Oct. 6, 1964 G. G. DAVIS 3,151,818

QUILL COUNTER FOR AUTOMATIC WINDING MACHINES

Filed April 12, 1963 4 Sheets-Sheet 1

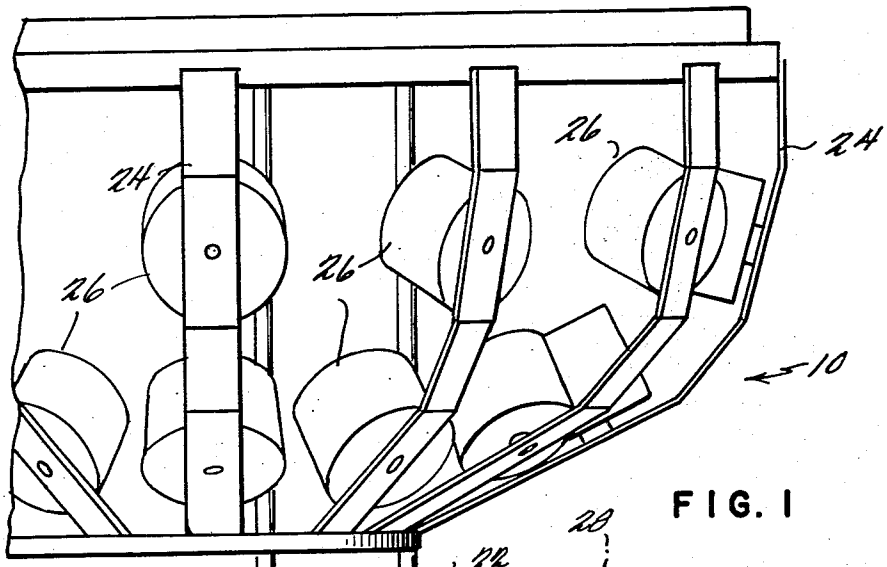
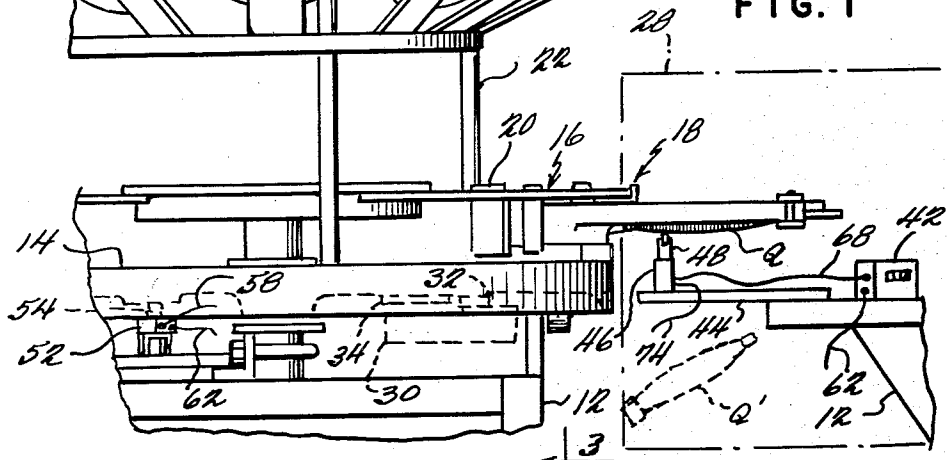


