Sept. 2, 1958 W. C. NELSON 2,850,430

APPARATUS FOR THE PERFORMANCE OF BLOOD TRANSFUSION TESTS

Filed Feb. 7, 1955 2 Sheets-Sheet 1

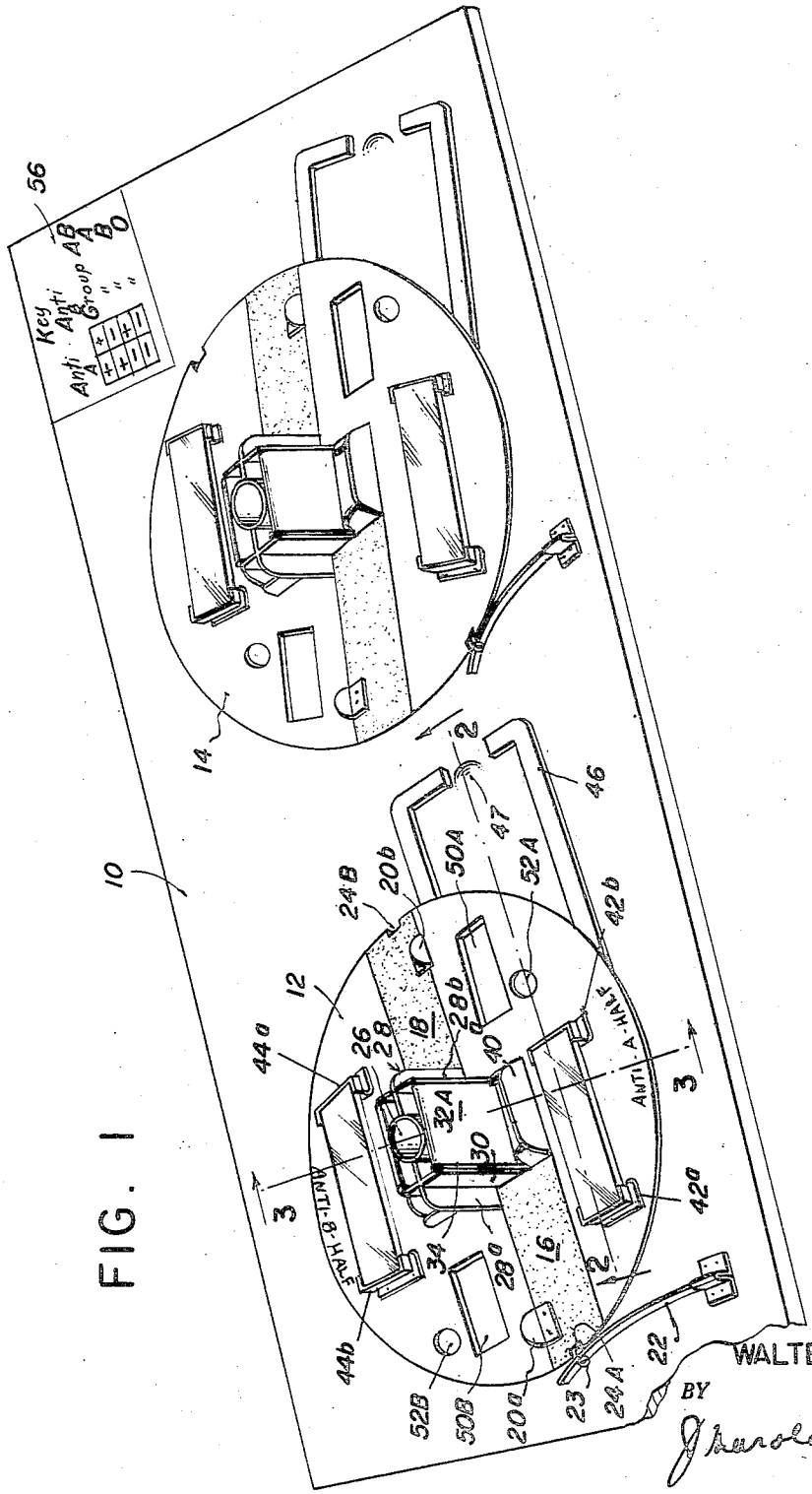

FIG. 1

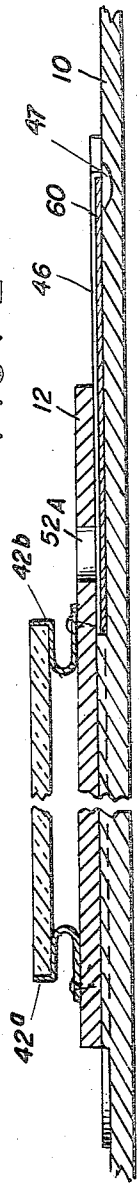

FIG. 2

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FIG. 3

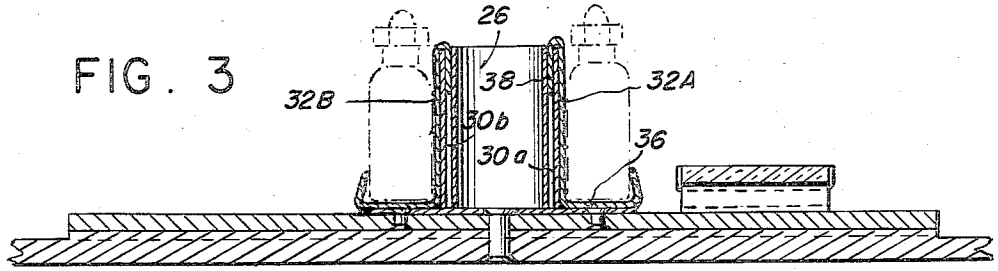


FIG. 4

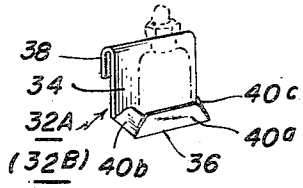


FIG. 5

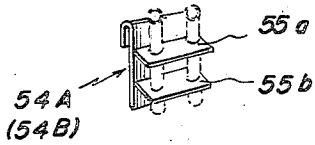


FIG. 6

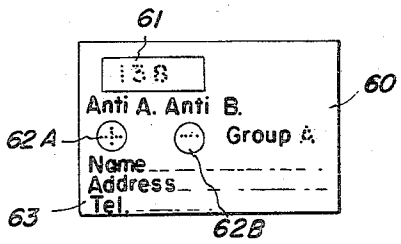


FIG. 7

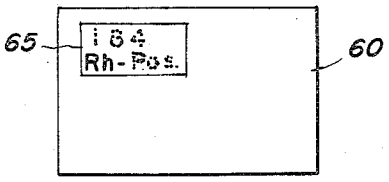
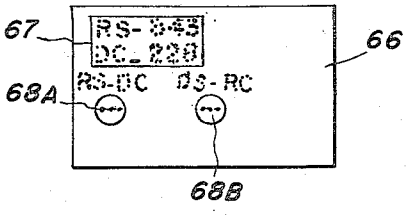


FIG. 8



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2,850,430

APPARATUS FOR THE PERFORMANCE OF BLOOD TRANSFUSION TESTS

Walter C. Nelson, Binghamton, N. Y.

Application February 7, 1955, Serial No. 486,600

6 Claims. (Cl. 167—84.5)

This invention relates to improvements in apparatus for the performance of blood transfusion tests, including the standard blood grouping tests, Rh determinations and cross matching tests, and, while not limited thereto, is more particularly directed to apparatus for facilitating the mass testing of the population in anticipation of anticipation of a large-scale disaster arising in either peace or war, and for the mass testing of both donors and patients in the event of an actual disaster.

Under normal peacetime conditions, only those persons technically qualified by training and experience are permitted to assume responsibility in the performance of blood tests in recognized hospitals and blood banks. However, in the event of anticipated or actual large-scale disaster, the services of the civilian population will undoubtedly be required to augment qualified laboratory and hospital personnel in meeting the demand for large quantities of fresh whole blood. Such will necessitate either the training of civilians by the available qualified personnel in the conventional methods of performing blood transfusion tests practiced by the technicians, with consequent great likelihood of error due to civilian inexperience in this exacting field and an inefficient utilization of the available trained personnel in supervising civilian efforts, or the devising of a substitute program or procedure which satisfies the need both of testing blood on a mass scale and recording the results thereof, quickly and without the commission of error either in the performance of the tests or in the recording of the test results.

With the above as background, a principal object of the present invention is the provision of apparatus for simplifying and facilitating the performance of standard blood grouping tests, Rh determinations and cross matching tests, or such of the enumerated tests as are desired, to a degree as to permit the rapid training of civilians in the accurate performance of these tests, thereby to make them immediately available to effectively aid the qualified technicians in the mass blood testing of the population in the event of anticipated or actual large-scale disaster.

