Sept. 17, 1940. T. A. FLOOD 2,215,118

CORRELATOR FOR BLOOD SPECIMENS

Filed Sept. 30, 1937

FIG. 1.

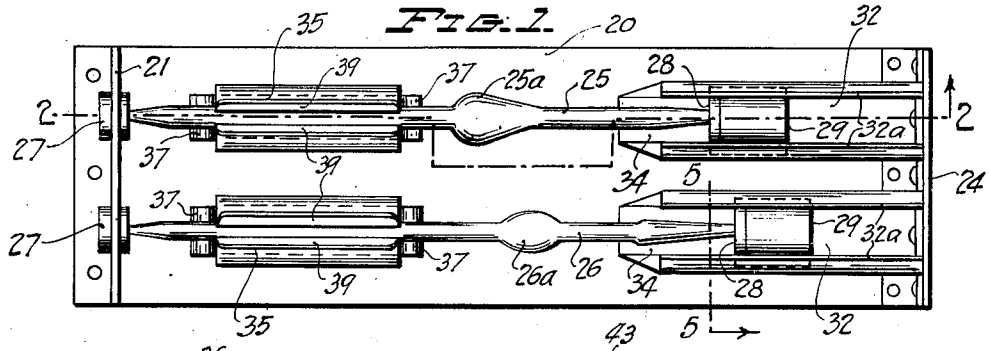


FIG. 2.

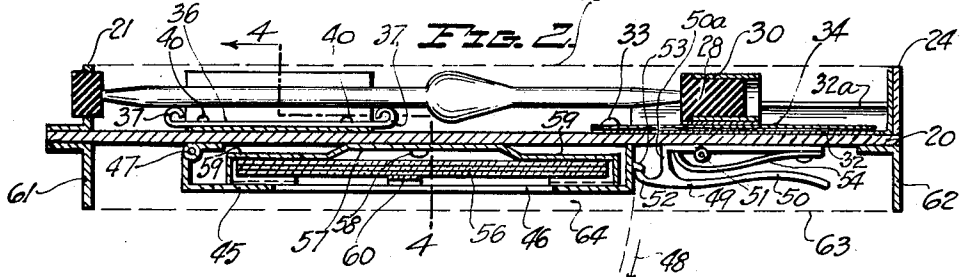
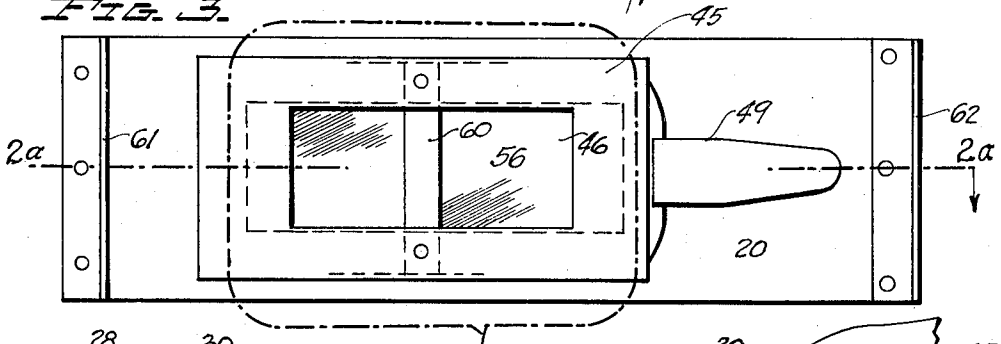


FIG. 3.



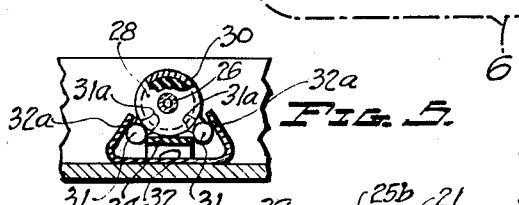


FIG. 5.

