

United States Patent

Perry

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[54] SNAP-ACTING SURGICAL LANCET

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[58] Field of Search 30/164.5, 164.6, 164.7, 164.8, 30/366, 367, 368; 83/586; 128/253, 305, 314, 315, 316, 329, 330, 333

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Primary Examiner—Channing L. Pace

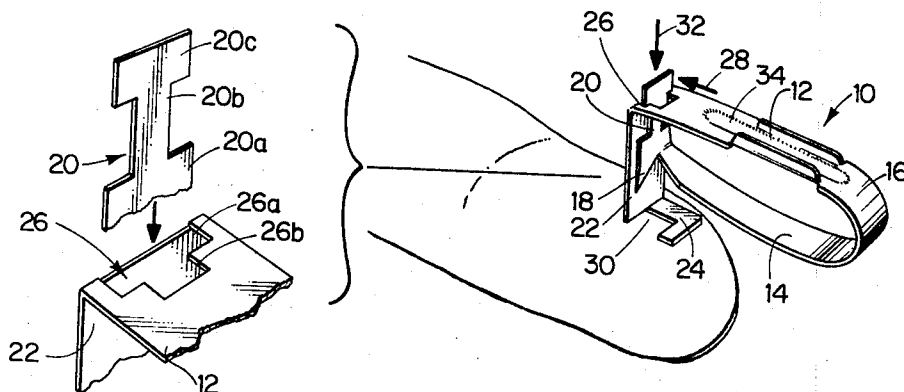
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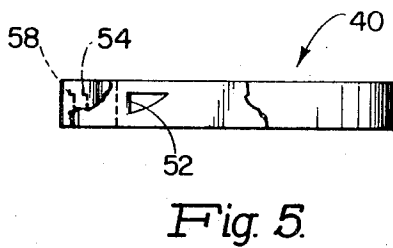
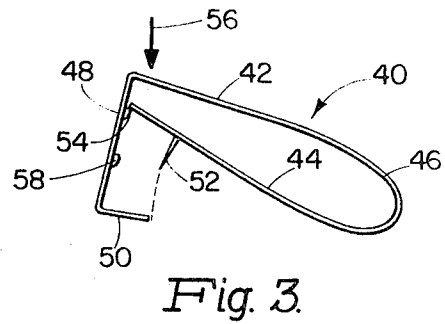
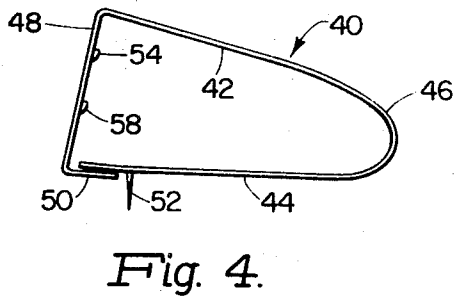
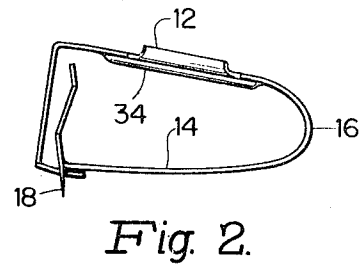
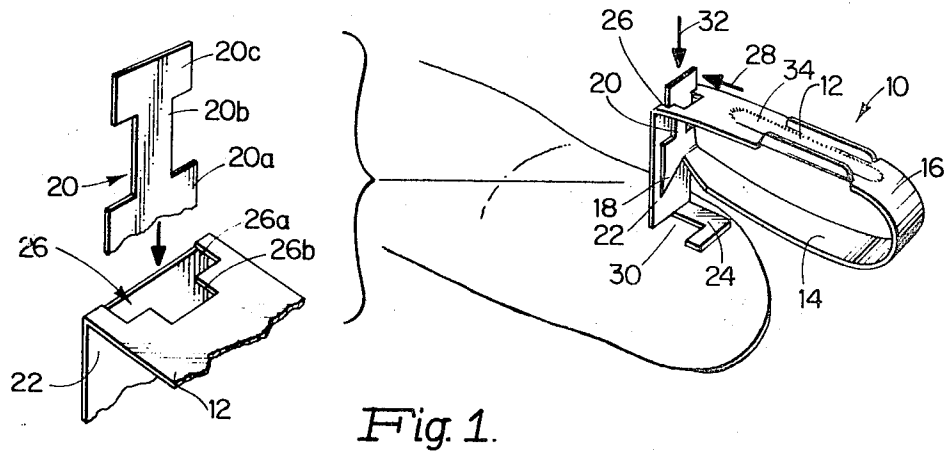
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ABSTRACT