A more particular object of the invention is the provision of blood testing apparatus functioning as aforesaid, which is designed so as to safeguard against and prevent to a great degree the inadvertent commission of mechanical error, either in the performance of the test routines or in the recording of the results thereof, thus offering assurance that no errors were made.

Yet another object of the invention is the provision of apparatus for simplifying and facilitating the performance of blood transfusion tests which, while designed particularly to satisfy the need of testing the blood of the population on a mass scale by technically untrained civilians in the event of an anticipated or actual disaster, can also be used as standard equipment by qualified technicians, if they elect to use it, as effectively and with as good results as the methods of performing these tests conventionally employed by them.

A further and highly practical object of the invention is the provision of apparatus for the performance of blood transfusion tests as aforesaid, which is characterized by simple construction, and which is moreover thoroughly dependable in its operation.

The above and other objects and features of advantage of the invention will be seen from the following detailed description thereof, reference being had to the accompanying drawing illustrating an embodiment of apparatus of the invention giving good results in actual service, wherein:

Fig. 1 is a perspective view of apparatus for the performance of blood transfusion tests according to the present invention;

Fig. 2 is a section along line 2—2 of Fig. 1;

Fig. 3 is a section along line 3—3 of Fig. 1;

Fig. 4 is a separated perspective view illustrating one of the two anti-A and anti-B serum bottle holders employed in blood grouping tests;

Fig. 5 is a similar view illustrating a corresponding one of the two holders employed in making a cross matching test; and

Figs. 6, 7 and 8 are views illustrating the record cards employed in performing blood grouping tests, Rh determinations and cross-matching tests, respectively.

Referring to the drawings, apparatus according to the invention illustratively comprises a preferably rectangular base member or board **10** which may be made of any suitable material such as wood, metal or plastic, to the upper face of which are mounted two revolving disc-like turntables **12, 14** which, for convenience, will be referred to hereinafter as "discs." While each disc is designed for the complete performance of one test, the second disc is provided in order to conserve time in blood grouping and Rh testing by absorbing the time lag between setting up the first test and reading the reaction. Since the discs **12, 14** and the elements carried by or associated therewith are identical, only one disc (that designated **12**) and its associated set of elements will be described in detail.

For purposes of accurate blood grouping testing, the invention provides that each disc is divided into two equal halves, of which one half is reserved for testing the blood with anti-A serum and is accordingly designated near its periphery with the legend "anti-A half," and the other half is reserved for testing with anti-B serum and is accordingly designated adjacent its periphery with the legend "anti-B half." To further distinguish the aforesaid halves of each disc, the anti-A half is preferably colored blue (to correspond to the blue color of anti-A serum) throughout a significant area thereof designated **16**, and similarly the anti-B half is colored yellow (to correspond to the anti-B serum color) throughout a significant area thereof designated **18**.

According to a further feature of the invention, it is proposed that each disc be actuable to and from two distinct working positions spaced 180° apart and in which one or the other half thereof is forwardly presented, and that the disc be positively held in the selected working position to which it has been actuated. For this purpose the disc is provided with two knobs or finger-pieces **20***a*, **20***b* conveniently located to enable one setting up for or making the test to turn the disc 180°; and the base board **10** mounts a spring-leaf catch **22** whose free end carries a detent **23** adapted to seat in either one of two notches **24A, 24B** provided in the edge of the disc **12** at locations such as to present one or the other half of the disc in the forward working position, which may be taken as the position in which it faces the front edge of the base board, as it is viewed in Fig. 1.

Secured to the upper face of said disc **12** is a tubular receptacle **26** of depth and diameter as to loosely hold a

