May 6, 1958 K. KLEEMANN 2,833,237

THREAD TENSION RELEASE AND PRESSER BAR LIFTER

Filed Aug. 15, 1955 2 Sheets-Sheet 1

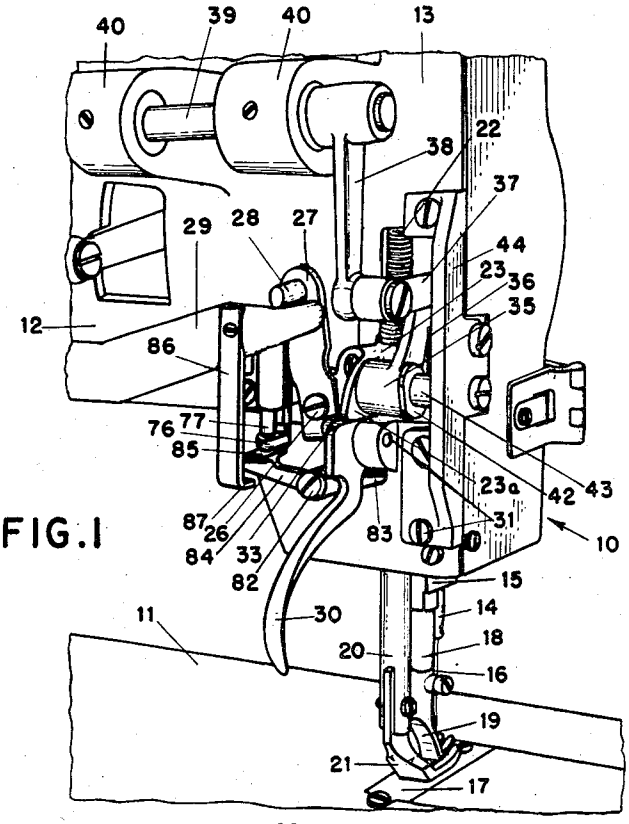


FIG. 1

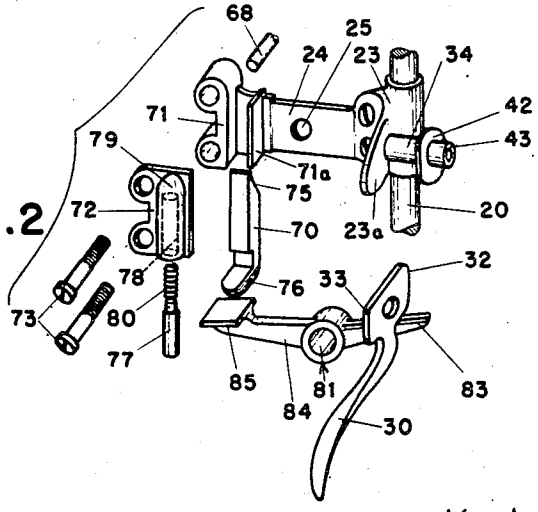


FIG. 2

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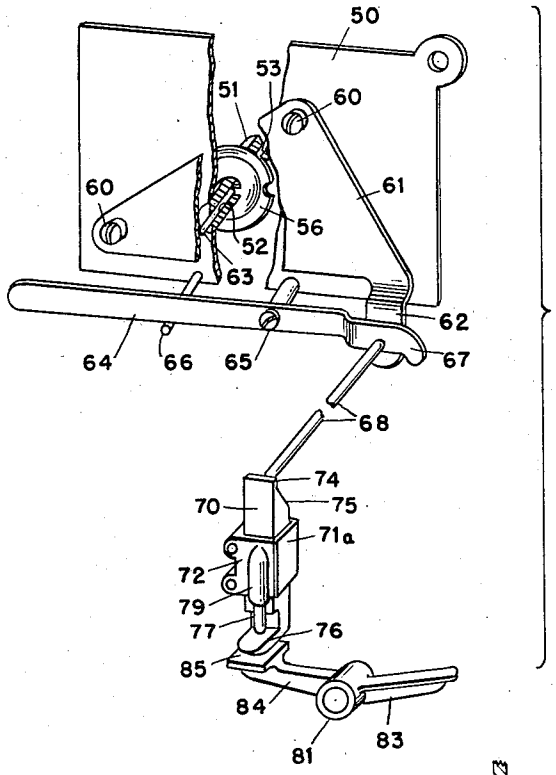