A new snap-acting surgical lancet has a spring urging the forward ends of two opposed arms apart. A lower of the two arms carries a downwardly protruding lancing blade. Latching elements on the two arms hold them cocked with their front ends close together, and are releasable to allow the spring to snap the end of the lower arm downward, carrying the blade downward to lance the skin. A stop carried on one arm engages the other arm to limit this snap-apart travel of the arm ends. A single piece of spring material is readily formed to provide all of the foregoing structure, thereby providing a one-piece lancet.

15 Claims, 5 Drawing Figures





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SNAP-ACTING SURGICAL LANCET

BACKGROUND OF THE INVENTION

This invention relates to a surgical lancet for slicing dermal tissue to sever plural capillaries and thereby produce a flow of blood for collection for analysis and like purposes. In particular, the invention provides such a lancet that is simply constructed to be of such low cost as to be disposable after use with a single patient. The lancet is diminutive in size so as not to excite fear or other anxiety in the patient. The lancet is used in a manner that allows it to be positioned at the desired site of incision before forming the incision.

Dermal puncture lancets of many constructions are known, including the seemingly simple pin-like blade mounted in a plastic handle and used with a stabbing motion. A drawback of this type of lancet is that a certain skill is required to aim the pin to the point of the desired incision. A misplaced puncture can, for example, bruise the patient's bone, which is most undesirable.

An older dermal puncture instrument has a hollow hand-held barrel containing a pointed rod that is spring loaded to protrude out of the end of the barrel. The rod is retractable within the barrel, compressing a spring, and latchable in this position. Depression of a button on the barrel releases the rod and the spring drives it forward, driving the blade beyond the end of the barrel to make the incision.

This lancet construction is too costly to dispose after each use, but is of relatively complex structure so as to make sterilizing or other pathogen-free cleansing difficult. Also, repeated use often requires that the blade be sharpened, which is inconvenient.

U.S. Pat. Nos. 16,478; 16,479; and 2,646,799 disclose other prior lancet constructions. The former two patents disclose relatively complex structures that would be too costly to be disposed after each use. The lancet of the latter patent requires the operator to manually depress the blade to make the desired cut.

Accordingly it is an object of this invention to provide an improved lancet for making a dermal puncture for obtaining a blood sample.

Another object of the invention is to provide such a lancet that can be made at such a low cost that it can reasonably be discarded after each use. A lancet meeting these objectives can be furnished to the medical practitioner in a sterile enclosure and then disposed after a single use. This ensures that the lancet is sufficiently sharp to form a clean incision and is truly pathogen-free to protect the patient from infection and the practitioner from malpractice liability.

It is another object of the invention to provide a surgical lancet that can be prepositioned at the desired site of incision prior to forming the incision.

It is also an object of the invention to provide a lancet of the above character that operates with a snap-acting lancing operation.

A further object is to provide a lancet of the above character that is diminutive in appearance and hence can be used with pediatric and geriatric patients, as well as others, without inciting fear or other traumatic anxiety.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

SUMMARY OF INVENTION

The present surgical lancet can be formed from a single strip of spring material to have a loop-like shape with opposed handle and blade-carrying arms and with a spring joining the back ends of the arms and urging the front ends apart. The arms carry a releasable latch for holding them in a cocked position where the spring is taught, and carry a stop for limiting the separation of the arm front ends when the latch is released and the spring snaps the arms apart.

This lancet structure is easily sterilized, inexpensive enough to be discarded after a single use, and easily operated with minimum skill to position and orient the incision as desired.

Further, a portion of the lancet loop structure is normally pressed against the tissue immediately adjacent the point of incision, thereby dulling the nerves of the patient so that the incision is formed with minimal discomfort.