specimen tube of blood to be grouped. Preferably, this tubular receptacle is disposed so as to cut through upright wall 28 which extends on the diameter separating the two halves of the disc, which wall is provided with side wings 28*a*, 28*b* functioning further to divide and isolate one from the other half of the disc. Illustratively, the tubular receptacle 26 is enclosed within a rectangular box-like housing 30, whose long front and rear sides 30*a*, 30*b* (Fig. 3) are spaced slightly from the adjacent periphery of said receptacle. To the top edges of said front and rear sides 30*a*, 30*b* are adapted to be clipped anti-A and anti-B serum bottle holders 32A, 32B (Fig. 4) (or RS–DC and RC–DS tube holders as shown in Fig. 5). The aforesaid serum bottle holders each preferably comprises a strip of metal bent to L-shape so as to provide a vertical wall 34 having height and width corresponding to that of said front and rear sides 30*a*, 30*b*. A clip flange or jaw 38 extends downwardly from the top edge of the vertical wall 34, and from the bottom wall 36 extends front- and end-edge flaps 40*a*, 40*b*, 40*c*, respectively, which are sufficiently flexible as to permit their being pressed inwardly against and conformed to a serum bottle supported on said bottom wall thereby not only to hold a serum bottle, but also to adjust the holder to different sizes and shapes of bottle. From the above, it will be appreciated that the serum bottle holders 32A, 32B as described may be simply clipped to the front and rear walls 30*a*, 30*b* of the box-like housing 30 surrounding the tubular blood-tube receptacle 26, and that a bottle of serum placed in the holder may be firmly held by pressing the flaps 40*a*, 40*b*, 40*c* against the sides of the bottle. To further insure against mistake in performing blood grouping tests, the anti-A serum bottle holder 32A may be colored blue to correspond to the blue color of the anti-A serum; and, similarly, the holder 32B may be colored yellow to correspond to the color of the anti-B serum.

To provide for the mounting of the ground glass slides conventionally employed in blood testing, two pairs of slide supports designated 42*a*, 42*b* and 44*a*, 44*b* are secured to the upper face of the disc halves, one pair of slide supports 42*a*, 42*b* serving the anti-A half of the disc and the other pair of slide supports 44*a*, 44*b* serving the anti-B half.

Means are provided for holding a record card so that a portion thereof, desirably its left-half portion, extends beneath each disc and in a fixed position with respect to both base and disc. Illustratively, such means comprise a rectangular frame 46 secured against the upper face of the base member 10 in position such that it extends beneath the disc, said frame defining a recess in which a rectangular record card will fit more or less exactly. The outer side of the frame may be broken away and a finger recess 47 formed in the upper surface of the base member to facilitate grasping of a card held in the frame for purpose of withdrawal.

The disc halves are each provided with two windows or perforations opening to the space within the frame overlapped by the disc. Of said windows, the corresponding larger rectangular windows 50A, 50B provide access to a surface of the card, principally for the purpose of making an identifying record thereon, and are accordingly hereinafter referred to as the record windows. The other corresponding windows are preferably circular, being designated 52A, 52B, and are referred to hereinafter as the anti-A and anti-B windows, respectively. At this point, it will be observed that, whereas the record windows 50A, 50B are located on like radii from the center of the disc so as always to open to the same relative rectangular area of a card positioned in the frame 46, the anti-A and anti-B windows 52A, 52B are positioned on different radii from the center of the disc, the difference between radii being such that the window 52A invariably opens to the anti-A rectangle (or circle) of the blood grouping record card to be described, and the anti-B window 52B invariably opens to the anti-B rectangle (or circle) of said card, which latter rectangle is disposed just to the right of the anti-A rectangle.

The aforesaid anti-A and anti-B serum bottle holders 32A, 32B may be replaced with holders for the so-called RS–DC and DS–RC blood tubes employed in the cross-matching tests. Referring to Fig. 5, one such holder designated 54A is shown (there being a corresponding holder 54B), and such is also of clip-on construction characterizing that of the aforesaid serum bottle holders. The holders 54A and 54B are each shown to be formed with a pair of vertically spaced shelves 55*a*, 55*b* provided with aligned tube-receiving openings adapted to receive a pair of blood tubes.

If desired, the upper face of the base board 10 is printed or otherwise provided with a so-called "key" designated 56, to which one making a test can refer in identifying the group in which falls a specimen blood being tested. Preferably, the entire apparatus, including the base board 10 and the discs 12 and 14, is painted white except for the blue and yellow colorations indicated, it having been found that the white background facilitates examination of blood serum mixtures.

The record cards employed in making blood group tests, Rh determinations and cross-matching tests with apparatus as aforesaid are preferably as shown in Figs. 6, 7 and 8. Of these views, Fig. 6 illustrates the blood grouping record card designated 60. It will be noted that this card is printed in its upper left portion with a large blank rectangle 61 with which either one of the "record windows" 50A or 50B always registers, thereby to enable the identification number of a specimen tube of blood being grouped to be copied on to the card and thereafter viewed; with two smaller blank rectangles (or circles) 62A, 62B disposed side by side, with the notation "Anti-A" being printed above the left rectangle 62A, the notation "Anti-B" being printed above the right rectangle 62B, and the word "Group" being printed to the right of said rectangles; and with its lower half portion 63 being printed in blank for the name, address and telephone number of a donor whose blood is being grouped. As forecast above, the anti-A window 52A is adapted to register with said blank rectangle 62A and the anti-B window 52B is adapted to register with said rectangle 62B.

