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ANTIBIOTIC SENSITIVITY DISC DISPENSER

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7 Claims. (Cl. 53—237)

This invention relates generally to dispensing devices and in particular to a novel device for dispensing antibiotic sensitivity discs.

Sensitivity discs are utilized in the laboratories of all hospitals for testing the allergy of a patient to antibiotic drugs prior to the administration thereof. The sensitivity discs are kept in sterile containers or vials and heretofore were individually removed by manual operation and placed in a petri dish in which a culture of agar, along with a sample of the blood of the patient has been deposited. Since there are many differing antibiotic drugs, it was necessary to individually remove sensitivity discs from each of the respective vials and then place them individually in the petri dish. Those antibiotic sensitivity discs which reacted in a negative manner were eliminated and the patient was saved from much discomfort. To maintain sterility, the manual handling of these discs consumed a considerable period of time which in many instances was not desirable since emergency treatment was required. Further, the manual handling sometimes introduced contamination and false reactions were observed. Further, many dispensing devices have been devised but all of these had shortcomings in that a plurality of discs could not be instantaneously or concurrently dispensed into the petri dish. This failure resulted from the fact that not all sensitivity discs were of the same thickness; however, they are all substantially of the same diametrical proportion.

The present invention provides a device which will automatically dispense into a petri dish a plurality of differing sensitivity discs without any manual contact with the discs per se. Furthermore, the present invention incorporates features which permit a plurality of sensitivity discs of differing thickness to be concurrently dispensed. The cycle of operation in dispensing the discs by means of the present invention consumes but a fraction of a second and much valuable time is saved. This time factor is extremely essential and especially so in large hospitals where testing procedures are almost continuous as a result of the large number of patients. With the present invention, there is absolutely no undue delay and the administration of the antibiotic drugs may be properly and promptly accomplished.

Accordingly, one of the principal objects of the invention is to provide a novel dispenser for concurrently dispensing into a petri dish a plurality of differing antibiotic sensitivity discs.

Another object of the invention resides in the provision of means to dispense a plurality of sensitivity discs of differing thickness.

Still another object of the invention resides in the provision of a novel carrier for the vials of sensitivity discs so that the vials can be readily interchanged, replaced, etc.

Still another object of the invention is to provide a device which is readily sterilized and which may be readily emptied of all sensitivity discs prior to the sterilization thereof.

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Other ancillary objects will be, in part, hereinafter apparent and will be, in part, hereinafter pointed out.

In the drawings:

Figure 1 is a cross sectional view of the dispenser, taken along line 1—1 of Figure 2 and illustrating the disposition of the device relative to the petri dish;

Figure 2 is a plan elevation of the dispensing device showing a plurality of disc vials disposed therein;

Figure 3 is a fragmentary cross sectional view illustrating the normal position of the carrier in the dispenser;

Figure 4 is a fragmentary cross section of one of the vials with the carrier in actuated position wherein a sensitivity disc has dropped into the petri dish; and

Figure 5 is an enlarged fragmentary detail, shown in cross section, illustrating the spaced relationship of the carrier to the remaining elements by means of which various thicknesses of sensitivity discs are received therein.

Referring to the drawings in detail, 10 generally designates the dispenser which comprises a base section 12 formed with an annular vertical skirt flange 14 which is adapted to overlie a petri dish designated as 16. The base 12 is provided with an annular recess 18 in which the remaining elements of the device are mounted. Base 12 is further provided with a central radial section 20 in which a plurality of apertures 22 are formed. Apertures 22 will be hereinafter described. Disposed within the annular recess 18 is an apertured plate 24 which is provided with a raised center section 26 and which is disposed adjacent to the base plate 20. Apertured plate 24 is known as the carrier plate for purposes hereinafter appearing. Extending vertically from the central section 26 of carrier plate 24 and secured thereto is a shaft 28 which is journaled in a sleeve 30. Sleeve 30 is formed with annular flanges 32 and 34 at the opposite ends thereof against which support members 36 and 38 abut. Support member 36 is a disc formed with a central aperture 40 which is disposed circumjacent to the outer periphery of sleeve 30. Further, disc 36 is provided with an annular flange 42 at its outer periphery. Flange 42 is adapted to receive thereunder a second sleeve 44 of larger diameter than that of sleeve 30.

Support member 38 disposed at the lower end of sleeve 30 is a disc having a similar central aperture 40a which is disposed around the outer periphery of sleeve 30 and abuts against the radial flange 32 thereof. The outer periphery of support member 38 is formed with a sleeve-like section 46 which has external diameter equivalent to the internal diameter of the sleeve 44 and is disposed therein, wherein the lowermost section of the sleeve 44 surrounds the sleeve-like section 46 of support member 38. At the lowermost end of sleeve-like member 46, there is integrally formed therefrom a radial flange 50 which is provided with a plurality of apertures 52 therein. Radial flange 50 is known as the loading plate for a purpose hereinafter apparent, and is arranged adjacent to but spaced from the carrying plate 24. Disposed on the upper surface of the loading plate 50 is an annular disc 54 which is provided with a central aperture 56. Aperture 56 is of such diameter as to receive the sleeve 44 therein.

