Jan. 9, 1940. S. ROSENTHAL 2,186,432

APPARATUS FOR STAINING SPECIMENS

Filed May 6, 1938 3 Sheets-Sheet 1

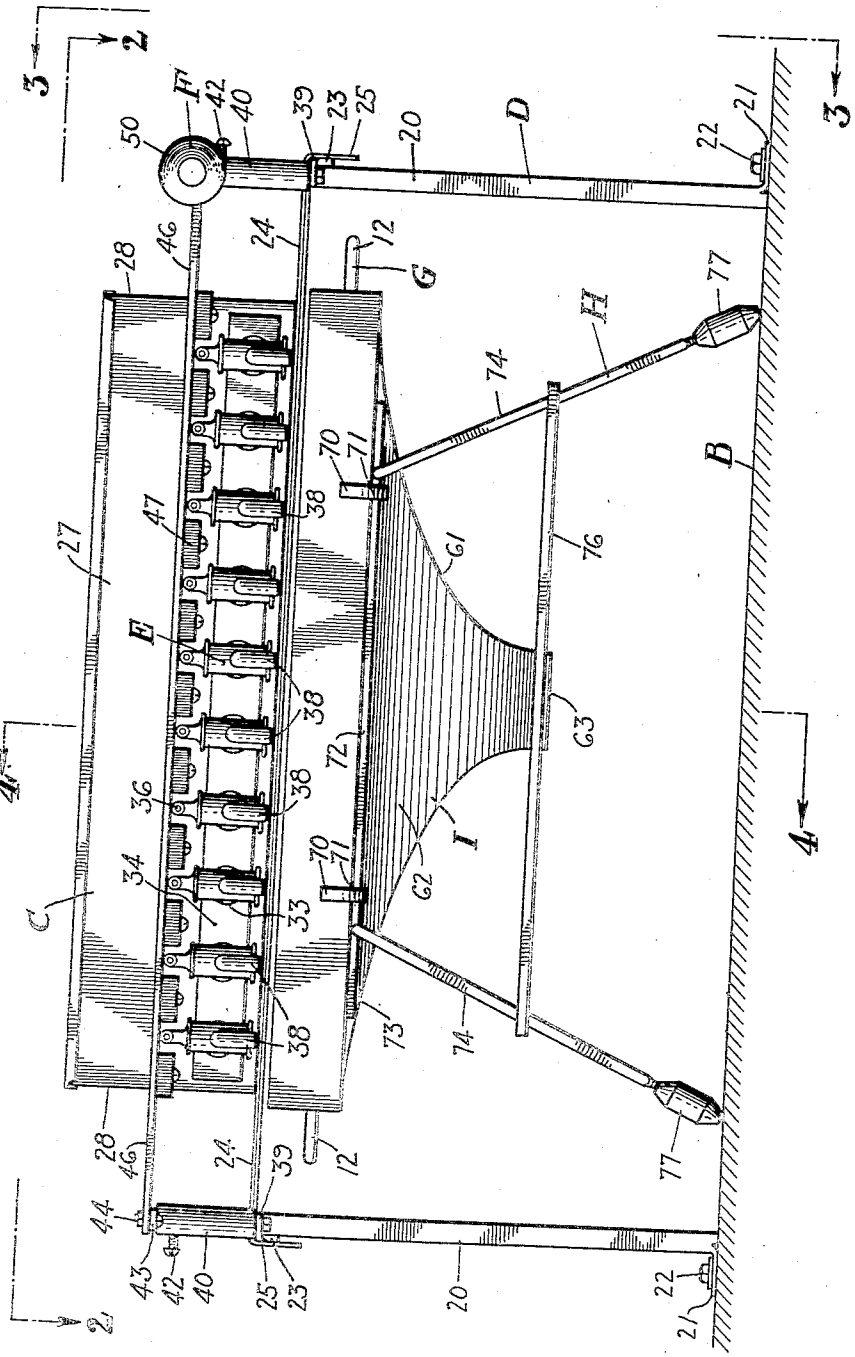


Fig. 1.