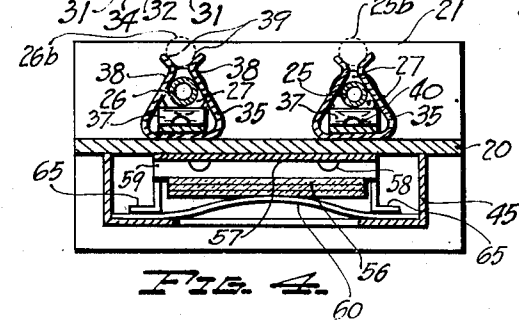


FIG. 4.

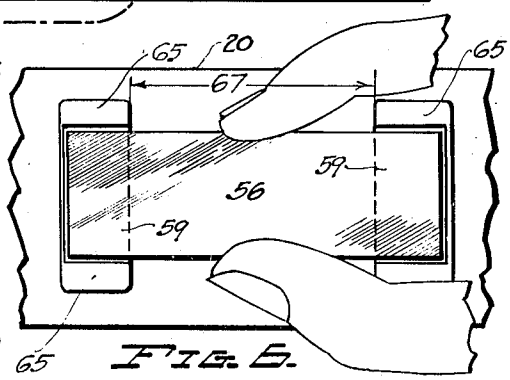


FIG. 6.

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CORRELATOR FOR BLOOD SPECIMENS

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Application September 30, 1937, Serial No. 166,677

12 Claims. (Cl. 206—43)

This invention relates to a correlator for blood specimens.

The principal objects of the invention are:

First.—To keep in an isolated, correlative relationship for individual blood tests, the pipettes and slides used in making such blood tests.

Second.—To provide a device which may be conveniently used in hospital laboratories, clinical laboratories, physicians' offices, at patients' bedsides, and elsewhere, in the collection and correlative preservation of specimens of blood, for subsequent microscopical examination.

Third.—To avoid confusion in the identification of different individual sets or groups of blood-specimen pipettes and slides, thereby preventing any particular set or group of pipettes or slides from becoming mixed with any other set or group.

Fourth.—To prevent collected blood specimens from becoming misplaced, lost, or inadvertently laid aside or overlooked.

Fifth.—To prevent the breakage of pipettes or slides by protecting them at all times, both before, and after, blood specimens are obtained, and while they are in transit from one point to another.

Sixth.—To prevent pipettes from rolling off tables or work-benches while making microscopical examinations of collected blood specimens.

Seventh.—To provide means whereby the contents of blood pipettes may be shaken or agitated without removing them from the correlator.

Eighth.—To prevent the tapered or conical ends or tips of blood pipettes from becoming clogged through drying or coagulation of the contents, after a specimen of blood is obtained.

Ninth.—To save valuable time, because of the expediency with which blood specimens may be obtained, safeguarded in temporary storage, and examined in systematic order.

Tenth.—To insure greater accuracy in rendering reports on blood examinations than has heretofore been possible, because the element of error is reduced to a minimum.

All hospitals approved by the American Medical Association must conform to certain basic requirements in order to receive recognition and approval. All admissions to a hospital, entered as "medical cases" must have an examination and report on the patient's blood. This examination includes what is known as "white," "red" and "differential" count regardless of any other additional examination that the attending physician may require. The details of such tests need not be here particularized, but it is sufficient to state that the blood specimens, after taking, must be carefully safeguarded, and specimens belonging to one individual, must be kept carefully segregated during every manipulation thereof, if the tests are to be of any value. This means that the blood specimens which are collected in pipettes, as well as blood smears made on glass slides at the same time, must have absolute security against confusion with other blood specimens, during transit from the patient to the laboratory, and in all subsequent manipulations thereof.

In the drawing, which illustrates an excellent embodiment of my invention,

Fig. 1 represents a plan;

Fig. 2, a vertical section taken on the line 2—2 in Fig. 1;

Fig. 3, a plan opposite to that shown in Fig. 1, which is to say, that the device is invertible, one plan being the top, and the other the bottom, at one time, and vice versa at another time.