The invention accordingly comprises the features of construction, combinations of elements and arrangement of parts exemplified in the constructions hereinafter set forth, and the scope of the invention is indicated in the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description taking in connection with the accompanying drawings, in which:

FIG. 1 is a pictorial representation showing a lancet embodying the invention positioned on the finger of a patient and ready for release to make an incision;

FIG. 2 is a side elevation view of the lancet of FIG. 1 in the lancing position;

FIGS. 3 and 4 are side elevation views of another lancet embodying the invention and showing it respectively in cocked and lancing positions; and

FIG. 5 is a top plan view, partly broken away, of the lancet shown in FIG. 4.

DESCRIPTION OF ILLUSTRATED EMBODIMENTS

FIG. 1 shows a lancet 10 according to the invention in a cocked position and positioned on a finger in which a dermal puncture is to be cut for obtaining a sample of blood. The lancet is operated by pressing down on it slightly in the direction of arrow 32 and by then moving a release element in the forward direction as indicated with arrow 28. Upon being released, the arms of the lancet snap apart to the lancing condition shown in FIG. 2, where the blade protrudes downward to make the desired incision.

More particularly, FIG. 1 shows a one piece lancet 10 formed by folding a strip of spring material to provide a handle arm 12 oppositely above a blade-carrying arm 14 and with the fold 16 joining the two arms together at back ends thereof. At the front end of arm 14, the spring strip is bent transversely to the arm to form a downwardly protruding lancing blade 18 and an upwardly extending latch arm 20. The latch arm has, in upward succession, a wide section 20a, a narrow section 20b, and an intermediate width top section 20c. The juncture between sections 20b and 20c forms a latching shoulder, and the top section 20c also forms a release element.

As also shown in FIG. 1, at the front end of the handle arm 12 the spring strip is bent to form a downwardly depending leg 22 terminating in a foot 24 that extends longitudinally of the arms 12 and 14 and is disposed below the arm 14.

The handle arm 12 has a latching aperture 26 therethrough adjacent the front end of the arm. The aperture has a wide section 26a, the forward end of which is essentially at the juncture of the handle arm 12 and leg 22 so that when the arms 12 and 14 are pressed together to the position shown in FIG. 1, the top section 20c of the latch arm can slide along the leg 22 directly into the aperture section 26a. The aperture 26 further has a narrow section 26b extending to the back along arm 12 from the wide section 26a. The wide aperture section 26a is of sufficient width for the top section 20c of the latch arm to pass therethrough, and the aperture section 26b is narrower than the latch arm top section 20c but wider than the latch arm narrow section 20b.

With further reference to FIGS. 1 and 2, the sections of the arm 20 are angled relative to the front end of the blade-carrying arm 14 so that when the arms 12 and 14 are pressed together, the wide section 20c of the upstanding arm passes through the aperture wide section 26a. With further pressing of the arms 12 to 14 together, the latch arm section 20b passes through the aperture 26 and snaps back into the aperture section 26b. Hence, if the arms are now released so that the resiliency of the fold 16 urges the front ends of arms 12 and 14

apart, the shoulder noted above engages the sides of the aperture section 26b. This engagement holds the arms 12 and 14 in the cocked position shown in FIG. 1, with their front ends relatively proximal to each other.

The lancet remains securely cocked in this position. However the lancet is released simply by urging the top, release element, section 20c of the latching arm forward, in the direction indicated with arrow 28 in FIG. 1. This disengages the latching shoulder of the arm 20 from the aperture section 26b and thereby releases the front end of arm 14 so that the spring action of fold 14 snaps the front ends of arms 12 and 14 apart, to the position shown in FIG. 2. With the handle arm 12 of the lancet held by the operator, this snap-apart action drives the blade 18 downward, thereby cutting the desired incision.

It should be noted that the illustrated lancet 10 has an elongated ridge-like stiffening rib 34 extending forward on the handle arm 12 from adjacent the fold 16. The rib maintains the arm 12 essentially straight, so that it does not bend appreciably when the lancet is cocked. Hence, the rib constrains more of the bending to the fold 16 than would occur where the arm 12 were only equally as stiff as the fold 16. As a result, the blade 18 undergoes less longitudinal movement, i.e. along the direction in which the arms 12 and 14 extend, when the lancet opens from the cocked position to the lancing position. Where desired, the blade carrying arm 14 can be similarly stiffened.