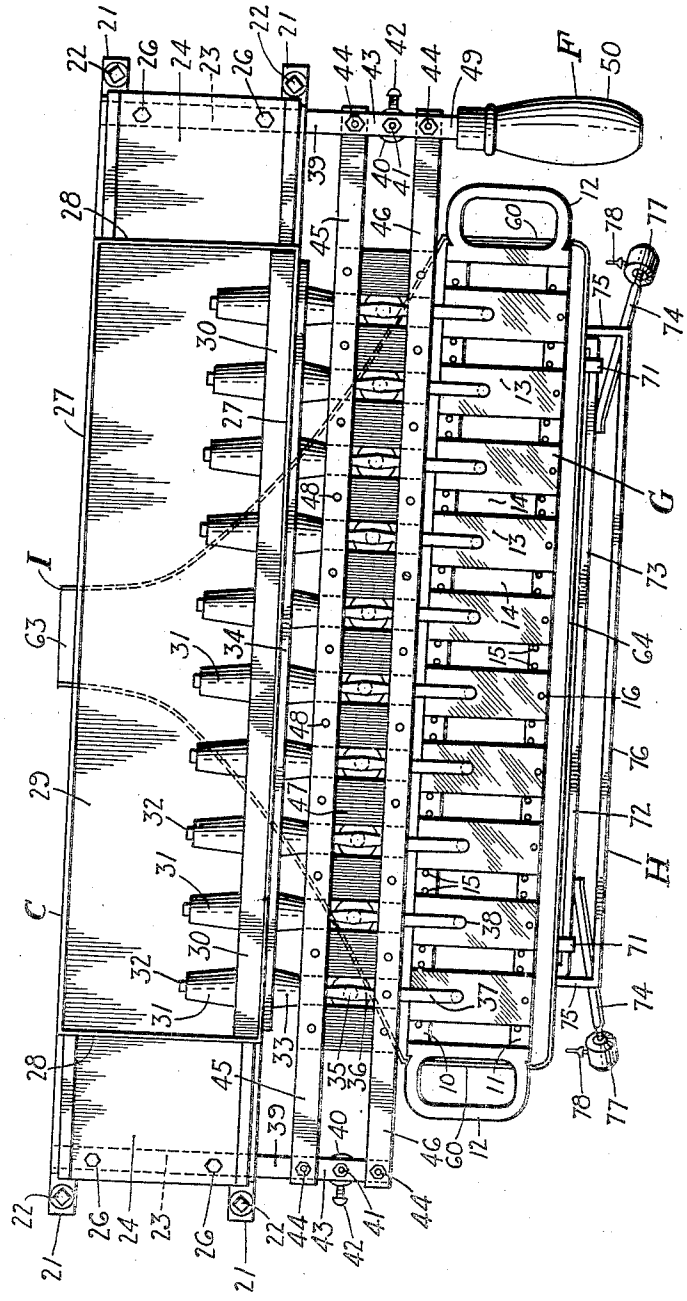
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Fig. 2.



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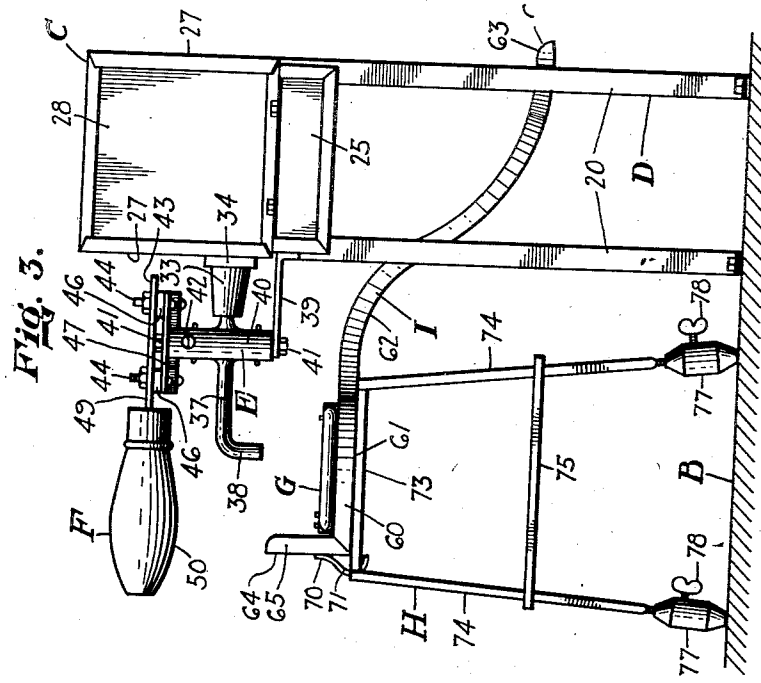


