Aug. 29, 1967 R. H. McBEE 3,338,795

CULTURE TUBE ROLLING MACHINE

Filed Nov. 13, 1964 2 Sheets-Sheet 1

Fig. 1

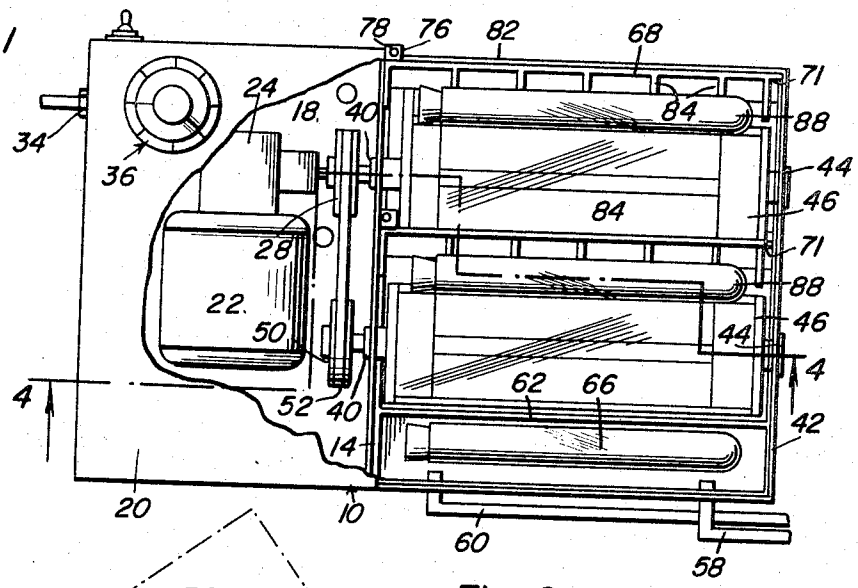


Fig. 2

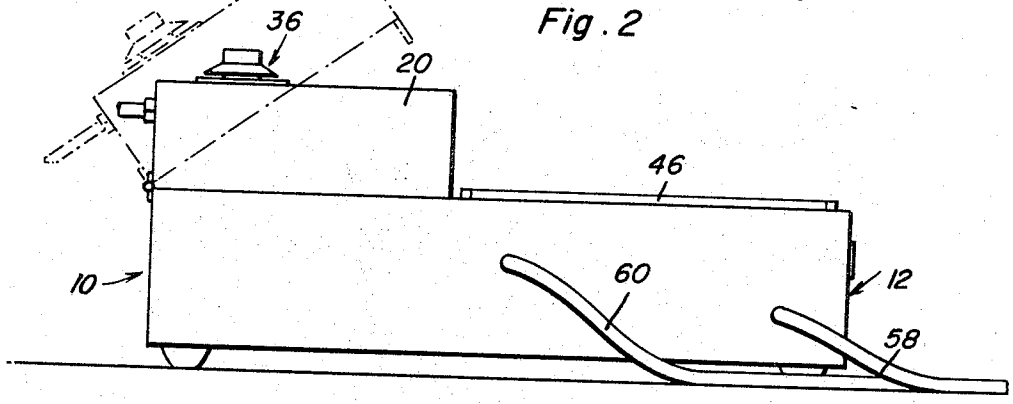
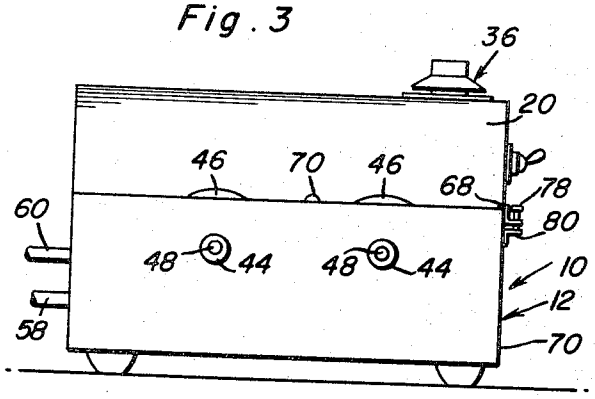


Fig. 3



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Filed Nov. 13, 1964 2 Sheets-Sheet 2

