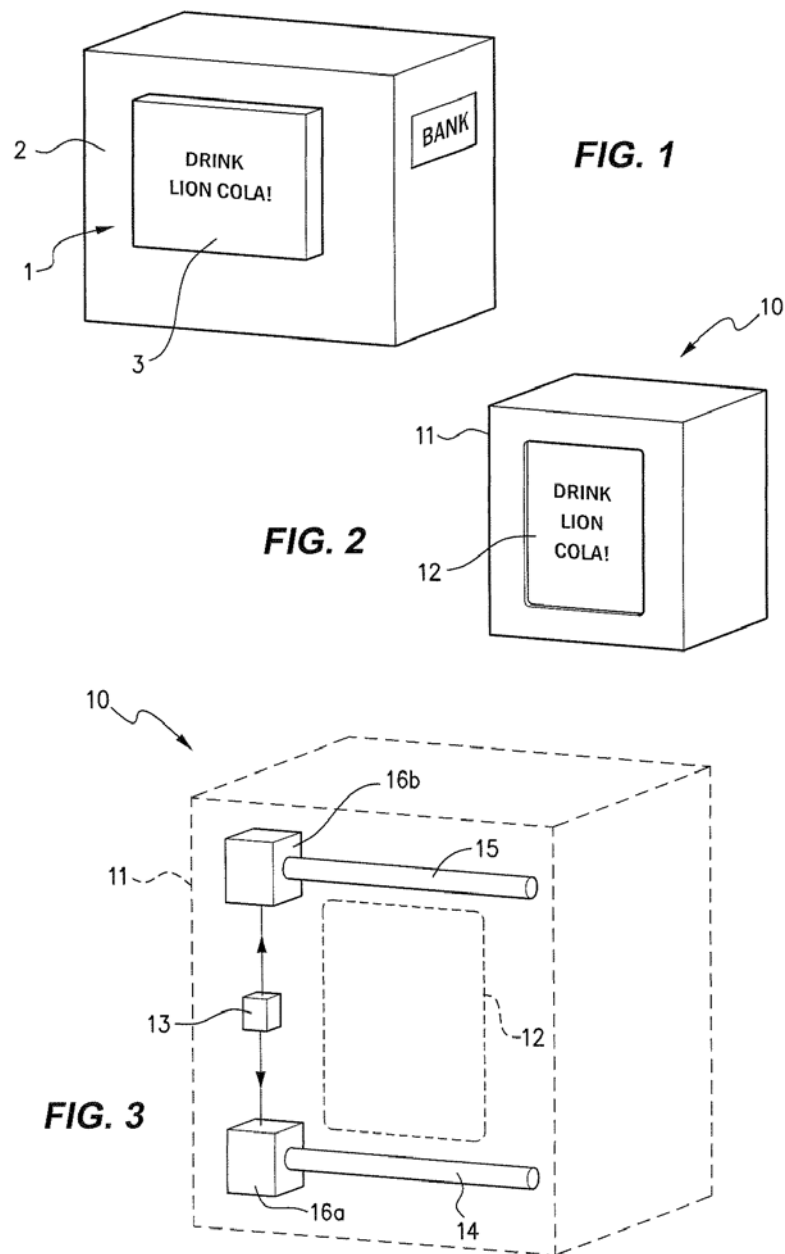
Please draft a patent application for my invention.

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**Document A – Client's write-up of his invention (5/8)**