Fig. 3.

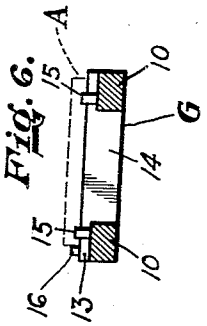


Fig. 6.

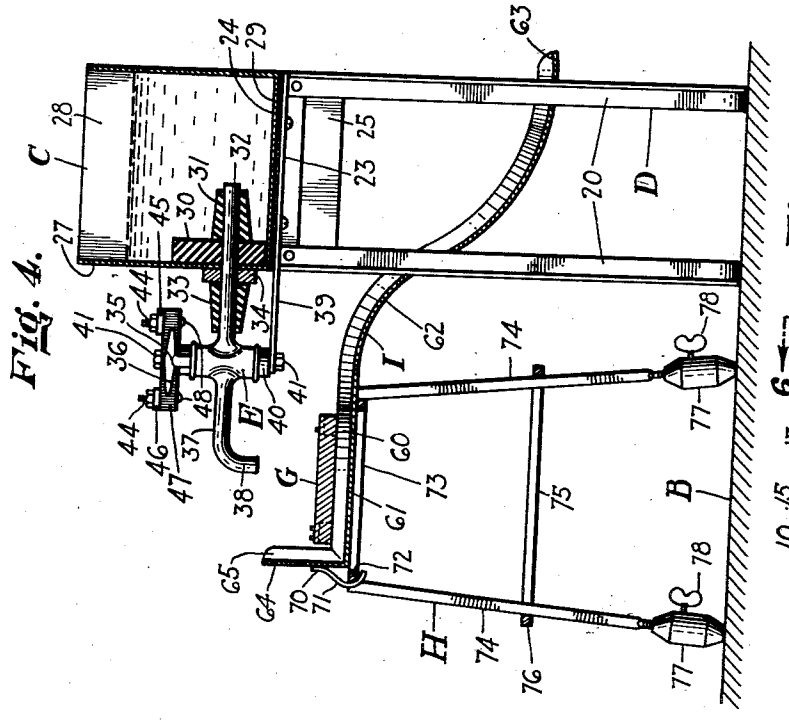


Fig. 4.

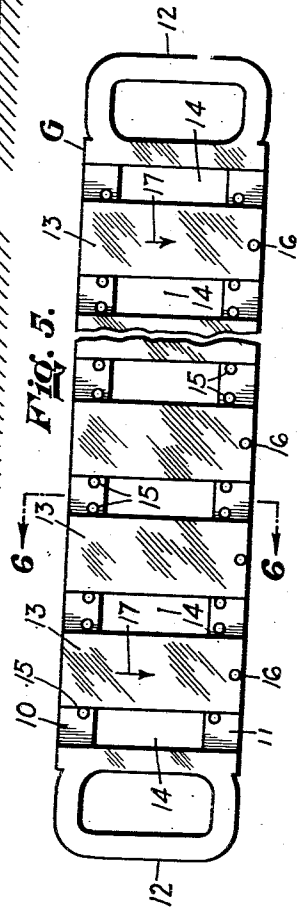


Fig. 5.

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APPARATUS FOR STAINING SPECIMENS

Samuel Rosenthal, Brooklyn, N. Y.