Means are provided to space the carrying plate 24 apart a predetermined distance from the loading plate 50 and directed toward this end are a plurality of rivets 60—each being formed with a center section 62 of increased diameter greater than the diameter of the remainder of the rivet 60. This enlarged diametrical portion provides a pair of opposed shoulders which abut against the loading plate 50 and the base plate 20. The rivets are disposed equi-distantly apart and are provided with an enlarged head portion 64.

Referring to Figure 1, there is secured to the upper-

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most end of shaft 28 a knob 66 for actuating the carrying plate 24 for a purpose hereinafter appearing. Knob 66 is secured to shaft 28 by conventional pin means 68.

A coil spring 70 having one end secured to knob 66 is circumjacently disposed around shaft 28 and has its other end secured to upper support member 36. Spring 70 is provided for a purpose hereinafter appearing.

Disposed in spaced relation around the outer periphery of sleeve 44 are a plurality of resilient clips 72 in which vials 74 are adapted to be mounted. Clips 72 are so positioned as to align the vials 74 with the respective apertures 76 in plate 56. It will be noted that apertures 76 are of greater diameter than apertures 52 in plate 50. This feature permits the mouth of the vial 74 to project within the aperture 76 and abut against loading plate 50. The inside diameter of dial 74 is equal to the diameter of aperture 52. Accordingly, sensitivity discs 80 conventionally disposed in stacked relation in vials 74, may readily pass through aperture 52 as will be hereinafter described.

Carrying plate 24 is rotatable to a limited degree which is defined by the length of arcuate slots 82 disposed therein. Slots 82 are disposed to receive the portion 62 of rivets 60 therein. Thus, carrying plate 24 may be rotated by means of knob 66 counterclockwise as viewed in Figure 2, the length of slots 82.

As shown in Figures 3 and 4, apertures 23 in carrying plate 24 are normally aligned with apertures 52 in loading plate 50. Therefore, a disc 80 will drop by gravity through aperture 52 into aperture 23 and rest there while resting on base plate 20. Manual rotation of knob 66 against the tension of spring 70 rotates carrying plate 24 with the sensitivity discs 80 which are in apertures 23 therein. As plate 24 reaches the limit of rotation as defined by slots 82, apertures 23 align with apertures 22 in base plate 20 and the discs 80 drop by gravity into the petri dish 16.

Upon the manual release of knob 66, spring 70 counter-rotates carrying plate 24 and restores apertures 23 therein to aligned relation with apertures 52 whereby new discs 80 drop into apertures 23.

The spacing between loading plate 50 and carrying plate 22 as defined by portion 62 of rivets 60, is such that single discs 80 of a maximum thickness may be transported in apertures 23 without binding while preventing two adjacent discs 80 of minimum thickness from entering an aperture 23. Thus, a minimum and maximum disc thickness may be utilized and by conventional practice, established thicknesses are readily accepted by the present device. It is obvious that loading plate 50 will retain the next disc 80 against movement as carrying plate 24 is rotated.

In operation, a simple turning of knob 66 will dispense discs 80 from vials 74. To replace vials 74 when empty, all that is necessary is manual removal thereof. In the event that it is desirable to remove a vial 74 that has discs 80 therein, inverting dispenser 10 to an upside-down position permits all discs 80 to drop into their respective vials since carrying plate apertures 23 are aligned with the vials when in normal position. Removal of the vial 74 and substitution thereof may be readily accomplished when the dispenser is inverted.

The changing of vials 74 in the present device is positive and assures the user that all discs have been removed when a vial is removed by the aforesaid method. The carrying plate 24 is operative only upon rotation of knob 66; therefore, no discs may be retained within the device when the vials are changed.

It is evident from the hereinbefore described elements of construction that the device may be readily emptied and placed in a conventional steam sterilizer when desired without any dismantling thereof.

Thus, there has been described a device in which the several objects of the invention have been accomplished and which will meet the conditions of practical use.

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The invention claimed is:

1. In a dispenser of the class described, in combination, a fixed loading plate having a plurality of apertures therein, means cooperable to support a plurality of containers in predetermined relation on said loading plate, a plurality of apertures in said loading plate adapted to be aligned with openings in the containers, a rotatable carrying plate having a plurality of apertures therein, the carrying plate apertures being normally disposed in aligned relation with the apertures in said loading plate, a fixed base plate having a plurality of apertures therein, said base plate apertures being offset relative to said carrying plate apertures, means cooperating with surfaces of said loading plate and said base plate to fix these plates relative to one another in substantial spaced-apart relation, said latter means being engageable with surfaces of said carrying plate to limit the relative rotation of this plate with respect to said loading plate and said base plate, and means to rotate said carrying plate apertures from alignment with said loading plate apertures to alignment with said base plate apertures.