FIG.3

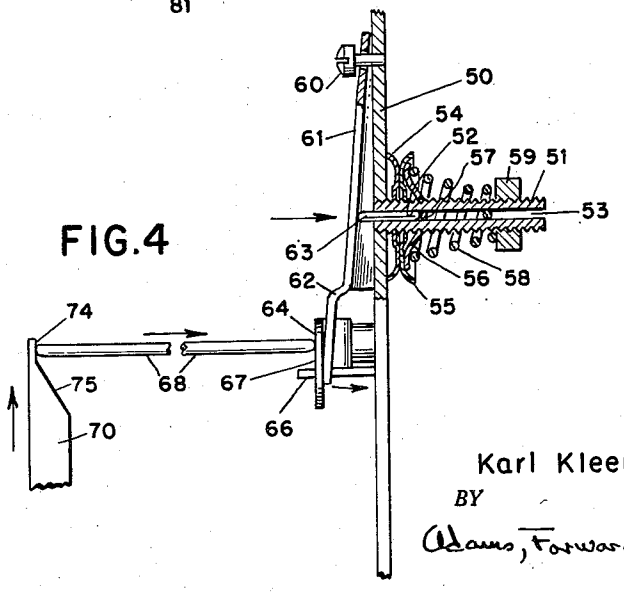


FIG.4

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THREAD TENSION RELEASE AND PRESSER BAR LIFTER

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Claims priority, application Germany August 16, 1954

5 Claims. (Cl. 112—238)

This invention relates to the control of thread tension devices in sewing machines and in particular to an apparatus for use in sewing machines by which any one of several devices for lifting the presser bar can be simultaneously utilized to release thread tension.

In many sewing machines of conventional types thread tension can be released by the use of a pin passing through the arm of the sewing machine which supports the sewing head and which pin, directly or indirectly, is operative to compress the spring which forces the thread tension disks together. Such a pin is commonly operated by the manual lifting device for the presser bar so that as the presser bar and foot are lifted to clear the material on the work table the release pin is simultaneously operated to loosen the compressive force exerted upon the tension disks through which the thread passes between the spool and needle.

Heretofore with thread tension releases of this type it has been common practice to position a block fixed on the presser bar, against which the cam surface of a manual presser lifter bears upwardly to lift the presser bar and foot. When the presser bar is so lifted to raise the presser foot from the material, the block affixed to the presser bar directly or indirectly engages the thread tension release pin and thus simultaneously releases tension on the thread passing to the needle. Such a device, however, is subject to the disadvantage that the thickness of the material reaches a maximum clearance between presser foot and throat plate at which undesirable slackening of thread tension occurs. It has heretofore also been found that this problem can be avoided by constructing the block which lifts the presser bar in two pieces, such that one piece is affixed to the presser bar and the other is loosely mounted on the presser bar but positioned between the cam surface of the presser lifter and the part of the block affixed to the presser bar. Tension is released in this arrangement by engagement of the loose part of the block with the release pin. In this manner upward movement of the presser bar caused by the thickness of the material has no effect upon the release pin and thread tension can be loosened only when the presser bar lifter forces the loose part of the block upwardly into engagement with the fixed part of the block.

In many machines, however, such as those employing a pair of alternating presser bars, the two-piece presser bar block arrangement cannot be employed without substantial change in the design of the machines. For this reason in such machines a two-piece presser bar block has not been used and thread tensions have heretofore been released simply by separate manual control.

Another problem arises in many commercial machines which employ secondary presser bar lifter systems for operation, for example, by the knee or foot of the operator. In such systems the tension releasing pin is actuated by a series of levers, and a cam shaft or a quadrant shaft with guide curves. In such sewing machines thread tensions are not prematurely loosened even when

thicker material is used. The construction of such releasing devices and the limited possibility of incorporating them in the sewing machine renders it impossible, however, to provide for release of thread tension also by means of a manual presser lifter.

It is an important object of this invention to provide an apparatus for releasing thread tensions by providing for engagement with a conventional thread tension release pin so that it will not release the thread tension when thicker material is employed and yet so that it can be actuated either by a secondary presser bar lifting device or by a manual presser bar lifter. It is a further object of this invention to provide such an apparatus for releasing thread tensions which can readily be incorporated in existing machines without changing the design of such machines.

This invention contemplates employment of a mechanism for actuating a thread tension release pin which is independent of the position of the presser bar but which is actuated to release the thread tension by engaging the thread tension release pin when either the secondary or manual presser bar lifter is operated. In particular it is preferred to employ a two-armed lever pivoted at its center to the machine, one arm of which is actuated by the manual presser bar lifter and the other arm of which is actuated by a secondary presser bar lifter, both such actuations causing the two-arm lever to rotate about the central pivot in the same direction to cause the two-arm lever to drive a spring-loaded, sliding, tapered, bar to engage and actuate the tension releasing pin. In this preferred arrangement it is advantageous to construct the two-arm lever such that one arm engages the manual presser bar lifter while the other arm both presses against the sliding member to actuate the tension release pin and is actuated by the secondary presser bar lifter.

These and other objects of the invention which will become more apparent hereinafter are illustrated in the accompanying drawings with reference to a specific construction embodying the principles of this invention for releasing thread tensions in a sewing machine. In the accompanying drawings:

Fig. 1 is a fragmentary perspective view of the head of a sewing machine employing compound feed and alternating pressers which is provided with a tension release device in accordance with this invention;

Fig. 2 is an exploded view of the essential parts for actuating the tension release pin which are employed in the machine shown in Fig. 1;

Fig. 3 is a perspective view of the assembled operating parts for producing thread tension release in the machine shown in Fig. 1; and

Fig. 4 is an end elevation of the machine shown in Figure 1, shown partly in section to illustrate in particular the operative connection between the presser bar lifters and tension disks.

In the drawings the reference numeral 10 designates a sewing machine having compound feed and alternating pressers. This general type of sewing machine is conventional and its operation will be described more fully hereinafter. Sewing machine 10 includes a work table 11 for supporting the material to be sewn, and an overhanging arm 12 supported above work table 11 and carrying a sewing head 13 at its end.

Arranged in sewing head 13 are a needle bar 14 which is vertically reciprocable in and depends at its lower end from a rocking double guide sleeve 15 pivotally connected at its upper end to sewing head 13 to permit its movement through an arc in a plane extending transversely across work table 11 and aligned with the direction of feed. Needle bar 14 is connected to a crank shaft (not shown) of conventional construction which causes

needle bar **14** to reciprocate vertically and to drive a needle **16**, secured in the lower end of needle bar **14**, into and out of an opening in throat plate **17**. Throat plate **17** is embedded in and secured on the surface of work table **11** and so positioned such that needle **16** cooperates with a rotary hook (not shown) in order to produce a conventional lock stitch. A power take-off (not shown) from the crank shaft having an eccentric movement is connected to sleeve **15** to cause it to oscillate about its top pivot.

An inside presser bar **18** is also mounted in and depends at its lower end from sleeve **15** for vertical reciprocating movement. The lower end of inside presser bar **18** carries an inside presser foot **19**, sometimes known as a walking foot, which bears downwardly against the feed dog (not shown) to cooperate with the feed dog in pulling material across work table **11**. Inside presser foot **19** is provided with an aperture through which needle **16** passes in its downward stroke to cooperate with the hook.

To the rear of needle bar **14** and inside presser bar **18** is the outside presser bar **20** which is mounted for vertical sliding movement in and depends at its lower end from head **13**. The lower end of outside presser bar **20** carries an outside presser foot **21** which cooperates with throat plate **17** to hold the material being sewn in fixed position. A heavy helical spring **22** is positioned about the upper end of outside presser bar **20** and bears at its lower end against a presser bar block **23** which is affixed to outside presser bar **20**.

Presser bar block **23** carries an arm **23***a* which extends laterally from presser bar **20** towards the rear of the machine. Presser bar block **23** also carries a guide arm **24** extending laterally from presser bar **20** and at right angles to arm **23***a* more or less parallel to the length of supporting arm **12**. Guide arm **24** is provided with a tapped opening **25** which threadedly engages a screw **26** serving to affix an upright post **27** to guide arm **24**. The upper end of upright post **27** carries a small stud **28** projecting toward the rear of the head which on its underside is aligned to engage the upper edge of presser bar lifting arm **29**.

Lifting arm **29** is pivotally secured at its center (beyond the fragmentary views shown) to sewing machine arm **12** in a conventional manner and at its remote end is pivotally connected to a vertical link extending through work table **11** for vertical reciprocation by means of a treadle actuatable by the foot of the operator or by means of a knee-operated lever. This actuation of lifting arm **29** causes it to ride upwardly at its end adjacent head **13** to engage stud **28** and lift outside presser bar **20** upwardly against biasing of spring **22**.

Presser bar block arm **23***a* in its lowermost position is closely adjacent to the end of manual presser bar lifter **30** in the proximity of the pivotal connection **31** by which presser bar lifter **30** is connected to head **13**. In the vicinity of pivot **31** presser bar lifter **30** is provided with a pair of cam surfaces, one cam surface **32** disposed forward of arm **23***a*, and the other cam surface **33** disposed to the rear of arm **23***a* as seen in Fig. 1. When presser bar lifter **30** is actuated by lifting its outer end remote from head **13**, cam surface **33** engages the underside of arm **23***a* and thereby lifts outside presser bar **20** to remove outside presser foot **21** from throat plate **17**.

On arm **23***a* of outside presser bar block **22** there is affixed a bearing bolt **34** which extends horizontally and lengthwise of sewing machine arm **12** toward the outer end of head **13**. Bearing bolt **34** rotatably carries the center of bell crank lever **35**, one arm, **36**, of which is pivotally connected by link **37**, to crank arm **38** of shaft **39** supported on sewing arm **12** in journals **40**. The remote end of shaft **39** (beyond fragmentary views shown) is provided with a similar crank arm and link which engage an eccentric on the main crank shaft and thus an oscillating movement is imparted to shaft **39** during operation of sewing machine **10**.

The other arm of bell crank lever **35** (not visible) terimnates in a pivotal link connection to the upper end of inside presser bar **18**. Bell crank lever **35** is held in position on bearing bolt **34** by means of a guide disk **42**. The outer end of bearing bolt **34** carries a small bearing cylinder **43** which rests in a vertical guide slot on the inside face of guide plate **44** affixed on the end of head **13**.

The oscillating movement of shaft **39** produced during operation of sewing machine **10** causes a similar oscillating movement of bell crank lever **35**. As this movement of bell crank lever **35** approaches its clockwise limit, as seen in Fig. 1, the arm of bell crank lever **35** extending forward in head **13** bears down against the upper end of inside presser bar **18**, the foot **19** of which is resting firmly on the feed dog. Thus, further movement of bell crank lever **35** in a clockwise direction lifts outside presser bar **20** and its foot **21** above throat plate **17**. As the same oscillating movement of bell crank lever **35** is reversed and approaches its counter-clockwise limit, as seen in Fig. 1, the central pivoted part of bell crank lever **35** forces down against outside presser bar **20** to cause outside presser foot **21** to bear against throat plate **17**. Further counterclockwise movement thereby lifts the forward arm of lever **35** carrying with it inside presser bar **18** to remove foot **19** from the feed dog, clear of table **11**. It is apparent therefore that the vertical movement of the inside and outside presser bars is alternating.

The timing of the vertical reciprocation of needle bar **14** and of the transverse movement of the feed dog cooperates with this alternating movement such that, as the needle **16** is plunged through the openings in inside presser foot **19** and throat plate **17** to cooperate with the hook, sleeve **15** carrying both needle bar **14** and inside presser bar **18** is oscillated toward the rear as seen from the operator's side of the machine. Simultaneously, the feed dog is in its upper position and moves toward the rear of the machine. At the same time outside presser bar **20** is raised and holds foot **21** above throat plate **17**. As sleeve **15** reaches its rearward limit of movement, outside presser bar **20** and presser foot **21** drop. At the same time the feed dog is lowered and removed to the forward position, and inside presser bar **18** and presser foot **19**, and needle bar **14** and needle **16** are raised and moved forward. In this action the material is alternately pulled and held firm, and the stitch is taken during the pulling movement.

Thread tension itself is maintained by a conventional device shown most clearly in Fig. 4, which includes a plate **50**, affixed to the forward face of sewing arm **12** of machine **10**, which carries a forwardly projecting threaded stud **51** having a central bore **52** and a long slot **53** at its outer end. On the outer face of plate **50** are positioned on stud **51** a pair of tension disks **54** and **55** which are held in position by a cup **56** having a web **57** which fits within slot **53**. These members are held under tension by spring **58** and nut **59**, the desired tension during sewing being set by the relative compression exerted upon spring **58** by nut **59**.

On the inside face of plate **50** there is loosely positioned by means of a pair of screws **60** a triangular plate **61**, the lower end of which is freely movable through a small arc and which carries a projection **62**. A small pin **63** extends through the bore **52** of stud **51** abutting at its inner end the outside surface of triangular plate **61** and abutting at its outer end web **57** of cup **56**.

A lever **64** is pivotally secured at its center **65** to the inside of plate **50** with sufficient freedom to permit it to wobble through a small arc. A guide pin **66** attached to the inside face of plate **56** prevents lever **64** from rotating through an appreciable angle. One end of lever **64** is provided with a projection **67** which engages the inside face of projection **62** of triangular plate **61**. Thus,

wobbling movement of lever **64** forces plate **61** against plate **50** and thus causes pin **63** outwardly in bore **52** to push web **57** and cup **56** from tension disk **55**, carrying with them spring **58** and thereby releasing the tension on the thread which ultimately passes through an appropriate take-up mechanism to the eye of the needle.

A long pin **68** passing through the body of arm **12** projects outwardly on the forward face of arm **12** into engagement with the inside face of projection **67** on lever **64** and also projects from the rear face of arm **12** slightly above the outer end of guide arm **24**. This rearward projection of pin **68** is commonly employed in many domestic and commercial machines in direct engagement with the presser bar block to produce release of tension on disks **53** and **54**. In machines of the type illustrated, however, where it is desired to effect release of tension only when the presser bar is deliberately lifted, as opposed to lifting that occurs in ordinary feeding of material between presser bar and throat plate, pin **68** cannot be positioned for actuation by any usual means.

Insofar as sewing machine **10** has been described above, with the exception of cam **32**, its construction is conventional and the description has necessarily been limited to such details as are necessary for a complete understanding of the operation of the tension release device of this invention. In the present invention pin **68** is actuated by upward vertical movement of a sliding member **70** which is on three of its sides surrounded and guided by guide piece **71** affixed to arm **12**. As is shown most clearly in Fig. 2 the flanged extension **71***a* of guide piece **71** which serves as a guide for two sides of slide **70** also serves in part as a guide for the outer end of guide arm **24**. The fourth side of slide **70** is guided by a plate **72** affixed over the outer side of guide piece **71** by means of screws **73** which also serve to affix guide piece **71** to arm **12**.

The upper end of slide **70** is provided with a vertical flat **74** on its inside face against which pin **68** rests. The lower end of flat **74** merges into a taper **75** which is engageable with the rearward projection of pin **68** when slide **70** is urged upwardly in guide piece **71**.

The lower end of slide **70** is provided with a rearwardly angled piece **76**, the upper face of which bears against the lower end of a pin **77** which is vertically reciprocable within a small vertical bore **78** in a boss **79** on plate **72**. A small coil spring **80** is positioned within bore **78** to bias pin **77** into contact with angle **76**.

A two-armed lever **81** is pivotally secured at its center by means of bolt **82** to sewing arm **12**. One end, **83**, of lever **81** is positioned immediately below cam surface **32** of the manual presser bar lifter **30**, such that upward movement of the outer end of lifter **30** causes cam surface **32** to bear downwardly against end **83** and rotate lever **81** clockwise as seen in Figs. 1 and 2. The other arm **84** of two-arm lever **81** carries at its outer end the impact plate **85** which is positioned with its upper face abutting the lower end of the angle portion **76** on slide **70**. Clockwise movement of lever arm **81** thus raises slide **70** to cause the end of pin **68** to move from its engagement with flat **74** on to taper **75** and thereby reciprocates pin **68** to cause it to bear against projection **67** and ultimately to release the tension of disks **53** and **54**.

Toward the outer end of lifting arm **29** there is affixed a downwardly depending hook arm **86** provided with a hook **87** at its lower end which is located beneath impact plate **85**. Thus, upward movement of the outer end of lifting arm **29**, causing it to bear against stud **28** and lift outside presser bar **20**, also engages hook **87** with arm **84** to rotate lever **81** clockwise and cause pin **68** to move from engagement with flat **74** to taper **75** on slide **70** and release the tension on disks **53** and **54**.