Application May 6, 1938, Serial No. 206,428

6 Claims. (Cl. 91—60)

The present invention relates to a sampling device and particularly relates to a process and system which will permit a series of specimens to be treated and stained for biological, bacteriological or other purposes.

Where a large number of specimens are to be examined as is necessary in public health work, and particularly where sputum is to be examined from many sources, it is desirable that a large number of specimens be processed by evaporation, staining, and so forth, at the same time, to save labor and enable more uniform treatment and staining.

However, considerable difficulty has been experienced in treating a large number of specimens at the same time particularly when they are deposited on glass slides because difficulty in preventing mixtures between the different specimens.

It has not been found satisfactory to place glass slides containing the specimens, such as sputum samples, on a common tray since there is liability of intermixture between the different specimens when they are dipped in a tank containing staining or decolorizing solution and therefore, it is not possible accurately to treat or stain the different specimens with convenience and with rapidity.

It is, therefore, among the objects of the present invention to provide an improved process and system for treating specimens for biological and bacteriological purposes according to which the various specimens may be kept free from contamination and inter-mixture with one another and according to which it will be possible conveniently and rapidly to treat and stain the various specimens.

Other objects will be obvious or will appear during the course of the following specification.

According to a preferred application of the present invention, a holder or tray is preferably provided for a plurality of glass slides which holder or tray will accurately position the glass slides during treatment, bleaching or staining.

The tray is so constructed that there will be no intermixture of the specimens upon the glass slides and so that treating solutions from one specimen slide will not tend to flow or become commingled with the specimen on another treating slide.

In the preferred construction of the present invention, a special device is employed for dropping and enabling the application of staining and bleaching solutions upon the various slides and such construction may consist of a tank provided with a suitable number of spaced and correctly positioned faucets or drip plugs through which the staining solution may be permitted to drop upon the slides.

The carrier or tray for the slides may be conveniently arranged to cooperate with said faucets and any suitable means may be provided for heating the tray and the slides carried thereon, either by external heat or by resistance heaters included in the structure of the slide itself.

In the drawings is shown one of the many possible embodiments according to the present invention by way of illustration and not by way of limitation because many changes and alterations may be made all within the scope of the present invention.

In the drawings:

Figure 1 is a front view of a staining apparatus together with the tray, which apparatus may be broadly applied in connection with other treatments than the application of staining solutions.

Figure 2 is a top view upon the lines 2—2 of Figure 1.

Figure 3 is a side view upon the line 3—3 of Figure 1.

Figure 4 is a transverse sectional view upon the line 4—4 of Figure 1.

Figure 5 is a top view of the tray broken away to shorten the length thereof.

Figure 6 is a cross sectional view upon the line 6—6 of Figure 5.

The present invention is particularly directed to the tray or holder best illustrated upon Figures 5 and 6 and shown in combination with the other apparatus in Figures 1 to 4.

Referring particularly to Figures 5 and 6, the tray may be made of a metal casting or of fabricated metal having the longitudinal bar elements 10 and 11, the end handle members 12 and the elevated plate support members 13.

The plate support members preferably project above the bars 10, as best shown upon Figure 6, and the open spaces 14 separate the plate holders 13, assure that there will be no seepage of liquid from one holder 13 to the other.

Extending upwardly from the longitudinal bar elements 10 are the pins 15. These pins 15 position the plates or slides indicated in dotted lines at A in Figure 6 upon the supports 13. The pins 16, projecting upwardly directly from the tops of the elevated holders or supports 13, limit the insertion or fix the position of the plates A carrying the specimens.

Generally, the plates after receiving a specimen are placed upon the supports 13 in the direc-

tion indicated by the arrows 17 and then a group of specimen plates depending upon the number of supports 13, may be handled as a unit by the handles 12.

Although the bar or tray best shown in Figures 5 and 6 may be made of cast aluminum or of magnesium or copper alloy, it may also be made of plastic materials or other metals or even of ceramics.