Fig. 4, a fragmentary vertical section taken on the line 4—4 in Fig. 1, drawn to an enlarged scale;

Fig. 5, a vertical cross-section taken on the line 5—5 in Fig. 2, drawn to an enlarged scale; and,

Fig. 6, a fragmentary plan, including approximately the area enclosed by the broken line 6 in Fig. 3, the cover of the device being omitted.

Referring to the drawing, a structural framework is provided, which may comprise a base plate 20, on one side of which, in this instance the upper side, are disposed vertical guards 21 and 24. Each of the guards may advantageously consist of the vertical leg of an angle rigidly attached to the base plate. Suitably supported and safeguarded in the space between the guards 21 and 24, are one or more, in this instance two, pipettes 25 and 26, which may be of the kind usually employed to contain blood specimens. Such pipettes are generally made of glass and have tapered tips with plain faces at both ends thereof. Naturally, the pipettes are rather fragile, so that they must be properly supported and protected to insure against breakage.

Another necessary condition is that the pipettes must be provided with means to prevent the accidental loss of their blood-specimen contents. This requirement I attain by bringing the plane faces of the pipette tips into close contact with resilient cushions so as to form tight closures. In the present instance, the closure cushions may consist of stationary stoppers 27,

made of rubber or other non-absorbent material, suitably held in the guard 21, and movable stoppers 28 made of similar material. Each movable stopper may conveniently be secured in a slidable carriage 29, consisting in this instance of a metallic sleeve 30, to which are attached, for example by means of soldering at 31*a*, two shoes 31 which engage or are engaged by the inwardly inclined flanges 32*a* of a guideway 32. There is preferably a frictional contact between the shoes 31 and the respective guideway flanges, such frictional contact being enhanced by any suitable means, for example, an upwardly convexed strip of spring metal 34 having one end thereof secured to the frame structure by a rivet 33. Thus the stoppers 28 may be moved back and forth along their respective guideways 32 to accommodate pipettes of different lengths. The yielding pressure exerted by the spring 34, increases the frictional engagement between the carriage and guideway, and prevents the too easy longitudinal displacement of the carriage.

The pipettes are secured against accidental displacement by supporting them in resilient clasps 35, which usually engage the long stems of the pipettes. The clasps are preferably made of very thin, springy material such as steel or phosphor bronze, having enduring elastic or resilient qualities which show no fatigue after long continued use.

Disposed in the bottom of each clasp is a cradle 36, formed preferably of a thin metallic strip having both ends thereof curled as indicated at 37, so as to form resilient bearings for a pipette. The curls are preferably located just beyond the extremities of the clasp. The pipettes rest on the cradles and are at least partially embraced by the wings of the respective clasps preferably longitudinally along the shanks or long stems of the pipettes, thus holding them securely and in perfect alignment. It is intended that the pipettes shall be slipped into the clasps without much pressure being exerted, and to be removed therefrom without exerting force. Removal is preferably effected by sliding the carriages 29 back sufficiently far so that the pipettes can be withdrawn by longitudinal movement. In practice, the pipettes vary considerably in length and diameter, but the construction of the clasps and cradles, as just set forth, easily accommodates the various sizes.

The pipettes are inserted in the cradles by laying them in the channels formed by the divergent tips 39 of the wings 38, and exerting a gentle downward pressure with the fingers. Thereby the wings open slightly and allow the stem to pass between them. The entering position of the stem is indicated by the dotted circles in Fig. 4. It is to be noted that as a pipette is pushed down into a clasp, there will be a little "give" to the curled ends of the cradle which prevents breakage of the pipette, and at the same time holds the same positively, without any chance of rattling when the correlator is shaken, as hereinafter described. Naturally, the position of the pipettes in their respective clasps is such, that the end faces of the pipettes lie wholly within the area of the stoppers 27 and 28.