The Rh record card shown in Fig. 7 may be the card 60 as described turned so that its normally rear face is disposed frontwise. Such rear face carries a large blank rectangle 65 positioned similarly to the rectangle 61 and being thus adapted to underlie record windows 50A or 50B.

Fig. 8 illustrates a cross-matching record card designated 66 which is characterized by a blank rectangle 67 corresponding in size and position to the rectangle 61, and by two smaller rectangles or circles 68A, 68B corresponding in size and position to the smaller rectangles 62A, 62B, of the aforesaid record card 60, but being differently identified. For example, the left small rectangle 68A is preferably identified by the legend RS–DC, and the right small rectangle 68B by the legend DS–RC, which legends appear above their respective rectangles.

The manner of using the above described apparatus in performing standard blood grouping tests, Rh determinations and cross-matching tests will now be briefly outlined:

Blood grouping.—Testing a tube of blood.—(1) While a test may be started on either the anti-A half or the anti-B half of either disc 12 or 14, by way of example set up the test for the left hand disc 12 by placing a bottle of anti-A serum in holder 32A and a bottle of anti-B serum in holder 32B of said disc 12, and turn the disc so that its anti-A half faces forwardly.

(2) Place a fresh grouping card 60 in the card-holding frame 46 associated with the disc 12.

(3) Pick up a specimen tube of blood and copy its

identification number on said card through the rectangle **50A**.

(4) Shake tube of blood and place it in tube receptacle **26**.

(5) Place clean ground glass slide on support **42***a*, **42***b*.

(6) Place drop of anti-A serum on slide and return serum bottle to its holder **32A**, if it has been picked up.

(7) Uncork blood tube and place stopper on disc.

(8) Collect blood on a clean (new) mixing stick and mix blood in the serum drop.

(9) Discard stick into a waste receptacle.

(10) Restopper tube and return it to its receptacle **26**.

(11) Swing the disc 180° to present other or anti-B half thereof forwardly.

(12) Place a second clean slide on support **44***a*, **44***b*.

(13) Place drop of serum on slide from anti-B serum bottle.

(14) Repeat step 7 and then collect blood on new mixing stick and mix in serum.

(15) Discard stick.

(16) Replace blood tube in its receptacle **26**.

(17) Discontinue work on disc **12** temporarily.

(18) Place fresh card in card frame **46** of disc **14**.

(19) Pick up second specimen tube of blood and carry through procedures on disc **14**, exactly as outlined for disc **12**.

(20) Discontinue work on disc **14** temporarily.

(21) Return to disc **12**, examine the slide mixture on the still forwardly disposed anti-B half thereof, and record result as plus or minus on the aforesaid card **60** by writing through the circular anti-B window **52B** in said disc.

(22) If glass slide has been removed from its support **44***a*, **44***b* to facilitate examination, return it to its support.

(23) Turn disc **12** through 180°, examine slide on its anti-A half, record result on card through circular anti-A window **52A**, and return slide to its support **42***a*, **42***b*.

(24) Remove card and determine blood group by comparing plus and/or minus record on card with that on key **56**.

(25) Print the blood group after the word "Group" on the card.

(26) Return card and blood tube to designated places therefor and discard glass slide from each half of disc.

(27) Return to disc **14** and finish the test thereon by following procedures identical with these just outlined for disc **12**.

(28) Immediately start testing two new blood tubes.

Blood grouping.—Finger testing.—(1) Donor should present himself with his own pre-numbered record card which is placed in the card slot as before.

(2) No recopying of the card number is required; therefore—

(3) All procedures are identical from now on except that the blood specimen is collected from a drop of finger-prick blood with a new tooth pick which is discarded after each serum mixing as before.

Rh determination.—Preliminary.—This is a single test and therefore, whether blood is from tube or finger, only one half or side of one disc is used for one test. A total of from 2–3 minutes must elapse between mixing the blood in serum and recording the reaction in mixtures which show no clumping (neg.) and they must be kept warm throughout this period by reheating from time to time. If definite clumping appears before the three minutes are up, the slide is positive and ready for recording.