As also shown in FIG. 1, the foot 24 of the lancet extends only part way across the width of the spring strip and the blade extends only across the portion of the strip width where the foot does not extend. The illustrated embodiment provides this arrangement by having a notch 30 through the foot through which the blade 18 passes when in the lancing condition of FIG. 2.

The foot 24 serves two functions in the lancet 10. One is to stop the travel of the arms 12 and 14 as they snap apart to the lancing position. This function is readily attained by having the foot 24 block the movement of the front end of the blade-carrying arm 14 as it snaps away from the arm 12. It will also be noted that the depth of the cut which the lancet makes is positively limited to the length of the blade 18 protruding below the stop 24, as shown in FIG. 2.

The other function of the foot 24 is to provide a pressure pad directly adjacent the site of the incision which the blade 18 makes. In use, the operator applies a slight downward pressure, in the direction of arrow 32, and the lancet leg 22 carries this pressure to the foot 24 which accordingly presses against the patient's skin closely about the site of the incision. As is known, this pressure desensitizes the dermal nerves of the patient and hence the patient feels hardly any discomfort when the lancet is released from the cocked position and makes the desired incision.

It will also be seen from the roughly approximate relative sizes in FIG. 1 of the finger and of the lancet that the lancet 10 is of such diminutive size that the patient in truth hardly notices it, especially when the handle arm 12 is held between the thumb and middle finger of the operator and his forefinger is placed on the top of the arm 12 ready to urge the latch arm top section 20c forward in the direction of arrow 28. This small size of the lancet makes it particularly acceptable for use with children, the elderly, and others likely to be distraught by the sight of a larger surgical instrument such as the hollow barreled lancet discussed hereinabove.

Turning to FIGS. 3, 4 and 5, the present folded spring strip construction for a surgical lancet can be applied to a lancet 40 that is even simpler than the lancet 10 of FIGS. 1 and 2. As with the lancet 10, the lancet 40 has a strip of spring material folded to provide a handle arm 42 and a blade carrying arm 44 joined together by a resilient spring fold 46; the arms 42 and 44 and fold 46 together having a generally U-shape. A leg 48 depends from the forward end of the handle arm 42 and has at its base end a foot 50 that serves the same stop and pressure foot functions as the foot 24 of the lancet 10. A blade 52 protrudes downwardly from adjacent the front end of the lan-

cet arm 44; the blade illustratively is formed by stamping it from the strip material in the arm 44 as shown in FIG. 5. When the lancet is in the lancing condition, FIGS. 4 and 5, the blade is disposed next to the edge of the foot 50. With this construction, the foot 50 can extend the full width of the spring strip as also shown in FIG. 5.

FIG. 3 shows the lancet 40 in a cocked position and FIG. 4 shows it in the lancing position where the foot 50 blocks the front end of the blade-carrying arm 44 from traveling further from the handle arm 42.

The latching structure for the lancet 40 is simply a detent 54 protruding inward, i.e. into the loop shape of the lancet 40, on the leg 48. The forward edge of the blade-carrying arm 44 is arranged to rest on the shoulder formed by the detent 54 as shown in FIG. 3.

The lancet is released from this cocked position simply by pressing downward on it, at the position and in the direction indicated with arrow 56 in FIG. 3. The geometry of the lancet is such that this force, combined with the reaction force developed in the upward direction at the foot 50, deform the lancet slightly to move the leg 48 and the forward edge of the arm 44 apart, thereby releasing the arm 44 from the detent 54 so that the arm 44 snaps down against the foot 50 under the resilient spring force of the fold 46. More specifically, as shown in FIGS. 3 and 4, the leg 48 extends from arm 42 and the lower end of the leg is below arm 44. The leg 48 mounts the detent 54 spaced from the fold beyond (i.e. to the left in the FIGURES) the juncture of the leg and arm 42. Hence when the arm 42 and foot 50, at the lower end of the leg, are pressed together, the detent 54 is displaced further from the fold 46, thereby releasing the free end of arm 44.

The lancet 40 is illustrated with a second detent 58 disposed lower on the leg 48 than the detent 54, the holding the lancet cocked with a lesser snap-apart force. The detents 54 and 58 are preferably wedge-shaped protrusions from the leg 48 as seen in the side views of FIGS. 3 and 4 so that the front edge of the blade-carrying arm 44 easily slides upward into the latching position when the arms 42 and 44 are pressed together.