Fig. 4

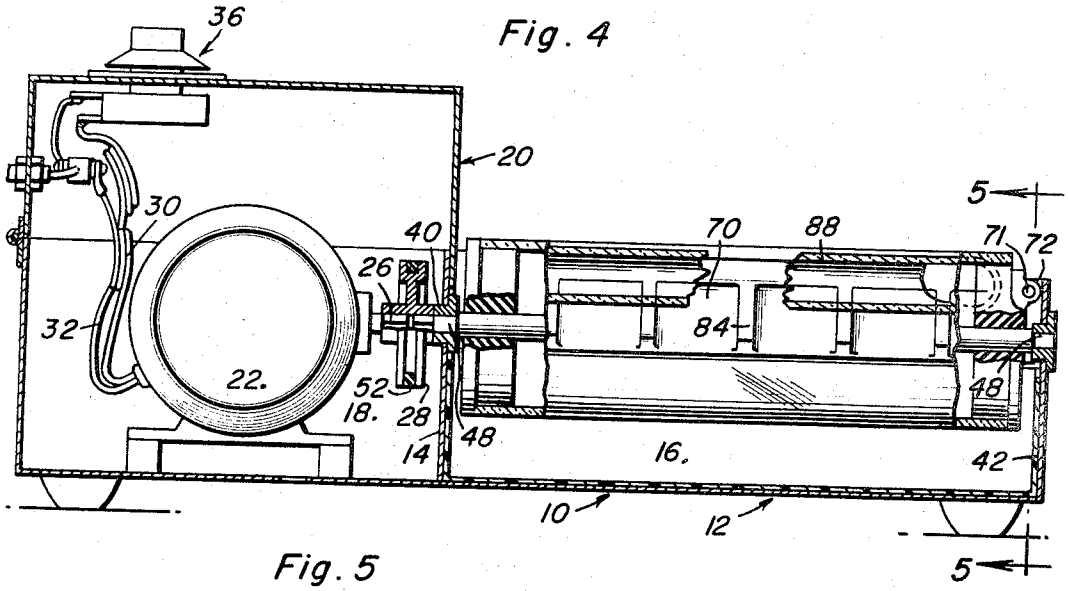


Fig. 5

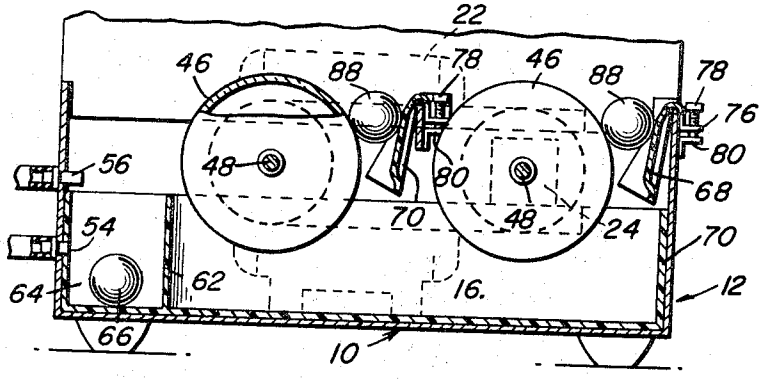
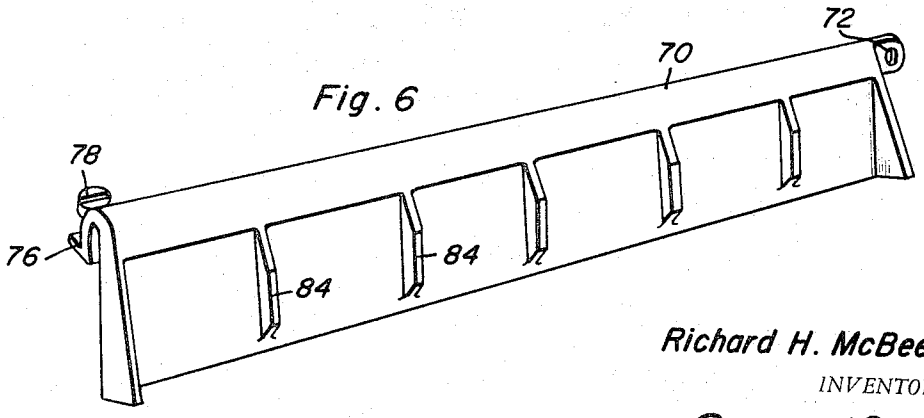