Operational procedure.—Testing a tube of blood.—(1) Light a candle and place on space of base board **10** reserved for same.

(2) Turn a fresh grouping card over and place in card frame **46** of disc **12** turned, for example, so that its printed rectangle **65** underlies the disc window **50A**. Pick up a tube of blood.

(3) Record tube number on card rectangle **65** and write "Rh" below it to the left, leaving room to write "positive" or "negative" after it. (The cards may of course be supplied with "Rh" written or printed in said rectangle.)

(4) Mix blood and place in tube receptacle **26**.

(5) Place slide on supports **42***a*, **42***b* and add serum drop from a bottle of anti-Rh_0 serum.

(6) Collect blood from the tube as by means of a soda straw and permit one large drop of blood to fall into the serum drop. Discard soda straw and replace tube.

(7) Mix blood and serum with a clean, new mixing stick. Discard stick.

(8) Hold slide above candle jar and heat until warm (but never hot), testing the heat of the slide frequently against the back of the hand.

(9) Tilt slide back and forth a few times to distribute heat evenly and return it to its supports. Now register time by watch or 3 minute timer.

(10) Using the other disc **14**, proceed with a second specimen in identically the same manner.

(11) Examine each slide mixture alternately from time to time for the presence or absence of clumping and reheat each slide from time to time with hand testing each time, always returning slides to their own supports.

(12) If clumping of cells occurs (usually at the end of 1–½ minutes, discontinue the examination and write the word "positive" after "Rh" on the card. (Do not use plus and minus signs, as a dash or minus sign might be misinterpreted as negative when the test is positive.)

(13) If no delayed clumping appears at the end of 3 minutes, write the word "negative" after "Rh" on the card.

(14) When both slides have been examined and the records completed, dispose of tubes, slides and cards, and proceed with two more blood tubes.

For finger testing.—(1) Blood is secured by permitting a large blood drop to fall from the finger into the serum or by allowing two drops from the finger to touch the slide near, but not in, the serum.

(2) Otherwise all other procedures are the same as for tube testing.

Cross-matching.—Preliminary.—In the earliest days of blood transfusion work it was quickly learned that transfusion of certain bloods was followed by the patient's death. This led to the recognition that incompatible bloods were capable of agglutinating each others red corpuscles, not only in the patient's blood stream but in the test tube as well.

In the patient's veins, the clumps of red cells not only stagnate the flow of blood by blocking the small vessels, but the cells themselves disintegrate losing their function of carrying oxygen to the tissues. It is rare that effective measures have been procured to prevent the death of a person who has mistakenly received a full pint of incompatible blood.

Completely compatible bloods only should be used in transfusions. Such bloods belong to the blood group and Rh type. It cannot be assumed, however, that because two bloods have been tested and designated with the same group and Rh notation that they are necessarily compatible. The vast majority of them will be, but, assuming that no mistake has been made in performing the grouping and Rh tests, experience reveals that rare, unusual and unclassified agglutinating factors are present in the occasional specimen that cannot be detected by the foregoing standard tests and serums.

Again there are subgroups of Group A, Group AB, and Rh negative bloods that are not separately identified by the foregoing tests. Yet these subgroups are incompatible and must be transfused on a group specific basis.

Before the "go-ahead" signal for transfusion can be safely given, therefore, the blood of the recipient must be

tested directly against the blood of the donor. This so-called "cross-matching" test consists of testing the serum of the recipient's blood (RS) against the red corpuscles of the donor's blood (DC). A second related test, i. e. testing the donor's serum (DS) against the recipient's cells (RC) is also done as a safeguard.

If agglutination occurs in either test, the bloods do not belong to the same group and are not completely compatible. Further search for a suitable donor is indicated.

If no agglutination is seen in either test, the two bloods are compatible and transfusion is indicated.

If one examines this test carefully, it will become obvious that an inadvertent failure to mix opposing cells and serums could result fatally for a patient if the mistake took place during the examination of bloods which happened to be incompatable because the "go-ahead" transfusion signal would be indicated and given. Instead of a report showing the tell-tale positive agglutinations of incompatibility, the completely negative reports of compatibility would appear, since all that would have been accomplished would have been merely the replacing of the recipient's and donor's cells in their own respective serums.