The invention thus provides a truly disposable but yet spring-driven snap-acting surgical lancet. Further, the lancet is prepositioned at the exact site desired for the puncture, and it desensitizes the puncture site. These features ensure the patient of the utmost in safety, even with relatively unskilled medical personnel and the minimum of discomfort.

It will thus be seen that the objects set forth above, among those made apparent from the preceding description, are efficiently attained and, since certain changes may be made in 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 drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

Having described the invention, what is claimed as new and secured by Letters Patent is:

1. A surgical lancet comprising

- A. a first, handle-forming, elongated member having front and back ends,
- B. a second, blade-carrying, elongated member having front and back ends,
- C. a spring element

- 1. connected between said first and second members and disposing them substantially lengthwise of each other with said front ends opposite each other and said back ends opposite each other,
- 2. constraining said members from lengthwise movement relative to each other and,
- 3. resiliently urging said members to snap from a cocked position in which said front ends are proximal to each

other to a lancing position in which said front ends are further removed from each other in a direction transverse to the elongation of said second member,

- D. a lancing blade carried on said second member adjacent the front end thereof and protruding therefrom in the direction in which said front end of said second member moves relative to said first member in moving from said cocked position to said lancing position, and

- E. releasable latching means for holding said members in said cocked position and releasable to allow said spring element to snap the front end of said second member away from said first member and into said lancing position.

2. A surgical lancet as defined in claim 1 further comprising a stop member carried on one of said first and second members and extending therefrom to beyond the other of said members and interferingly engaging said other member when said members are in said lancing position to limit the distance the front ends of said members snap apart in moving from said cocked position into said lancing position.

3. A surgical lancet as defined in claim 1 further comprising
A. a leg member extending from said first member in the direction toward said second member, and

- B. a pressure foot carried on said leg member and disposed beyond said second member relative to said first member and adjacent the protrusion of said blade from said second member when said second member is in said lancing position.

4. A lancet as defined in claim 3 in which said pressure foot is further disposed opposite said second member in the direction away from said first member to block the travel of the front end of said second member beyond said lancing position.

5. A lancet as defined in claim 1 in which said latching means includes

- A. an arm extending from said second member in the direction opposite to said blade and, when said members are in said docked position, to beyond said first member, and

- B. a latch element on said arm and engageable with the side of said first member facing away from said second member to hold said members in said cocked position, said arm and latch element being moveable to release said latch element from said engagement with said first member.

6. A lancet as defined in claim 5 in which

- A. said first member has an aperture therethrough, and
B. said arm is disposed to carry said latch element through said aperture when said first and second members are in said cocked position and into latching engagement with said side of said first member.

7. A surgical lancet as defined in claim 1 in which said latching means includes

- A. a leg member extending from said first member adjacent the front end thereof in the direction toward said second member, and

- B. latching shoulder means on said leg member for releasably engaging said second member when in said cocked position.

8. A lancet as defined in claim 7 further comprising a stop member protruding from said leg member beyond said second member relative to said first member and limiting the travel of the front end of said second member away from said first member beyond said lancing position.

9. A surgical lancet comprising

- A. a folded U-shaped strip spring having first and second elongated members joined at said fold and resiliently deformable to allow portions of said members remote from said fold to move toward each other into a cocked position and resiliently urging said portions apart into a lancing position,

- B. a lancing blade protruding from said second member at said portion thereof and in the direction away from said portion on said first member,

- C. releasable catch means carried with one of said first and second members for holding said members with said portions thereof in said cocked position and movable to release said members thereby allowing said portions thereof to spring apart into said lancing position, and

- D. stop means carried with one of said first and second members and engaging the other member to limit the separation of said portions from each other beyond said lancing position.

10. A lancet as defined in claim 9 in which said strip spring further comprises a leg member depending from said portion of said first member toward said second member and carrying said stop means thereon.

11. A lancet as defined in claim 9 in which said stop means is carried on said first member and underlies, when said portions are in said lancing position, said second member closely adjacent the protrusion of said blade from said second member, thereby to form a pressure foot.