The cradles and clasps are firmly fastened to the base plate 20 by any suitable means, for example, rivets 40.

As shown in Figs. 1 and 2, the bulbs, such as 25*a* and 26*a*, of the pipettes, are entirely clear of the base plate, and are so disposed that a proper clearance space is also left between the bulbs and a plane 43 corresponding to a flat table or other surface on which the correlator may be placed. Such a surface extends across the guards 21 and 24, and protects the bulbs against breakage.

Since it is important that the slides on which smears of blood have been made, shall always accompany the pipettes to the laboratory and remain so assembled until examination is complete, I provide a safe compartment for the slides on the reverse side of the base plate 20. This compartment consists of a box-like cover 45 having preferably an opening 46 therein, through which the slides can be viewed. The cover may be hinged at 47, and swing open as indicated by the arrow 48. Normally, the cover is held in the closed position by means of a spring catch 49. The catch may advantageously consist of a lever 50 hinged at 51, and having its tip 52 normally in engagement with an abutment 53, forming an integral part of the cover 45. A leaf spring 54 having its forward portion bearing against an angular portion 50*a* of the lever 50, serves to exert the proper pressure.

The glass slides 56 are fragile, and while they must be held positively against rattling when the correlator is shaken, no extreme force is permitted to be exerted upon them. Therefore, I provide a resilient seat member 57, having a central portion suitably attached to the base plate, for example, by rivets 58, and having the seat portions 59 spaced apart from the base plate. The slides are yieldingly held against both seats by means of an intermediate leaf spring 60 which exerts its pressure inwardly of the cover. The closed cover is protected by guards 61 and 62, since a plane occupying the position 63 across the tips of the guards, leaves a sufficient clearance space 64 between itself and the cover.

It is to be remembered that the correlator is invertible in plan, which is for the purpose of having the pipette side uppermost, as indicated in Fig. 2, when the pipettes are manipulated, and on the other hand, to have the slides uppermost when these are being manipulated. Therefore, when the cover 45 is to be opened, it is customary to have that side uppermost, exactly the reverse of the condition indicated in Fig. 2.

Assuming the slide side of the correlator to be uppermost, slides may be inserted or removed by releasing the catch 49. This is accomplished by pulling up the free end of the cover and inserting or removing the slides one by one. The construction of the seat member is such that a central portion of each slide can be engaged by the thumb and forefinger of one hand, as indicated in Fig. 6. For this purpose, the slides are confined sidewisely by only the end portions 65 of the seat member. This leaves the space 67 between the two seat portions on both sides entirely clear of any obstruction.

An important consideration in a blood test is that the blood specimens in pipettes shall be correlatively and thoroughly shaken at significant times, in order that the corpuscles shall be brought freely into uniform suspension in the diluting fluid, preferably through a compound shaking motion. Rather costly special shaking machines have heretofore been used for this purpose, but with the present, rather inexpensive correlator, the same purpose may be conveniently attained manually, because both the pipettes are firmly held against displacement during agitation of the blood specimens.

Because of the necessity that a close operative relationship between the pipettes and the slides

be maintained, and that the one constantly accompanying the other, provision must be made in the present device for holding the slides in pressure contact with one another to keep them from rattling. This is accomplished by the spring-pressed, yielding means hereinbefore explained.

While a specific embodiment of the invention is herein shown and described, it is to be understood that I may resort to various changes that lie within the scope of the following claims.

Having fully described my invention, what I claim is:

1. A correlator for blood specimens, including in combination, two pipettes containing blood specimens of a single individual, a base, means for firmly and removably mounting the said pipettes thereon, substantially parallel to the base, but spaced apart therefrom, stoppers for both ends of the respective pipettes and mounted on the base in substantial alignment with the said pipettes, a slide on which is a smear of the blood of the said individual, and securing means on the said base whereby the blood-smeared slide is held fixed, relative to the said pipettes.