Fig. 6



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CULTURE TUBE ROLLING MACHINE

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12 Claims. (Cl. 195—127)

ABSTRACT OF THE DISCLOSURE

An apparatus for supporting and journaling a cylindrical member for rotation about its longitudinal axis while in a generally horizontally disposed position and including at least one elongated roller from which the cylindrical member is supported in part and with which the cylindrical member is rollingly engaged, the roller being driven and including lower peripheral portions disposed in a bath of heat transferring liquid whereby the heat transferring liquid will be applied to the periphery of the roller upon its rotation and transferred to the periphery of the cylindrical member so as to accomplish a transfer of heat to or from the cylindrical member.

This invention relates to a novel and useful machine and more specifically to a machine designed primarily to support and roll culture tubes in a manner to cause a melted agar-containing bacterial culture medium to be distributed in a uniform layer on the inside wall of the tube where it will solidify when cooled. In addition, the culture tube rolling machine may also be used to cause other materials to be spread over the surface of a tube of culture medium which has been previously spread over the inner surface of the tube by the rolling machine.

The tube rolling machine of the instant invention also includes means whereby the culture tube may be cooled during the rolling process thereby enabling the melted agar-containing bacterial culture medium to be simultaneously distributed in a uniform layer on the inside wall of the tube and cooled.

The tube rolling machine of the instant invention is constructed in a manner whereby it may be readily modified so as to accommodate culture tubes of varying diameter and length and the tube rolling machine also includes drive means which may be readily varied so as to roll the culture tube at substantially any desired speed.

The main object of this invention is to provide a tube rolling machine of precision quality thereby affording means by which a culture tube may be rotated at a precise speed while being cooled.

Another object of this invention, in accordance with the immediately preceding object, is to provide a culture tube rolling machine including means by which a precise quantity of cooling fluid may be caused to flow over the culture tube being rolled by the machine.

Still another object of this invention, in accordance with the immediately preceding object, is to provide a culture tube rolling machine including water cooling means having structural features which will automatically increase the amount of cooling liquid caused to flow over the outer surfaces of the culture tube being rotated thereby in direct response to an increase in the speed of rotation of the culture tube.

Another object of this invention is to provide a culture tube rolling machine including means for supporting and rolling a culture tube with the means for supporting and rolling the culture tube also including means for inclining the culture tube enabling the melted agar-containing bacterial culture medium disposed in the tube being rolled to be spread from one end of the tube toward the other as the tube is rolled.

A final object of this invention to be specifically enumerated herein is to provide a culture tube rolling machine in accordance with the preceding objects which will conform to conventional forms of manufacture, be of simple construction and easy to use so as to provide a device that will be economically feasible, long lasting and relatively trouble free in operation.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a top plan view of the culture tube rolling machine of the instant invention shown with portions of the motor compartment cover broken away;

FIGURE 2 is a side elevational view of the assembly illustrated in FIGURE 1 and with an alternate position of the motor compartment cover shown in phantom lines;

FIGURE 3 is an end elevational view of the assembly illustrated in FIGURE 2 and as seen from the right side thereof;

FIGURE 4 is a longitudinal vertical sectional view taken substantially upon the plane indicated by the section line 4—4 of FIGURE 1 and on somewhat of an enlarged scale;

FIGURE 5 is a fragmentary transverse vertical sectional view taken substantially upon the plane indicated by the section line 5—5 of FIGURE 4; and

FIGURE 6 is a perspective view of one of the elongated members of the machine utilized to support the culture tube while it is being rolled and to incline the culture tube if it is desired to do so.

Referring now more specifically to the drawings, the numeral **10** generally designates the culture tube rolling machine of the instant invention. The machine **10** includes an open top receptacle generally referred to by the reference numeral **12** including a partition wall assembly **14** disposed therein and extending transversely thereof dividing the receptacle **12** into a liquid reservoir compartment **16** and a motor compartment **18**.