2. In a dispenser of the class described, in combination, a loading plate having a plurality of apertures therein, means cooperable to support a plurality of containers in predetermined relation on said loading plate, a plurality of apertures in said loading plate adapted to be aligned with openings in said containers, a carrying plate having a plurality of apertures therein, the carrying plate apertures being normally disposed in aligned relation with the apertures in said loading plate, a base plate having a plurality of apertures therein, said base plate apertures being offset relative to said carrying plate apertures, means cooperating with surfaces of said loading plate and said base plate to fix these plates relative to one another in substantial spaced-apart relation, said latter means being engageable with surfaces of said carrying plate to limit the relative rotation of this plate with respect to said loading plate and said base plate, manually operable means to rotate said carrying plate apertures from alignment with said loading plate apertures to alignment with said base plate apertures, and resilient means to restore said carrying plate apertures to their initial alignment with said loading plate apertures.

3. In a dispenser of the class described, in combination, a loading plate having a plurality of apertures therein, means cooperable to support a plurality of containers in predetermined relation on said loading plate, a plurality of apertures in said loading plate adapted to be aligned with openings in the containers, a carrying plate having a plurality of apertures therein, the carrying plate apertures being normally disposed in aligned relation with the apertures in said loading plate, a base plate having a plurality of apertures therein, said base plate apertures being offset relative to said carrying plate apertures, means cooperating with surfaces of said loading plate and said base plate to fix these plates relative to one another in substantial spaced-apart relation, said latter means being engageable with surfaces of said carrying plate to limit the relative rotation of this plate with respect to said loading plate and said base plate, and means to rotate said carrying plate apertures from alignment with said loading plate apertures to alignment with said base plate apertures.

4. In a dispenser of the class described, in combination, a loading plate having a plurality of apertures therein, means cooperable to support a plurality of containers in predetermined relation on said loading plate, a plurality of apertures in said loading plate adapted to be aligned with openings in the containers, a carrying plate having a plurality of apertures therein, the carrying plate apertures being normally disposed in aligned relation with the apertures in said loading plate, a base plate having a plurality of apertures therein, said base plate apertures being offset relative to said carrying plate apertures, means cooperating with surfaces of said loading plate

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and said base plate to fix these plates relative to one another in substantial spaced-apart relation, said latter means being engageable with surfaces of said carrying plate to limit the relative rotation of this plate with respect to said loading plate and said base plate, means to rotate said carrying plate apertures from alignment with said loading plate apertures to alignment with said base plate apertures, a skirt extending upwardly and thence downwardly to provide a support for said dispenser and also provide a channel to receive the rim of a supported petri dish introduced into position within said skirt by passing the latter over the same; said skirt preventing lateral displacement of said dish with respect to said dispenser.

5. A dispenser including in combination a hollow base support to receive a dish, said support having a horizontal portion formed with an annular series of apertures, a rotatable carrying plate overlying said base plate, a loading plate overlying said carrying plate, both the latter and said loading plate being formed with series of apertures disposed similarly to those of said support, means cooperating with surfaces of said loading plate and said base plate to fix these plates relative to one another in substantial spaced-apart relation, said latter means being engageable with surfaces of said carrying plate to limit the relative rotation of this plate with respect to said loading plate and said base plate, a rotatably mounted shaft connected centrally of said carrying plate and extending upwardly therefrom, disc-carrying vials mounted by said loading plate in line with the apertures thereof and the upper end of said shaft extending beyond said vials to provide a manipulating portion for the rotation of said carrying plate.

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6. In a dispenser as specified in claim 5, a supporting structure fixed with respect to said loading plate and a spring connected to said structure and shaft to cause said carrying plate to assume a predetermined position with respect to said base.

7. A dispensing apparatus comprising in combination: a supporting structure embracing a pair of vertically spaced plates, each formed with a series of openings, the individual openings in one plate being non-aligned with openings in the other plate, a dispensing structure including a plate also formed with a series of openings, means for supporting said latter plate at a point intermediate the plates of said pair, means cooperating with surfaces of the plates of said pair to fix these plates relative to one another in substantial spaced-apart relation, said latter means being engageable with surfaces of the plate of said dispensing structure to limit the relative shifting of this plate with respect to the plates of said pair, and means connected to one of said structures and extending beyond all of said plates for shifting the plate of said dispensing structure with respect to the plates of said pair to align certain of the openings of different plates.

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