The role that the apparatus presented here can play in assisting the examiner to perform this crucial cross-matching test correctly is as follows:

(1) It presents him with a logical pattern of orderly procedures preorganized in an actual, physical working field in which the tubes to be tested are so arranged in relation to each other that a simple rearrangement automatically insures mixing opposing cells and serums.

(2) It provides for the performance of the RS–DC test in a separate field from the DS–RC test.

(3) It provides for the simultaneous set-up of a tube and a slide cross-matching test in each field of work without confusion of slides and test materials belonging to the other field.

(4) It isolates the tubes concerned in the complete cross-match until the test set-ups are completed.

(5) It compels the examiner to record on the report card the recipient's serum tube number together with the number of the tube associated with it. Duplicate numbers reveal at once to the supervisor that the cross-match has not been done. Different numbers reveal that the tubes were consciously and correctly aligned and that inadvertent failure to mix the opposing serums has not taken place.

The method of performing the test is now given in detail. The procedure described here presupposes that serum and cells from both recipient and donor have been properly procured and are now ready for testing by the crucial cross-matching method.

Operational procedure.—Tube or slide method or both.—The special holders 54A, 54B (Fig. 5) replace the anti-A and anti-B serium holders 32A, 32B employed in the grouping tests, and such special holders each accommodate two RS and DC sized tubes side by side. One such holder is labeled RS–DC and the other DS–RC and they are clipped in place to the blue and yellow colored halves of a disc, i. e. the disc 12.

(1) The recipient's serum tube (RS) is first placed with the recipient's cells tube (RC) in the RS–RC support (blue half of the disc).

(2) The donor's serum tube (DS) is then placed with the donor's cells tube (DC) on the other or DS–RC support on the other half of the disc. (Both sets of tubes have been secured from different people of the same blood group, but they bear different identifying numbers, for example, 843 and 228.)

(3) The RC tube is now transferred to the DC place on the yellow half of the disc and the DC tube transferred to the RC place on the blue half of the disc. The cross has now been made.

(4) The examiner now records tube numbers in the rectangular space 67 of a card 66 (Fig. 8). For example, he writes "RS–843" and below same "DC–228" as indicated, the two different numbers giving assurance that the cells have been crossed.

(5) The examiner now labels a clean tube and a clean slide with the corresponding notation:

RS–843
DC–228

the slide is placed on the slide support on the blue half of the disc and the tube is held in the examiner's hand.

(6) By means of a glass pipette he transfers 3 drops of RS–843 to both clean tube and clean slide and then replaces pipette in RS–843.

(7) By means of a second pipette he adds 3 drops of DC–228 to both tube and slide and replaces pipette in DC–228.

(8) The tube of RS–843—DC–228 is now placed in the first front hole of a special rack (not shown).

(9) The glass slide mixture is now mixed with a new stick which is promptly discarded.

(10) The slide is placed on one-half of a special tray (not shown).

(11) The disc is now turned 180° and a new clean tube and slide are labeled

DS–228
RC–843

and mixtures are made as before.

(12) This tube is placed behind the first in the special rack and the slide is placed beside the other on the special tray.

(13) The tubes are centrifuged to facilitate agglutination and the slides remain for ½–1 hour.

(14) The aforesaid RS–843—DC–228 tube and slide are returned to their blue side of the disc. Then the disc is reversed and the DS–228—RC–843 tube and slide placed in position on their yellow side.

(15) The previously labeled card is inserted in card frame 46.

(16) Tube results are recorded through the circular windows 50A and 50B onto the RS–DC and DS–RC spaces on the card, "+" meaning positive, "—" meaning negative.

(17) Slide results are recorded also in the same places. The results will appear as follows:

= = (meaning "Compatible"); or # # (meaning "Incompatible.") NOTE.—If the tube is negative and the slide positive on the same side, the result would appear +. All these markings indicate that four tests have been examined and recorded.

(18) The card is written "Compatible" or "Incompatible," and it will be understood that all incompatibilities require investigation.

(19) When the cards are withdrawn to permit writing "Compatible" or "Incompatible," a final step is introduced, as follows: Each tube and slide are rechecked for proper number, and if correct, RS–843—DC–228 and DS–228—RS–843 would appear beneath the recording spaces on the card. A discrepancy in numbers on the recheck would require investigation by the examiner.

By an assembly line set-up in which a volunteer helper does one particular job over and over, the whole job could be accomplished under the supervision of one technician, with the apparatus taking care of the crucial cross-match part.