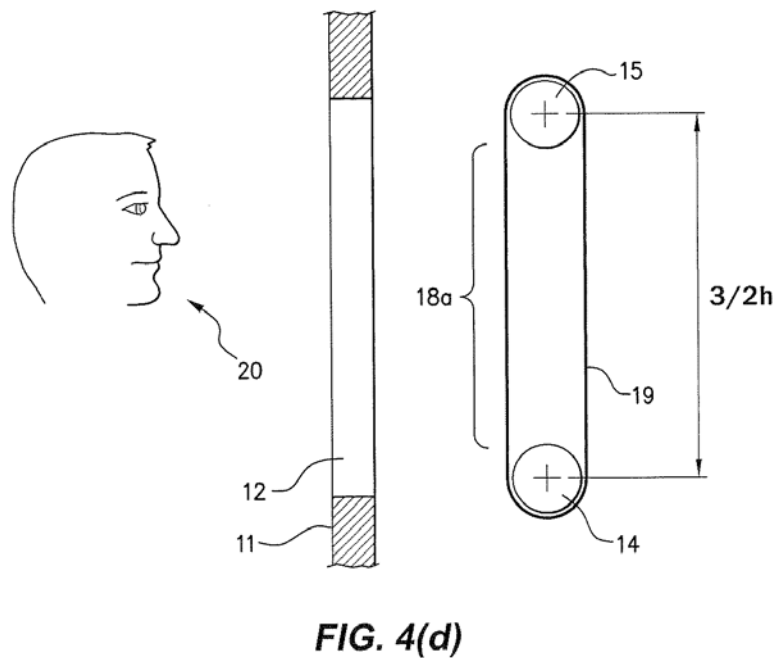
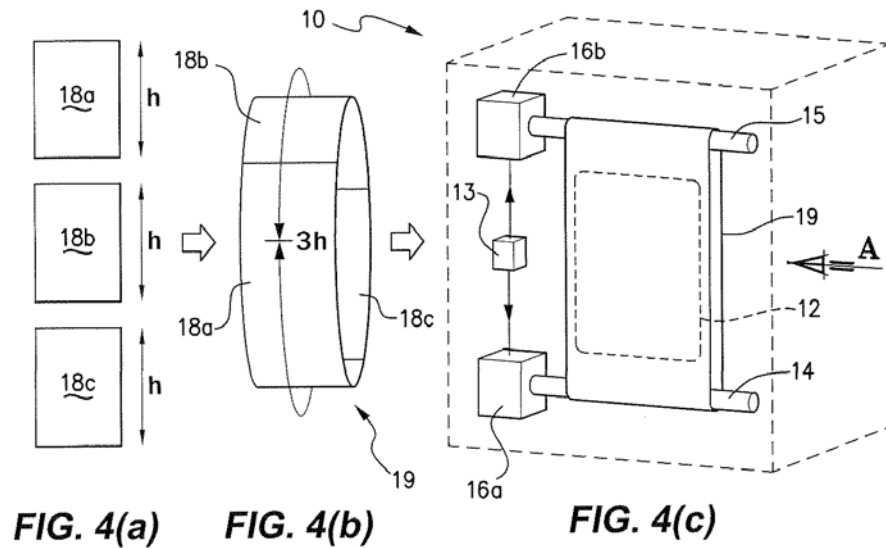


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**Document A – Client's write-up of his invention (6/8)**



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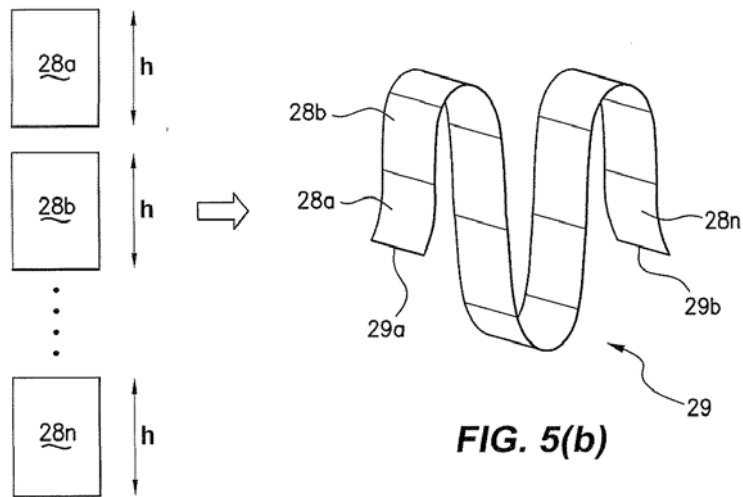
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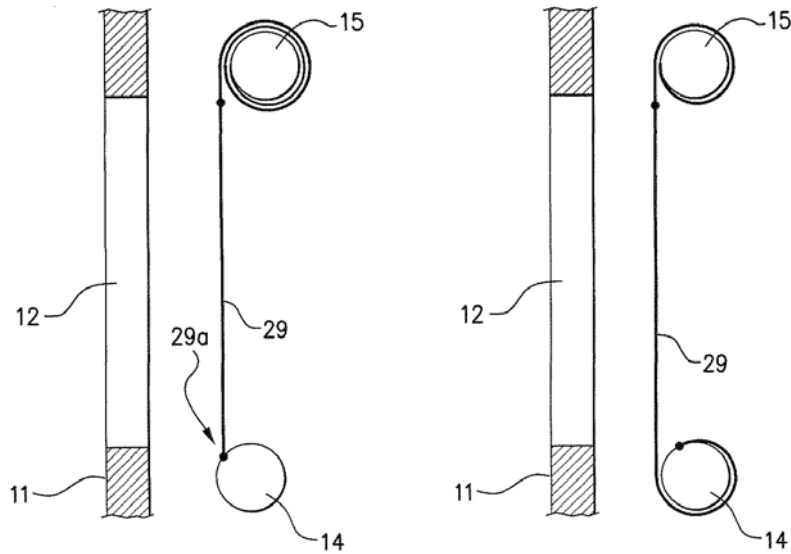
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**Document A – Client's write-up of his invention (7/8)**



**FIG. 5(a)**





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**Document A – Client's write-up of his invention (8/8)**