2. A correlator for blood specimens, including in combination, a blood-specimen pipette, a base, means for detachably mounting the pipette on the base substantially parallel to the plane thereof, a stopper mounted stationary on the base in contact with one end of the pipette and a second stopper movably mounted on the base so as to contact the other end of the pipette.

3. A correlator for blood specimens in accordance with claim 2, wherein guards are disposed at each end of the base, each of the said guards having a substantially vertical member of a height and lateral extent such that when the correlator is inverted a plane in contact with and extending across the guard is suitably spaced apart from every point of the pipette.

4. A correlator for blood specimens in accordance with claim 2, wherein the mounting for the second-mentioned stopper includes a carriage in which the stopper is tightly held, and guides in which the carriage is slidable.

5. A correlator for blood specimens including in combination, a base, a pipette, and means for mounting the pipette on the base, wherein the mounting means for the pipette includes a clasp comprising two mutually parallel resilient wings adapted to yieldingly contact the stem of the pipette and a cradle having resilient curled portions at both ends thereof, the said curled portions being adapted to exert a yielding pressure upon the pipette in opposition to at least a portion of the yielding pressure exerted by the said wings.

6. A correlator for blood specimens, including in combination, a blood specimen pipette, a base, means for removably mounting the said pipette upon the base, and movable stopper means in contact with the tip of the pipette, the said stopper means comprising a carriage in which the stopper is fixed, a guideway in which the carriage is slidable, and spring means whereby frictional pressure is exerted between the carriage and the guideway.

7. A correlator for blood specimens in accordance with claim 6, in which the carriage has two outwardly extending shoe portions and the guideway consists of a channel having inwardly extending flanges against which the shoe portions of the carriage have their bearing.

8. The combination with a base, of means for mounting a blood-specimen pipette upon the base substantially parallel therewith; stopper means for the pipette, including a movable stopper in contact with a tip of the pipette, a carriage in which the stopper is fixed, shoes extending outwardly from the carrier, a channel guideway having inwardly extending flanges against which the said shoes have a bearing, and a flat spring within the channel and extending lengthwise thereof, the said spring being curved so as to exert a yielding pressure against the carriage, thereby causing a frictional pressure to be exerted between the said shoes and the said flanges.

9. The combination, including a base, means for removably mounting two pipettes spaced apart from, but substantially parallel to each other, on one side of the base, guards extending upwardly from the base and having the outer plane thereof suitably spaced apart from the pipette, and means for confining a suitable plurality of blood specimen slides upon the opposite surface of the said base, the said confining means comprising a resilient seat member having seat portions adapted to support the mutually opposing end portions of the said slides, and a hinged cover enclosing the said seat member and slides, the said cover being adapted to exert a yielding pressure upon the slides in opposition to the resilient stress of the holder.

10. The combination specified in claim 9, but including the provision that the seat member for the slides has the seat portions thereof spaced apart from each other sufficiently far so that the slides can be lifted out of the seat member by means of the thumb and forefinger of a user when the said cover is open.

11. A correlator for blood specimens comprising a relatively light and compact structural framework capable of being easily shaken manually, stopper means secured to and spaced apart on said structural framework for receiving blood pipettes, said stopper means being adjustable and adapted to seal the open ends of the said blood pipettes against leakage while being shaken, and means for securing said blood pipettes to said structural framework between said stopper means.

12. A correlator for blood specimens comprising a relatively light and compact structural framework capable of being easily shaken manually, stopper means secured to and spaced apart on said structural framework for receiving blood pipettes, said stopper means being adjustable and adapted to seal the open ends of the said blood pipettes against leakage while being shaken, means for securing said blood pipettes to said structural framework between said stopper means, and means secured to said structural framework for retaining a plurality of glass slides, said means being so constructed and arranged as to tightly hold the plurality of slides while said correlator is being shaken.

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