Without further analysis, it will be appreciated that the advantages and protective features of the above described apparatus are numerous. For example, it effects isolation of a blood specimen tube within a specific field of testing, and thus protects against confusion of said tube with other tubes, while at the same time permitting simultaneous testing of two bloods by one examiner without confusion and danger of mixing. Also, in blood grouping and Rh determinations, it reduces time lag between set-

ting up of test and reading the reaction to a minimum.

Another notable advantage of apparatus of the invention is that it accurately relates the record card with the specimen tested, thereby offering assurance that no mixing of record cards has taken place and that no mistake has occurred in recording the reaction of the tested specimen on the record card for that specimen.

By separating the fields of operative procedure, i. e. by providing on each disc two separate fields of operation, each of which is equipped with the materials and accessories to completely perform the work of testing and recording within its own field of operation, apparatus of the invention also protects against improper substitution of serum, and against disturbance of the relationship of two serums which may be fixed initially by a supervisor or other skilled technician. It also protects against the use of the same mixing stick with two serums or serum mixtures, because of the fact that only one serum (mixture) is available at any one time. The aforesaid separation of the fields of procedure is also of great advantage in insuring against confusion of test results arising from simultaneous reading of two results, because only one result is available at the time of recording. Moreover, since the apparatus provides for recording a test result in a specific place provided therefor on a record card, the possibility of inaccurately recording test results is effectively minimized if not prevented altogether.

As many changes could be made in carrying out the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. In blood testing and test recording apparatus including a board member providing a working surface, a turntable mounted on said board member for rotation in a plane parallel and closely adjacent to said working surface, means on said turntable for supporting a specimen-and/or testing fluid container in upright position and generally centrally thereof, and means for mounting a pair of glass slides in horizontal disposition on opposite portions of the turntable, the improvement comprising means dividing the upper surface of the turntable in half, each half representing a separate test field to which said container is individually accessible and having an aforesaid glass slide mounting means therewithin, means for detachably securing the turntable in one or the other of two opposite positions in which a clearly defined test field is presented to the person making the test and record, means for locating a record card having a plurality of spaced recording areas thereon on said board member and in a position thereon such that its said recording areas extend beneath the turntable and are spaced differently from the center thereof, each half of the turntable having at least one window, said windows being on different radii from the center of the turntable and said radii corresponding to the distances of the spaced recording areas of a record card positioned by said positioning means from said center, said windows being further located circumferentially of the turntable that when the latter is turned to one of its opposite positions a window of one turntable half registers with one said recording area and when turned to its other opposite position the corresponding window of the other turntable half registers with another said recording area.

2. The improvement in blood testing and test recording apparatus substantially as set forth in claim 1, wherein the turntable halves are colored and marked differently from one another.

3. The improvement in blood testing and test recording apparatus substantially as set forth in claim 1, wherein the turntable halves are each also provided with an additional window, said last-named windows being on equal radii from the turntable center and circumferentially located to register with the same one of the plurality of spaced recording areas of the card in each of the opposite positions of the turntable.

4. The improvement in blood testing and test recording apparatus as set forth in claim 3, wherein said first-named and said additional windows are differently shaped so as to be readily distinguishable one from the other.

5. In blood testing and test recording apparatus including a generally rectangular board member providing a working surface, a turntable mounted on said board member for rotation in a plane parallel and closely adjacent to said working surface, means on said turntable for supporting a specimen and/or testing-fluid container in position as to be accessible from and related to a predetermined area of the turntable, and means mounting a glass slide in horizontal disposition on said predetermined area, the improvement comprising means for detachably securing the turntable in an angular position in which said predetermined area is presented to the person making the test and record, means for locating a record card having at least two spaced and differently shaped recording areas thereon on said board member and in a position thereon such that its said recording areas extend beneath the turntable and are spaced differently from the center thereof, said turntable being provided in its said predetermined area with a plurality of windows corresponding in number, size and shape to the said recording areas, said windows being on different radii from the center of the turntable and said radii corresponding to the different distances of said recording areas of a record card positioned as aforesaid by said card positioning means from the center of the turntable and being further located circumferentially to register with said record areas when the turntable is secured in its angular position aforesaid.

6. The improvement in blood testing and test recording apparatus substantially as set forth in claim 5, wherein the container suporting means comprise fixed and detachable container holders of which the fixed holder detachably mounts the detachable holder.

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