The motor compartment **18** includes a hinged cover assembly generally referred to by the reference numeral **20** and has an electric motor **22** disposed therein including a speed reduction assembly **24** on whose output shaft **26** a drive pulley **28** is mounted. The electric motor **22** has a pair of electrical conductors **30** and **32** operatively connected thereto and the ends of the electrical conductors **30** and **32** remote from the motor **22** pass through a grommet **34** in the hinged closure cover assembly **20** of the motor compartment **18**. In addition, a rheostat switch assembly generally referred to by the reference numeral **36** is serially connected in the conductor **32** and may be utilized to vary the speed of the electric motor **22** and thus the output shaft **26** when the electric motor **22** is electrically connected with a suitable source of electrical potential (not shown) by means of the conductors **30** and **32**.

The partition wall or assembly **14** has a pair of bushings **40** secured therethrough and the end wall **42** of the receptacle **12** forming the remote end of the liquid reservoir **16** also has a pair of bushings **44** secured therethrough aligned with the bushings **40**. A pair of rollers **46** each including a pair of opposite end stub axle portions **48** are journaled between the partition wall **14** and the end wall **42** with the stub axle portions **48** rotatably received in corresponding pairs of the bushings **40** and **44**. One of the stub axle portions projecting through the partition wall **14** is aligned with the output shaft **26** and keyed to the drive pulley **28**. The other stub axle portion **48** projecting through the partition wall **14** has a pulley **50** mounted thereon and an endless flexible belt **52** is entrained over

the pulleys **28** and **50**. In this manner, the rollers **46** will each be driven by means of the output shaft **26** of the speed reduction assembly **24** upon operation of the electric motor **22**.

The liquid reservoir **16** includes a liquid inlet **54** and a liquid outlet **56** to which inlet and outlet hoses **58** and **60**, respectively, are secured. The inlet hose **58** is adapted to be communicated with a suitable source (not shown) of cooling liquid at its inlet end.

The liquid reservoir **16** includes a longitudinal low partion **62** defining a tube storage compartment **64** in which a culture tube **66** may be disposed. The partition **62** extends almost to the liquid level which will be defined by the outlet **56** and to a point adjacent the closest roller **46**. In this manner, should the culture tube **66** be floating in the cooling liquid disposed within the storage compartment **64**, the culture tube **66** will be prevented from engaging the roller **46** adjacent the partition **62**.

With attention now invited to FIGURES 1, and 4–6 of the drawings there may be seen a pair of generally horizontally disposed and upstanding elongated panel-like supports **68** and **70** which are pivotally secured to the end wall **42** by means of suitable pivot fasteners **71** secured through apertured ear portions **72** formed on corresponding ends of the panel-like supports **68** and **70**. The ends of the panel-like supports **68** and **70** remote from the apertured ear portions **72** include laterally outwardly directed horizontal flanges **76** through which adjusting abutment screws **78** are threadedly engaged, the lower ends of the adjusting screws **78** abutting against horizontal abutment flanges **80** supported from the partition wall **14** and the side wall **82** of the reservoir **12**.

The panel-like supports **68** and **70** generally parallel and are disposed closely adjacent the corresponding rollers **46** and include laterally outwardly projecting rib portions **84** which coact with the rollers **46** to form cradle means for cradling the culture tubes **88**.

Inasmuch as the culture tubes **88** are in part supported by the rollers **46**, rotation of the rollers **46** in counterclockwise directions as viewed in FIGURE 5 of the drawings will effect rotation of the culture tubes **88**. In addition, it will be noted that the lower peripheral portions of the rollers **46** are disposed below the liquid level which will be defined by the outlet **56** and thereby that the rollers **46** will be wetted by the liquid within the reservoir **12**. As the rollers **46** rotate in order to effect rotation of the culture tubes **88**, some of the cooled liquid entering the reservoir **12** by means of the inlet **54** will adhere to the rollers **46** and be transferred to the outer surfaces of the culture tubes **88**. In this manner, as the melted agar-containing bacterial culture medium is distributed in a uniform layer on the inside surfaces of the tubes **88** it will solidify because of the cooling effect of the cooling liquid transferred from the rollers **46** to the outer surfaces of the tubes **88**.

If it is desired, the ends of the panel-like members **68** and **70** may be vertically adjusted so as to incline the tubes **88** merely by adjusting the adjusting abutment screws **78**.

