

受験番号:24IPM011

問1

[0002]

Bicycle parking lots are equipped with parking devices which lock bicycles. Known techniques include an example parking device in which a wheel is locked with open/close arms engaged with each other at a position slightly higher than the position where the wheel is grounded. This parking device is configured such that the closed arms, which are closed by a spring member, are pushed open by a front wheel of a bicycle, and that when the front wheel comes into contact with a contact plate, a switch is actuated to have the arms close again by the spring member, which locks the arms now encircling the front wheel. The parking device locks the bicycle in this manner. Another example of the known techniques is configured such that the contact plate is pushed down by a front wheel that has reached a parking position, and that the open/close arms connected to the plate are closed to encircle the front wheel.

[0003]

However, wheels of bicycles have difference sizes or thicknesses. Besides, bicycles are properties that belong to the bicycle owners. Thus, just to be safe, the open/close arms are designed to have backlash and play. If the front wheel leans to one side or is not placed at the right position, the front wheel may not be locked properly.

問2

As described above, the fluid injection valve includes: the seat 10 provided at an intermediate portion of the fluid channel and having the seat surface 10a; the valve body 8 configured to control opening and closing of the fluid channel by seating or unseating with respect to the seat surface 10a; and an injection hole plate 11 located downstream of the seat 10 and provided with a plurality of injection holes 12. Here, the flow in each injection hole and the flow immediately after the flow through each injection hole are substantially liquid film flows. According to the method for generating mists using this fluid injection valve, the injected flows 30, 31 from the injection holes 12, 12 are not necessarily aligned with the central axes of the respective

injection holes 12, and do not necessarily intersect with each other downstream of the holes. When the injected flow from each injection hole 12 turns into mists at a downstream position, the mists of the injected flows are brought closer to each other, or merged with each other, due to the Coanda effect which acts on the plurality of mists. As a result, substantially one solid cone of the mists is formed. After the formation of the solid cone of the mists, the entrainment of ambient air based on the momentum theory of the mists, and the inducement of airflow along a downstream direction of the mists in a predetermined portion thereof, are mainly caused. The distribution of the injection amounts is kept at peak substantially in the center of the cross-section of the flow of the mists, and the angle of injection is maintained at a small degree, until such behavior substantially disappears. As a result, finer fuel mists through the injection and a higher degree of flexibility in designing the shape of the mists, the mist patterns, and/or the distribution of the injection amounts can be achieved. It is clear that the peak of the distribution of the injection amounts does not have to be substantially in the center of the cross-section of the flow of the mists, and that the angle of injection does not have to be as small as possible. It is also clear that the same or similar effects can be obtained even if the injection hole plate 11 is configured as a nozzle integrally formed with the seat 10.

### 問 3

1. A refill (2) of a ballpoint pen (1), comprising:
  - a first annular member (3) having an outer circumferential surface (5) on a side closer to the rear end (50);
  - a second annular member (4) made of an elastic material and having an inner circumferential surface (6) fitted with the outer circumferential surface (5); and
  - an ink (7) stored in a space defined by the first annular member (3) and the inner circumferential surface (6), wherein
    - the outer circumferential surface (5) includes
      - a first inclined portion (51) having an increased outer diameter away from the rear end,
      - a first annular portion (52) continuous with the first inclined portion,
      - a second inclined portion (53) continuous with the first annular portion (52) and having a decreased outer diameter away from the rear end,
      - an annular recessed portion (54) continuous with the second inclined

portion (53),

a third inclined portion (55) continuous with the annular recessed portion (54) and having an increased outer diameter away from the rear end, and

a second annular portion (56) continuous with the third inclined portion (55) and having a uniform outer diameter,

the inner circumferential surface (6) forms an inner diameter larger than an outer diameter of the annular recessed portion (54) and smaller than the outer diameter of the second annular portion (56), before being fitted with the outer circumferential surface (5), and

the first annular portion (52) has an outer diameter larger than the outer diameter of the second annular portion (56).

\*下線部を補って訳しています。