It is readily possible to include electrical resistance elements therein or the entire tray may be directly or indirectly heated by means of flames, steam, and so forth.

Normally, each glass slide A receives one or two drops of a sputum specimen selected from a jar to form a smear about one half inch wide and about one inch long.

These slides containing the specimens are then placed upon the tray of Figures 5 and 6, which trays are heated by electrical resistance heaters which latter heaters may be incorporated in the body of the elements 13 or by steam or gas flame. The heating is continued until the specimens are dried and fixed without charring.

At this time, it is desirable to place a predetermined small quantity of a stain upon each slide, for example, 1 cc. of fuchsine per slide.

As a general rule, this should be done fairly rapidly and the stain should be applied to each slide at the same time so that uniform results may be attained and this cannot be readily done by a dropper by an individual who must handle each slide successively.

For this purpose, there is a metering system for applying treating solutions to the entire group of slides upon the tray, shown in Figures 1 to 4. This apparatus includes a support B having a reservoir C supported by the standard D, which reservoir is supplied with measuring means E provided with a controller F.

The trays G are supported upon an adjustable standard H and a run off device or drain tray I is provided for removing excess treating solution. The slide carrying tray G is supported upon said standard H by said run off device I.

Attached to the support B and forming part of standard B are the four legs 20 of angle stock having the outturned foot elements 21 which are bolted in position at 22, on the support B.

The upper ends of the legs 20 are connected by the cross bars 23.

The sheet metal extensions 24 of the reservoir structure C extend outwardly and have downturned lips 25 extending over the upper ends of the bars or legs 20. The extensions 24 are bolted down at 26 to the angular cross bars 23.

The reservoir consists of a rectangular container having the side walls 27, the end walls 28 and the bottom 29. It has an inside board 30 having a plurality of stoppers 31 in which fit the tubes 32 extending inwardly from the metering construction E. These tubes 32 each extend through an opening in the front wall 27 of the reservoir.

The tubes also pass through the stoppers 33 which are pressed against the front board 34 in front of the wall 27 of the reservoir C.

At the front entrance of the tube 32 are the stop cocks 35 each provided with a handle 36 and a drip nozzle or extension 37 (see Figures 1 and 2). The front forward portions 38 of the nozzles 37 are designed to be positioned directly and centrally over the elements 13.

Extending forwardly from the cross bar elements 23 are the bars 39 to the forward ends of which are attached the tubes 40 receiving a bolt 41, which is fixed in position by the set screws 42.

The bolt 41 serves as a pivot mount for the bars 43, which bars therein are provided with pivotal connections 44 to the longitudinal bars 45, 46. The bars 45, 46 carry the cross members 47 by the swinging connections or pivots 48.

The elements 47, as best shown upon Figures 1 and 2, extend substantially the entire distance between the cock actuators 36 so that movement of the bars 45 and 46 will cause a movement of the elements 47 sufficient to move the actuators 36 in unison.

The element 43 at the right hand side of the device is preferably provided with an extension 49 having the handle 50 by which the entire row of stop cocks 35 may be actuated at once to permit one or two or more drops to fall upon the slides A supported upon the holders 13.

It is obvious of course, that many other types of actuators may be utilized than the one shown at F and also other types of proportion and metering devices may be employed other than the stop cocks specifically shown at 35. If desired, fixed metering devices might be employed having a single outlet from the reservoir C instead of the plurality of stop cocks each having a separate connection to said reservoir C.

If desired, there may be a single metering device which could control the feed to all of the dripping devices and each dripping device may be made of such a high resistance as to control the flow of staining or treating solution without separate manipulation of each outlet or dripper.

The tray G is desirably supported upon the side flanges 60 of the pan element 61 which has a run off 62 with a spout 63 which may empty into a suitable waste reservoir.

From the floor 61 extends upwardly the back plate 64 having the side flanges 65 which close the back of the device I and prevent splashing of the dripping solution.

Spot welded at 70 to the back plate 64 are the hook members 71 which fit under and engage the bar 72 of the supporting structure 73.