Further, if it is desired meshed gear wheels may be utilized to drivingly connect the rollers **46** in lieu of the endless flexible belt **52** and means (not shown) may be provided for enabling the level of the cooling liquid within the reservoir **12** to be adjusted.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A culture tube rolling machine comprising a support, at least one horizontally disposed elongated cradle means supported from said support and adapted to cradle an elongated horizontally disposed culture tube, each cradle means including drive means adapted to be engaged by said culture tube and to rotate said tube about its longitudinal axis, said support comprising a liquid reservoir adapted to have liquid of a predetermined temperature disposed therein to a predetermined level, each of said cradle means including means adapted to support a culture tube above said liquid level, and said drive means including means adapted to convey some of said liquid onto the outer surfaces of said tube, said drive means of each of said cradle means comprising a horizontal roller, at least the lower peripheral portions of said roller being disposed in said liquid, said drive roller functioning as a transfer roller and comprising said means adapted to convey said liquid onto the outer surfaces of said tube.

2. The combination of claim **1** wherein said drive means includes driving variable speed motor means.

3. The combination of claim **1** wherein said cradle means includes adjustment means adapted to adjustably longitudinally incline said culture tube.

4. The combination of claim **1** wherein said roller comprises one side of said cradle means, the other side of said cradle means comprising an elongated generally horizontal support, said roller and said horizontal support generally paralleling each other adapted to cradle said tube therebetween.

5. The combination of claim **4** wherein said horizontal support is pivotally supported from said reservoir at one end for rotation about a horizontal transverse axis, and means supporting the other end of said horizontal support from said reservoir for vertical adjustment.

6. The combination of claim **1** wherein said roller comprises one side of said cradle means, the other side of said cradle means comprising an elongated generally horizontal support, said roller and said horizontal support generally paralleling each other and adapted to cradle said tube therebetween, said elongated generally horizontal support including a plurality of vertically extending laterally outwardly projecting contact members projecting toward said roller and adapted to contact and support said tube from the adjacent side thereof.

7. The combination of claim **1** wherein said support includes a plurality of said cradle means arranged in laterally spaced side by side relation.

8. In combination, a generally horizontal tube container which is to be rotated about its longitudinal axis and whose temperature is to be changed, and a support, said support including means defining elongated horizontal cradle means forming a generally horizontally disposed upwardly opening recess in which said tube container is disposed, one side portion of said recess being defined by horizontally disposed driven roller means journaled from said support and against which the adjacent surfaces of said tube container are rollingly engaged for partial support therefrom, said support including means operative to apply heat transferring liquid to and about the periphery of said roller means in response to its rotation relative to said support means, whereby said heat transferring liquid will be transferred from said roller means to said tube container at the point of rolling contact of said tube container with said roller means.

9. The combination of claim **8** wherein said means operative to apply heat transferring liquid to said roller means comprises a liquid reservoir defined by said support means, a quantity of said liquid in said reservoir, the lower peripheral portions of said roller projecting down into said liquid.

10. The combination of claim **8** wherein said cradle means also includes an elongated horizontally disposed guide support member generally paralleling said roller means and defining the other side portion of said recess, said guide support member including surface portions thereof from which said tube container is supported and

with which the adjacent surface portions of said tube container are slidingly engaged.

11. The combination of claim **10** wherein said guide support member includes one end thereof supported from said support for vertical adjustment relative to the latter.

12. The combination of claim **8** wherein said cradle means also includes an elongated horizontally disposed guide support member generally paralleling said roller means and defining the other side portion of said recess, said guide support member including surface portions thereof from which said tube container is supported and with which the adjacent surface portions of said tube container are slidingly engaged, said surface portions of said guide support member being spaced apart longitudinally of said guide support member and facing upwardly, said longitudinally spaced surface portions facing slightly upwardly and opposing the adjacent upper peripheral portions of said roller means with which said generally horizontally disposed tube container is rollingly engaged.

References Cited

UNITED STATES PATENTS

1,997,761	4/1935	Bailey et al.	47—95 X
2,096,866	10/1937	Thompson	118—55
2,510,858	6/1950	Black	259—89 X
2,597,291	5/1952	Clegg	259—89 X
3,163,404	12/1964	Kraft	259—81 X
3,175,762	3/1965	Dinter	233—11
3,238,115	3/1966	Pedersen	23—253 X

OTHER REFERENCES

Parker: Methods of Tissue Culture, 3rd ed., pp. 158 and 159, November 1961.

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