12. A surgical lancet comprising:

- A. a loop of strip spring having disconnected ends and having, in succession about said loop from one said end thereof,

1. a stop foot,

2. a leg member substantially perpendicular to said stop foot,

3. a handle member extending substantially perpendicularly from said leg member along the same direction as said stop foot,

4. a blade-carrying member extending substantially lengthwise of said handle member towards said leg member with a terminal portion thereof overlying and normally being resiliently urged against the side of said foot opposite said handle member,

- B. a lancing blade carried on said blade-carrying member and protruding therefrom away from said loop and from the juncture of said leg and handle members, and

- C. first and second latching means carried on said handle and blade-carrying members respectively, said latching means automatically engaging one another when said terminal portion of said blade-carrying member and said handle member are moved proximal to each other from said normal position and manually disengageable to allow said terminal portion of said blade-carrying member to snap into said normal position.

13. A surgical lancet as defined in claim 1

- A. in which said latching means includes a leg member

1. extending from said first member adjacent the front end thereof in the direction toward said second member,

2. having a first end at the juncture thereof with said first member,

3. having a second end disposed, at least when said first and second members are in said cocked position, beyond the side of said second member facing away from said first member, so that said second end can bear against a surface to be lanced,

4. said leg member having at least a portion thereof between said ends which is further removed than said first end thereof from said back end of said first member, and

- B. in which said latching means further includes latching shoulder means on said portion of said leg member for releasably engaging said second member when in said cocked position, said latching shoulder means

1. including a protrusion extending longitudinal to the elongation of said second member between said front end and said back end thereof,

2. engaging with said protrusion said front end of said second member to provide said latching engagement,

3. being displaced away from said front end of said second member, thereby to release said latching engagement, in response to a force on the front end of said first member directed toward the front end of said second member and opposed by a reaction force

directed on said leg member from said second end thereof to said first end thereof.

14. A surgical lancet comprising

- A. a first, handle member having front and back portions,
- B. a second, blade-carrying member having front and back ends, 5
- C. a spring element
 - 1. connected between said first and second members and disposing them substantially lengthwise of each other with said front end and front portion lengthwise adjacent each other and with said back end and back portion lengthwise adjacent each other, 10
 - 2. constraining said members from lengthwise movement relative to each other, and
 - 3. resiliently urging said members to snap from a cocked position in which said front end and front portion are proximal to a lancing position in which said front end and front portion are distal, 15
- D. a lancing blade carried on said second member adjacent the front end thereof and protruding therefrom in the direction in which said front end of said second member moves relative to said first member in moving from said cocked position to said lancing position, 20
- E. releasable latching means for holding said members in said cocked position and releasable to allow said front end of said second member to snap into said lancing position, and 25
- F. a foot member mounted with said first member and disposed opposite, in said first direction, to said front end of said second member; said foot member interferingly 30

engaging said second member, when in said lancing position, adjacent the protrusion of said lancing blade therefrom to fix its location in said lancing position.

15. A surgical lancet comprising

- A. a handle member,
- B. a presser foot on the handle member,
- C. a lancing blade,
- D. an elongated blade-carrying member
 - 1. having front and back portions and connected at said back portion to said handle member to extend lengthwise thereof,
 - 2. having a spring section constituting at least a portion thereof between said connection to said handle member and said front portion, said spring section rendering said front portion movable relative to said handle member between a cocked position where said front portion is retracted from said presser foot and a lancing position where said front portion abuts said presser foot, the resiliency of said spring section urging said front portion into said lancing position, and
 - 3. carrying said lancing blade at said front portion thereof disposed to be retracted from said presser foot in said cocked position and to protrude therefrom in said lancing position, and
- E. releasable latching means for holding said front portion of said blade-carrying member in said cocked position and releasable for allowing said front portion to assume said lancing position.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,659,608 Dated May 2, 1972
Inventor(s) Wesley G. Perry

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 1, line 29, "made" should read -- make --.
Column 3, line 11, "14" should read -- 16 --; same line 11,
"16" should read -- 14 --. Column 5, line 39, "docked" should
read -- cocked --; line 44, "moveable" should read -- movable --.

Signed and sealed this 24th day of September 1974.

(SEAL)
Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents