July 17, 1951 M. G. IVANDICK 2,560,577

UPPER TENSION DEVICE FOR SEWING MACHINES

Filed May 22, 1944

Fig. 1

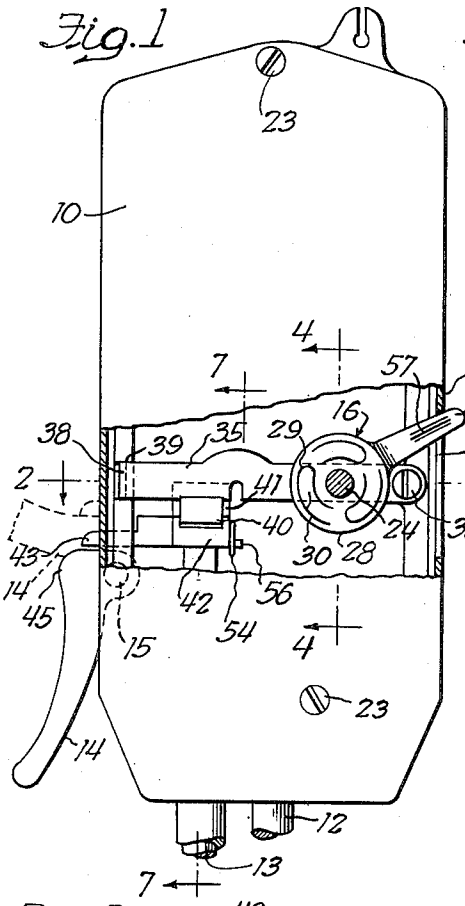


Fig. 5

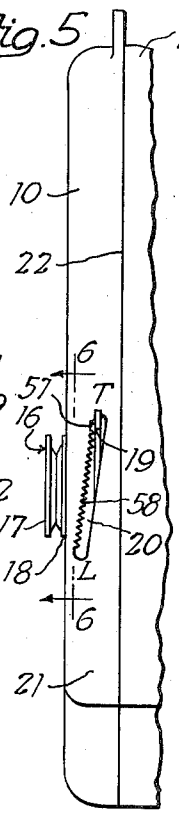


Fig. 7

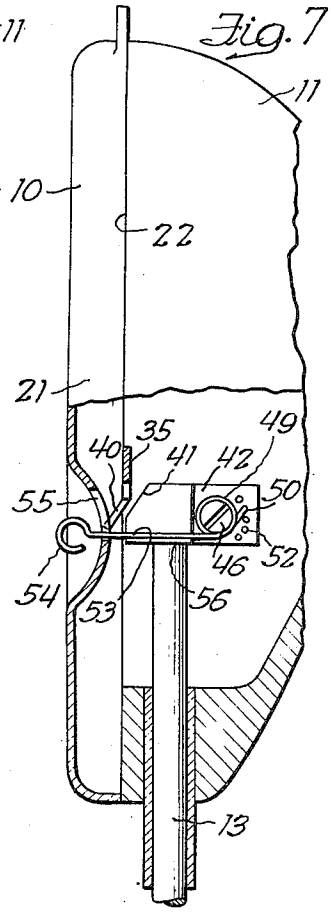


Fig. 2

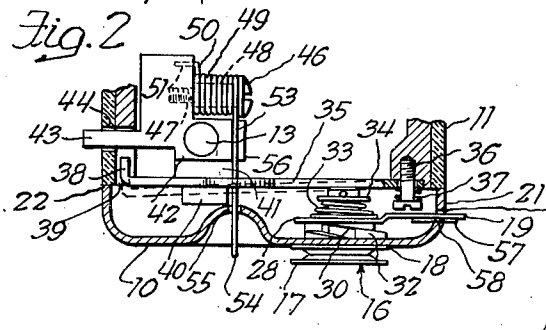


Fig. 6

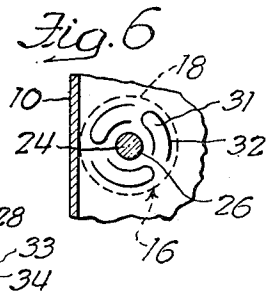


Fig. 4

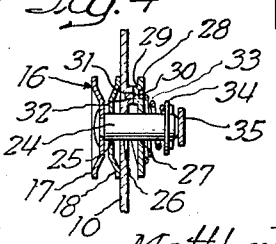
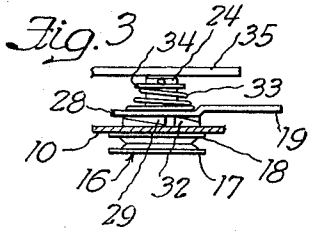


Fig. 3



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UNITED STATES PATENT OFFICE

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UPPER TENSION DEVICE FOR SEWING MACHINES

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Application May 22, 1944, Serial No. 536,692

9 Claims. (Cl. 242—150)

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This invention relates to a new and improved upper tension device for sewing machines.

Sewing machines have invariably been provided with exposed adjustable thumb nut type tensions, which are too apt to be tampered with by children and, if loosened enough, will come apart and not only present a problem as to the correct reassembly but present the possibility of one or more loose parts being mislaid or lost, thus rendering the machine useless until it can be overhauled (at appreciable expense) by an experienced repairman. Furthermore, even though no actual damage may be done to the machine by such tampering with the tension adjustment, it is obvious that the housewife, not having a visible indication that a change has been made in the tension adjustment, is quite apt to do an appreciable amount of sewing with the improper tension adjustment before becoming aware of it, and thus have her work spoiled, with consequent loss of time and, in some instances, damaged, if not ruined, material also, if the material happens to be of a delicate texture that will not permit removal of the imperfect stitching, and resewing. It is, therefore, the principal object of my invention to provide an improved tension device, in which there are no knobs or thumb nuts to be turned, but only a tension adjusting lever to be oscillated in an elongated slot in the face plate of the machine, so that the housewife can see at a glance the setting of the machine so far as tension is concerned, without having to read the fine graduations on a scale, which at best are never easy for the uninitiated or non-mechanically inclined person to decipher. A salient feature of the present invention lies in having a vertical slot in the arm of the machine in which the tension adjusting lever is arranged to be moved, the lever being so connected to the tension means that a higher setting of the lever obtains higher tension, and vice versa, thus making it possible for the operator to tell at a glance whether the tension is high, low, or medium without having to decipher some fine print or refer to a manual explaining the matter.

A further object is to provide a simple means for positively holding the adjusting lever in adjusted position so that vibration incident to operation of the machine will not be apt to result in an accidental change in the tension adjustment.

The invention is illustrated in the accompanying drawing, in which—

Figure 1 is an end view of a sewing machine head equipped with an upper tension, made in accordance with my invention, a portion of the

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tension device and a portion of the face plate being broken away to disclose in side elevation those portions of the tension device that are behind the face plate;

Fig. 2 is a horizontal section through the tension device, taken on the line 2—2 of Fig. 1;

Fig. 3 is a view corresponding to a portion of Fig. 2, showing the tension device set for less tension;

Fig. 4 is a vertical section through the tension device, taken on the line 4—4 of Fig. 1, showing tension released;

Fig. 5 is a front view of the end portion of a sewing machine head embodying my improved tension device, showing the elongated slot through which the tension adjusting lever extends for operation;

Fig. 6 is a sectional detail on the line 6—6 of Fig. 5, and

Fig. 7 is a view partly in front elevation and partly in vertical section on the line 7—7 of Fig. 1.

The same reference numerals are applied to corresponding parts throughout the views.

The drawing discloses only enough of the sewing machine to enable those skilled in the art to understand and appreciate the improvements of my invention. Showing more of the machine, it was believed, would only result in confusion.

The reference numeral 10 designates the face plate on the end of the arm 11, and 12 designates the needle bar and 13 the presser bar that is normally urged downwardly under the pressure of a coiled compression spring (not shown) bearing upon the upper end portion of said bar, the loading of which may be varied as desired by the adjustment in the usual way of a cap screw (not shown) on top of the arm 11, the presser bar being adapted to be raised against the action of the spring in the well known manner by upward swinging movement of the lift lever 14 that is pivoted as at 15 on the arm 11. In the present structure the spring referred to would bear either on top of the plate 42 that is carried on the upper end of the presser bar 13, or on an upper extension of said bar.

The upper tension device of my invention is indicated generally by the reference numeral 16, and attention is called first of all to the fact that the only parts of the tension device that are exposed outside the face plate 10, are the disks 17 and 18, between which the thread slides frictionally, and the tension adjusting lever 19 that is oscillatable in the elongated substantially vertical slot 20 provided in the front marginal wall

21 of the face plate. The face plate is, by the way, of cupped form and bears against the end of the arm on the rim portion 22, and is fastened to the arm by screws 23 that are entered through holes in the face plate, and thread in registering holes in the arm. The slot 20 is inclined at a small angle with respect to a vertical, as indicated in Fig. 5, and, as will presently appear, the position of the lever in this slot determines the spring pressure holding the disks 17 and 18 engaged. To increase the spring pressure, the lever 19 is moved upwardly in the substantially vertical slot 20 from the lower or L-end, so marked to indicate looseness, toward the upper or T-end, so marked to indicate tightness. The housewife can therefore tell at a glance for what tension the machine is set, and there is no need for close inspection of numbered fine graduations on a scale, which are not only hard to read, but difficult for most women to understand without careful study of an instruction book, which may not be available when the occasion for reference thereto arises. A child tampering with this tension adjustment cannot, therefore, cause the havoc sometimes experienced with the old, unimproved tension devices, as previously pointed out, because there is nothing to come apart, and any change in tension adjustment is indicated at a glance by noting the position of the lever 19 in the slot 20.

A pin 24 is rigidly connected with the disk 17, and extends freely through a center hole 25 in the disk 18, and through another hole 26 in the face plate, and still another hole 27 in the enlarged circular cam portion 28, provided on the inner end of the tension adjusting lever 19. The lever is formed from a piece of sheet metal, and has embossed arcuate cam portions 29, which provide helical cam surfaces 30 on the crowns thereof, to cooperate with helical cam surfaces 31, provided on the crown portions of embossed arcuate cam portions 32, struck inwardly from the face plate 10 around the hole 26, and in concentric relation thereto. A conical compression spring 33 surrounds the inner end portion of the pin 24, and has its large end bearing against the back of the cam portion 28 of the lever 19, and its small end abuts a washer 34 that is retained in place by a cross-pin inserted in a transverse hole in the end portion of the pin 24. When the lever 19 is in the lower end of the slot 20, the parts are in the position shown in Fig. 3, giving light tension on the thread slidably engaged between the disks 17 and 18, but when the lever 19 is moved to the upper end of the slot 20, as shown in Fig. 5, the parts are in the position shown in Fig. 2, in which the spring 33 is compressed to a greater extent than in Fig. 3, so that the thread is placed under proportionately greater tension. The stamped sheet metal helical cam portions can, of course, be produced very economically, and will not show any perceptible wear after years of use, and there is obviously nothing to get out of order or apt to come aparat accidentally, even if children tamper with the machine. Vibration incident to operation of the machine might cause an accidental shifting of the position of the lever 19 unless some form of catch or detent means were provided. For that purpose I prefer to strike an elongated rib 57 from the handle end of the lever, which is V-shaped in cross-section so as to fit nicely in any one of the V-notches 58 on the saw-toothed side of the slot 20. The lever 19 yields sufficiently easily to be shiftable with light finger pressure upwardly or downwardly, for increase or decrease in thread tension, but will not be apt to shift its position accidentally as a result of vibration. A clicking sound is heard as the rib 57 drops into one notch 58 after another, so that the housewife can easily gauge changes in tension and restore a previous adjustment if a new setting is not satisfactory. The spring 33 which provides the adjustable spring pressure for the tension device 16 also acts to hold the lever 19 locked by its rib 57 on the saw-toothed side 58 of the slot 20, and it is this spring which yields to permit the lever to be shifted one way or the other in changing the tension adjustment.

Automatic release of the tension when the presser bar is raised with the lift lever 14 is obtained in the present machine by deflection of a lever 35, which has abutment near one end with the end of the pin 24. As clearly appears in Fig. 2, the lever 35 is loosely hinged on a screw 36 threaded in a hole in the arm 11 and is subject to the pressure of a small coiled compression spring 37 mounted on the screw, whereby the lever returns to the normal position shown when the presser bar is lowered. The other end 38 of the lever 35 is slidable in a horizontal guideway 39 provided therefor on the inside of the rear wall of the arm 11. The lug portion 40 adjacent the free end 38 of the lever is bent at an acute angle to the vertical, so as to provide an inclined cam surface on the back thereof, to cooperate with an inclined cam surface 41 provided on the adjacent side of a plate 42 suitably secured on the upper end of the presser bar 13. This plate has a prong 43 extending through a slot 44 in the rear wall of the arm 11, and is disposed directly over the lift lever 14 for cooperation with the cam-shaped projection 45 on said lever, whereby the presser bar 13 is raised when the lift lever 14 is raised, as indicated in dotted lines in Fig. 1. In operation, the lever 35 is deflected by the cam 41 on the presser bar, as indicated in dotted lines in Fig. 2, and forces the pin 24 outwardly against the action of the spring 33, thereby releasing the tension on the thread. The presser bar is raised whenever the work is to be removed from beneath the presser foot.

The plate 42, in accordance with my invention, has a screw 46 threaded in a hole 47 and provides an enlarged cylindrical neck portion 48 to receive the coiled torsion spring 49, one end portion 50 of which extends tangentially and has the outer end thereof bent at right angles, as indicated at 51 in Fig. 2, for entry selectively in any one of a series of circumferentially spaced holes 52 provided therefor in the side of the plate 42 at a uniform distance radially with respect to the hole 47. The other end portion 53 of the spring 49 forms the check spring for the sewing machine, and has a looped end 54 movable up and down in the vertical slot 55 provided therefor in the face plate 10. The end portion 53 of the spring is normally maintained in right angle relation to the presser bar 13 by engagement with a horizontal flange 56 provided on the edge portion of the plate 42, and it should be obvious that the downward pressure of the check spring 53 may accordingly be varied by setting the bent end 51 in a lower hole 52 for less tension, or in a higher hole 52 for greater tension, the series of holes 52 providing for adjustment of the end portion 50 of the spring through at least a quarter-turn, which is sufficient for the present purposes. The check spring, being mounted on the presser bar, will rise with it as the presser foot rides over different thicknesses of work, and in that way,

the check spring automatically eases up on the thread at the proper time to properly control the amount of slack thread at all times and reduce likelihood of the thread breaking or of the machine skipping stitches. The range of adjustability afforded by the series of holes **52** is sufficient to compensate for the degree of variation in stiffness of springs encountered in the quantity producing of sewing machines, a lighter spring requiring a higher setting to bring the check spring up to standard specifications, and vice versa. More holes **52** may be provided if a range of more than 90° of adjustability of the fixed end of the spring is found to be necessary.

It is believed the foregoing description conveys a good understanding of all of the objects and advantages of my invention. The appended claims have been drawn with a view to covering all legitimate modifications and adaptations.

I claim:

1. Means for regulating tension on the thread of a sewing machine, comprising in combination with a pair of revoluble tension disks disposed adjacent the outside of a wall of the arm of said machine and adapted to be held in spring-pressed engagement, the outer one of said disks having a center pin projecting therefrom through the inner disk and through said wall, a spring disposed between said wall and the inner end portion of said pin to pull said pin inwardly and press the disks together resiliently with a force that is related to the degree of deflection of said spring, a cam plate rotatably adjustable directly relative to said spring and pin between a cam surface on the inner side of said wall and said spring to increase or decrease the deflection of the latter relative to the wall and the inner end of said pin, means whereby said cam plate may be turned manually from outside the arm of said machine, said last mentioned means including a detent projection, and keeper means on the arm of said machine arranged to be engaged by said detent projection, said spring urging said plate and the means for turning said plate yieldingly in a direction to keep said detent projection engaged with said keeper means.

2. Means for regulating tension on the thread of a sewing machine, comprising in combination with a pair of revoluble tension disks disposed adjacent the outside of a wall of the arm of said machine and adapted to be held in spring-pressed engagement, the outer one of said disks having a center pin projecting therefrom through the inner disk and through said wall, a spring disposed between said wall and the inner end portion of said pin to pull said pin inwardly and press the disks together resiliently with a force that is related to the degree of deflection of said spring, a cam plate rotatably adjustable directly relative to said spring and pin between a cam surface on the inner side of said wall and said spring to increase or decrease the deflection of the latter, the arm of said machine having a substantially vertical elongated slot provided in another wall, a manually adjustable lever oscillatable about said center pin as an axis and connected to said cam plate to turn the same and extending through said slot for operation outside said arm, in addition to serving as a tension indicator in accordance with the position of said lever in relation to either end of the slot, and means operative under pressure of said spring for resiliently and releasably locking said lever in adjusted position.

3. Means for regulating tension on the thread of a sewing machine, comprising in combination with a pair of revoluble tension disks disposed adjacent the outside of a wall of the arm of said machine and adapted to be held in spring-pressed engagement, the outer one of said disks having a center pin projecting therefrom through the inner disk and through said wall, a coiled compression spring disposed between said wall and the inner end portion of said pin which it surrounds to pull said pin inwardly and press the disks together resiliently with a force that is related to the degree of compression of said spring, a manually oscillatable lever adjustable in a slot provided in another wall of the arm of said machine, and a helical cam disk disposed between said first mentioned wall and the adjoining end of said spring directly rotatable by said lever relative to a fixed helical cam surface on the inner side of the first mentioned wall, whereby to adjust said cam disk bodily axially relative to said pin and thereby increase or decrease the compression of said spring according to the direction of movement relative thereto, said lever having a substantially V-shaped detent projection on one side thereof, and said slot having a saw-toothed edge to receive said projection selectively in any one of the notches thereof, whereby to hold said lever releasably in adjusted position, said spring acting against said cam disk so as to urge the detent portion of said lever toward the saw-toothed side of the slot.

4. Means for regulating tension on the thread of a sewing machine, comprising in combination with a pair of revoluble tension disks disposed adjacent the outside of a wall of the arm of said machine and adapted to be held in spring-pressed engagement, the outer one of said disks having a center pin projecting therefrom through the inner disk and through said wall, a spring disposed between said wall and the inner end portion of said pin to pull said pin inwardly and press said disks together resiliently with a force that is related to the degree of deflection of said spring, and a manually adjustable member having a portion movable inside the arm of said machine endwise relative to the pin and bearing against the spring to deflect the same and having a handle portion for its actuation movable from outside the arm of said machine in an elongated slot provided therein so as to increase or decrease the deflection of said spring according to the direction of movement relative thereto, the selected tension adjustment for looser or tighter thread being indicated directly by the proximity of said handle with respect to one or the other end of the slot, and means for releasably securing said member in adjusted position.

5. Means for regulating tension on the thread of a sewing machine, comprising in combination with a pair of revoluble tension disks disposed adjacent the outside of a wall of the arm of said machine and adapted to be held in spring-pressed engagement, the outer one of said disks having a center pin projecting therefrom through the inner disk and through said wall, a coiled compression spring disposed between said wall and the inner end portion of said pin which it surrounds to pull said pin inwardly and press said disks together resiliently with a force that is related to the degree of compression of the spring, and a manually adjustable lever oscillatable about said center pin as an axis in an elongated substantially vertical slot provided in another wall of the arm of said machine, said slot being

in transverse relation to said center pin and inclined in a direction longitudinally relative thereto, said lever having an adjustable seat on its inner end engaging one end of said spring which is movable endwise relative to said center pin upon adjustment of said lever in said slot to increase or decrease the compression of said spring according to the direction of the movement relative thereto, the selected tension adjustment for looser or tighter thread being indicated directly by the proximity of said lever with respect to one or the other end of the slot, said lever having a substantially V-shaped detent projection on one side thereof, and said slot having a saw-toothed edge to receive said projection selectively in any one of the notches thereof, whereby to hold said lever releasably in adjusted position, said spring acting against said adjustable seat on said lever so as to urge said lever toward the saw-toothed side of the slot.

6. Means for regulating tension on the thread of a sewing machine, comprising in combination with a pair of revoluble tension disks disposed adjacent the outside of a wall of the arm of said machine and adapted to be held in spring-pressed engagement, the outer one of said disks having a center pin projecting therefrom through the inner disks and through said wall, a coiled compression spring disposed between said wall and the inner end portion of said pin which it surrounds to pull said pin inwardly and press said disks together resiliently with a force that is related to the degree of compression of said spring, a manually adjustable lever oscillatable about said center pin as an axis in an elongated substantially vertical slot provided in another wall of the arm of said machine, said slot being in transverse relation to said center pin and inclined in a direction longitudinally relative thereto, said lever having an adjustable seat on its inner end engaging one end of said spring which is movable endwise relative to said center pin upon adjustment of said lever in said slot to increase or decrease the compression of said spring according to the direction of movement relative thereto, the selected tension adjustment for looser or tighter thread being indicated directly by the proximity of said lever with respect to one or the other end of the slot, and means for releasably securing said arm in adjusted position.

7. Means for regulating tension on the thread of a sewing machine, comprising in combination with a pair of revoluble tension disks disposed adjacent the outside of a wall of the arm of said machine and adapted to be held in spring-pressed engagement, the outer one of said disks having a center pin projecting therefrom through the inner disk and through said wall, a coiled compression spring disposed between said wall and the inner end portion of said pin which it surrounds to pull said pin inwardly and press the disks together resiliently with a force that is related to the degree of compression of said spring, a manually oscillatable lever adjustable in a slot provided in another wall of the arm of said machine, and a helical cam disk disposed between said first mentioned wall and the adjoining end of said spring and directly rotatable by said lever relative to a fixed helical cam surface on the inner side of the first mentioned wall, whereby to adjust said cam disk bodily axially relative to said pin and thereby increase or decrease the compression of said spring according to the direction of movement relative thereto, and means for releasably securing said lever in adjusted position.

8. Means for regulating tension on the thread of a sewing machine, comprising in combination with a pair of revoluble tension disks disposed adjacent the outside of a wall of the arm of said machine and adapted to be held in spring-pressed engagement, the outer one of said disks having a center pin projecting therefrom through the inner disk and through said wall, a spring disposed between said wall and the inner end portion of said pin to pull said pin inwardly and press the disks together resiliently with a force that is related to the degree of reflection of said spring, a cam plate rotatably adjustable directly relative to said spring and pin between a cam surface on the inner side of said wall and said spring to increase or decrease the deflection of said spring relative to the wall and the inner end of said spring, means whereby said cam plate may be turned manually from outside the arm of said machine, and means for releasably locking the same in adjusted position.

9. Means for regulating tension on the thread of a sewing machine, comprising in combination with a pair of revoluble tension disks disposed adjacent the outside of a wall of the arm of said machine and adapted to be held in spring-pressed engagement, the outer one of said disks having a center pin projecting therefrom through the inner disk and through said wall, a coiled compression spring disposed between said wall and the inner end portion of said pin which is surrounds to pull said pin inwardly and press said disks together resiliently with a force that is related to the degree of compression of said spring, a manually adjustable lever oscillatable about said center pin as an axis in an elongated substantially vertical slot provided in another wall of the arm of said machine, said slot being in transverse relation to said center pin and inclined in a direction longitudinally relative thereto, said lever having an adjustable seat on its inner end engaging one end of said spring which is movable endwise relative to said center pin upon adjustment of said lever in said slot to increase or decrease the compression of said spring according to the direction of movement relative thereto, the selected tension adjustment for looser or tighter thread being indicated directly by the proximity of said lever with respect to one or the other end of the slot, and means for releasably securing said lever in adjusted position.

MATTHEW G. IVANDICK.

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The following references are of record in the file of this patent:

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Number	Country	Date
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310,516	Great Britain	Mar. 20, 1930
617,425	Germany	Aug. 19, 1935

Certificate of Correction

Patent No. 2,560,577 July 17, 1951

MATTHEW G. IVANDICK

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows:

Column 8, line 34, for "is" read *it*;

and that the said Letters Patent should be read as corrected above, so that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 23rd day of October, A. D. 1951.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.