From the preceding description it is apparent that upward movement of the outer end of presser bar lifter **30** or upward movement of the outer end of lifting arm **29** produces a clockwise rotation of lever **81** and thus depresses pin **68**, as seen from the rear of machine **10**, to release thread tension. In the particular machine illustrated the same upward movement not only carries the outside presser bar **20** upwardly, but also carries inside presser bar **18** upwardly by producing a movement of bell crank lever **35** equivalent to that utilized to lift inside presser bar **18** during operation of the machine.

While this invention has been described in a specific application to a machine employing a compound feed and alternating pressers and is particularly advantageous in such a machine, devices constructed in accordance with the invention can similarly be employed to coordinate intentional lifting of the presser bar with simultaneous release of thread tension in any conventional machine employing one or more presser bars which hold the material in position on the work table or cooperate with the feed dog.

I claim:

1. A device for a sewing machine having a reciprocable presser bar, a presser bar lifter movably mounted on said sewing machine operably engageable with said presser bar to lift said bar upon movement of said lifter and thread tension release means including a reciprocable release pin, which device comprises a lever pivotally mounted on said sewing machine, said presser bar lifter being operably engageable with said lever separately of said presser bar to rotate said lever upon actuation of said presser bar lifter to lift said presser bar, a block having a tapered end slidably mounted on said machine with its tapered end extendable past an end of said release pin in sliding engagement therewith to reciprocate said release pin, and means biasing the other end of said block into engagement with said lever opposing said rotation of said lever and biasing said tapered end of said block out of engagement with said pin.

2. A device according to claim 1 in which said sewing machine further includes a second presser bar lifter movably mounted on said machine operably engageable with said presser bar to lift said presser bar and operably engageable with said lever separately of said presser bar to rotate said lever opposing the biasing of said block.

3. A device for a sewing machine having a vertically reciprocable presser bar, a presser bar lifter pivotally mounted on said sewing machine and operably engageable with said presser bar to lift said bar upon pivotal movement of said lifter and thread tension release means including a reciprocable release pin, which device comprises a lever pivotally mounted on said sewing machine, said presser bar lifter being operably engageable with said lever separately of said presser bar to rotate said lever upon actuation of said presser bar lifter to lift said presser bar, an arm affixed to said presser bar, a block having a tapered end slidably mounted in said arm with its tapered end extendable past an end of said release pin in sliding engagement therewith to reciprocate said release pin, and means biasing the other end of said block into engagement with said lever opposing said rotation of said lever and biasing said tapered end of said block out of engagement with said pin.

4. A device according to claim 4 in which said sewing machine further includes a second presser bar lifter pivotally mounted on said machine operably engageable with said presser bar to lift said presser bar upon pivotal movement of said second lifter and operably engageable with said lever separately of said presser bar to rotate said lever opposing the biasing of said block.

5. A device for a sewing machine having a vertically reciprocable presser bar, a first presser bar lifter pivotally mounted on said sewing machine and operably engageable with said presser bar to lift said bar upon pivotal movement of said first lifter, a second presser bar lifter pivotally mounted on said sewing machine and operably engageable with said presser bar to lift said bar upon pivot-

al movement of said second lifter, and thread tension release means including a reciprocable release pin, which device comprises a lever pivotally mounted intermediate at its ends on said sewing machine, a cam surface on said first presser bar lifter operably engageable at one end of said lever separately of said presser bar to rotate said lever upon actuation of said first presser bar lifter to lift said presser bar, a hook on said second presser bar lifter operably engageable at the other end of said lever separately of said presser bar similarly to rotate said lever upon actuation of said second presser bar lifter to lift said presser bar, an arm affixed to said presser bar, a block having a tapered end slidably mounted in said arm with its tapered end extendable past an end of said release pin in sliding engagement therewith to reciprocate said release pin, and means biasing the other end of said block into engagement with said other end of said lever

opposing said rotation of said lever and biasing said tapered end of said block out of engagement with said pin.

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CERTIFICATE OF CORRECTION

Patent No. 2,833,237 May 6, 1958

Karl Kleemann

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 6, line 62, for the claim reference numeral "4" read -- 3 --.

Signed and sealed this 29th day of July 1958.

(SEAL)
Attest:

KARL H. AXLINE
Attesting Officer

ROBERT C. WATSON
Commissioner of Patents