The supporting structure 73 is provided with four outwardly and downwardly extending legs 74 having the braces 75 and 76. The lower ends of the legs 74 are provided with the adjustable sleeve floor contact members 77 having the set screws 78 which enable their position to be fixed.

In operation, the run off tray I is positioned upon the standard H and the tray G is positioned upon said run off device I after the sputum specimens have been placed thereon and have been evaporated to dryness.

The tank C may contain a fuchsine solution and by operation of the handle 50 of the actuator or metering device, assurance is had that a certain number of drops, for instance, amounting to about 1 cc. of fuchsine, is permitted to drop on each glass slide A.

Then, the trays G containing the specimens are steamed for about three to five minutes and the excess fuchsine stain is washed off by water for about ten seconds. The washing solution may be applied by an apparatus such as indicated in Figures 1 to 4, or in some other manner.

Then, suitable discoloring or bleaching solutions are employed and dropped upon the slides, as for example, a discoloring solution of 73% alcohol, 21% water and 5% of hydrochloric acid. This solution may be applied in the amount of 1 cc. and permitted to act for about two minutes. Then, the tray G containing the specimens

is washed again for about ten seconds with distilled water and a second application of a discoloring solution is made.

The discolorizing solution is permitted to act upon the specimens for about three minutes and the specimens are washed again.

Then, a methylene blue counter-stain is applied in the amount of about 1 cc. for about a few seconds.

Finally, the excess methylene blue is washed off the slides. The slides are removed from the tray G and dried with an absorbent material, such as filter or blotting paper.

The above operation may be carried out rapidly and quickly to determine the presence or absence of tuberculosis or any acid fast bacteria, but it is obvious that many other tests may be made with the apparatus shown and described that the tray G may be widely used for testing bacteriological or biological specimens of many varieties.

It is apparent that the specific illustrations shown above have been given by way of illustration and not by way of limitation and that the structures above described are subject to wide variation and modification without departing from the scope or intent of the invention, all of which variations and modifications are to be included within the scope of the present invention.

What is claimed is:

1. An elongated holder for receiving a plurality of slides to receive specimens to be examined comprising a series of separated supports for said slides, said supports being elevated so as to support said slides above the level of the holder and said supports being connected by spaced parallel edge bars extending the full length of said holder.

2. An elongated holder for receiving a plurality of glass slides for sputum investigation and the investigation of bacteriological, biological and other specimens comprising a series of separated supports for said slides and handles at the ends of the holder, said supports being provided with location pins, said supports being elevated so as to support said slides above the level of the holder and said supports being connected by spaced parallel edge bars extending the full length of said holder.

3. An elongated holder for receiving a plurality of glass slides for sputum investigation and the investigation of bacteriological and biological specimens comprising a series of separated supports for said slides and handles at the ends of the holder, said supports being connected by bars.

4. An elongated holder for receiving a plurality of glass slides for sputum investigation and the investigation of bacteriological and biological specimens comprising a series of separated supports for said slides, each of said supports being elevated above the holder so as to hold the slide in elevated position and a series of upstanding contact elements extending above the upper surfaces of said supports for holding said slides in position upon said supports, and handles at the ends of the holder, said tray being formed of a light metal casting.

5. An elongated holder for receiving a plurality of glass slides for sputum investigation and the investigation of bacteriological and biological specimens comprising a series of separated supports for said slides and handles at the ends of the holder, said tray being formed by a bar of metal having elevations forming said supports and connecting bars, with intervening spaces between the supports, said supports being provided with upstanding pins positioned at the side edges and end edges of the supports to locate the slides and prevent said slides from moving off said supports.

6. A carrier or tray for glass slides carrying sputum specimens, said slides being subject to treatment, bleaching or staining while on said carrier, said tray having end handles, parallel connecting bars extending between said handles and cross members connected at spaced intervals between said parallel connecting bars, the upper surfaces of said cross members being substantially elevated above said parallel connecting bars to receive said slides, and upstanding members extending above the upper surfaces of said cross members to hold said slides in position upon said cross members.

SAMUEL ROSENTHAL.