FIG. 1



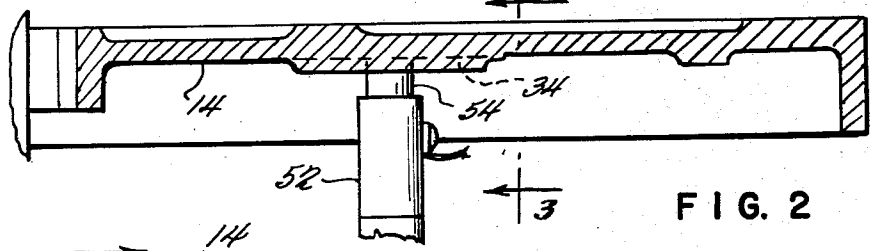


FIG. 2

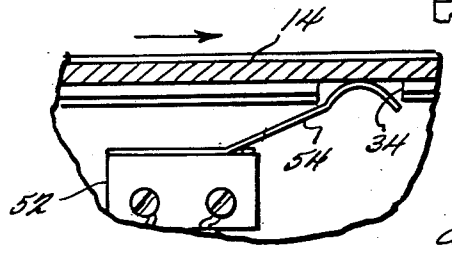


FIG. 3

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QUILL COUNTER FOR AUTOMATIC WINDING MACHINES

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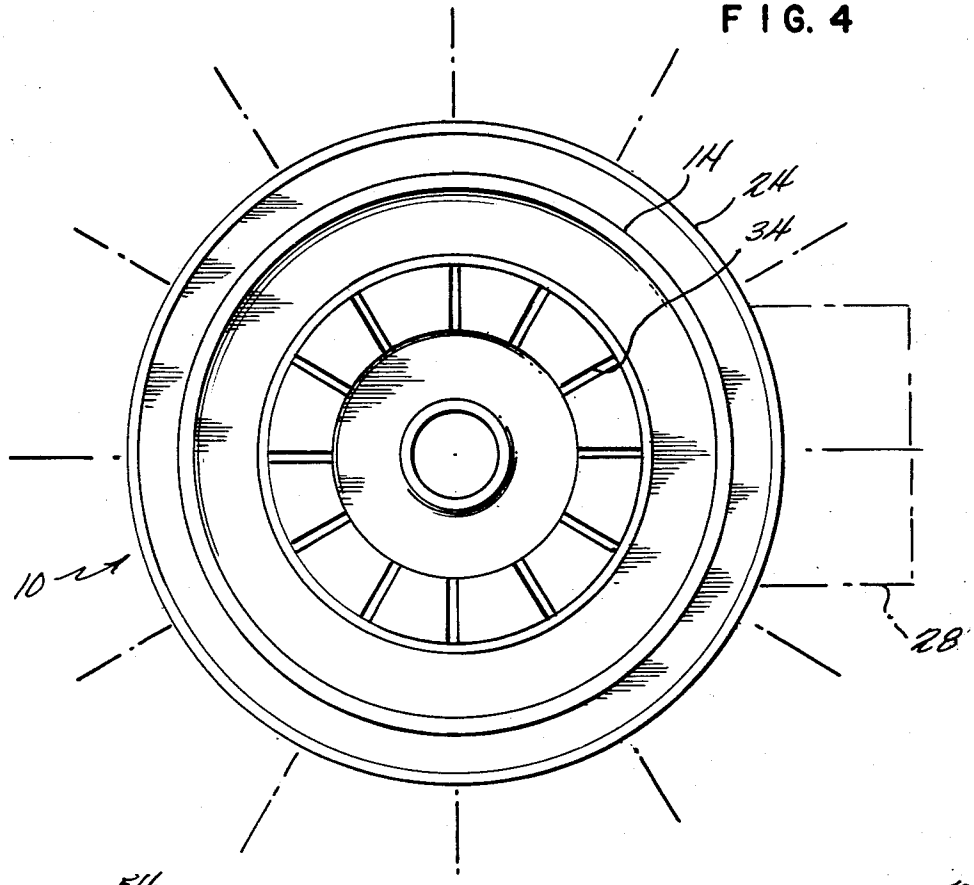
FIG. 4



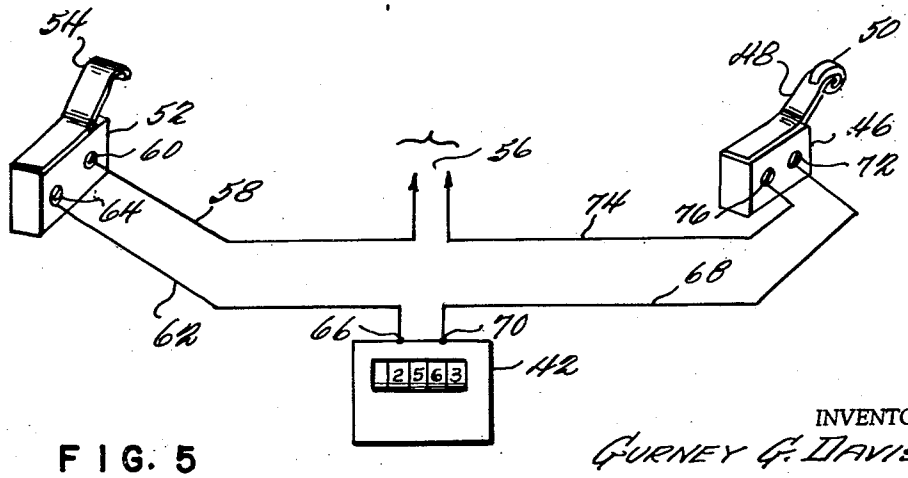


FIG. 5

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QUILL COUNTER FOR AUTOMATIC WINDING MACHINES

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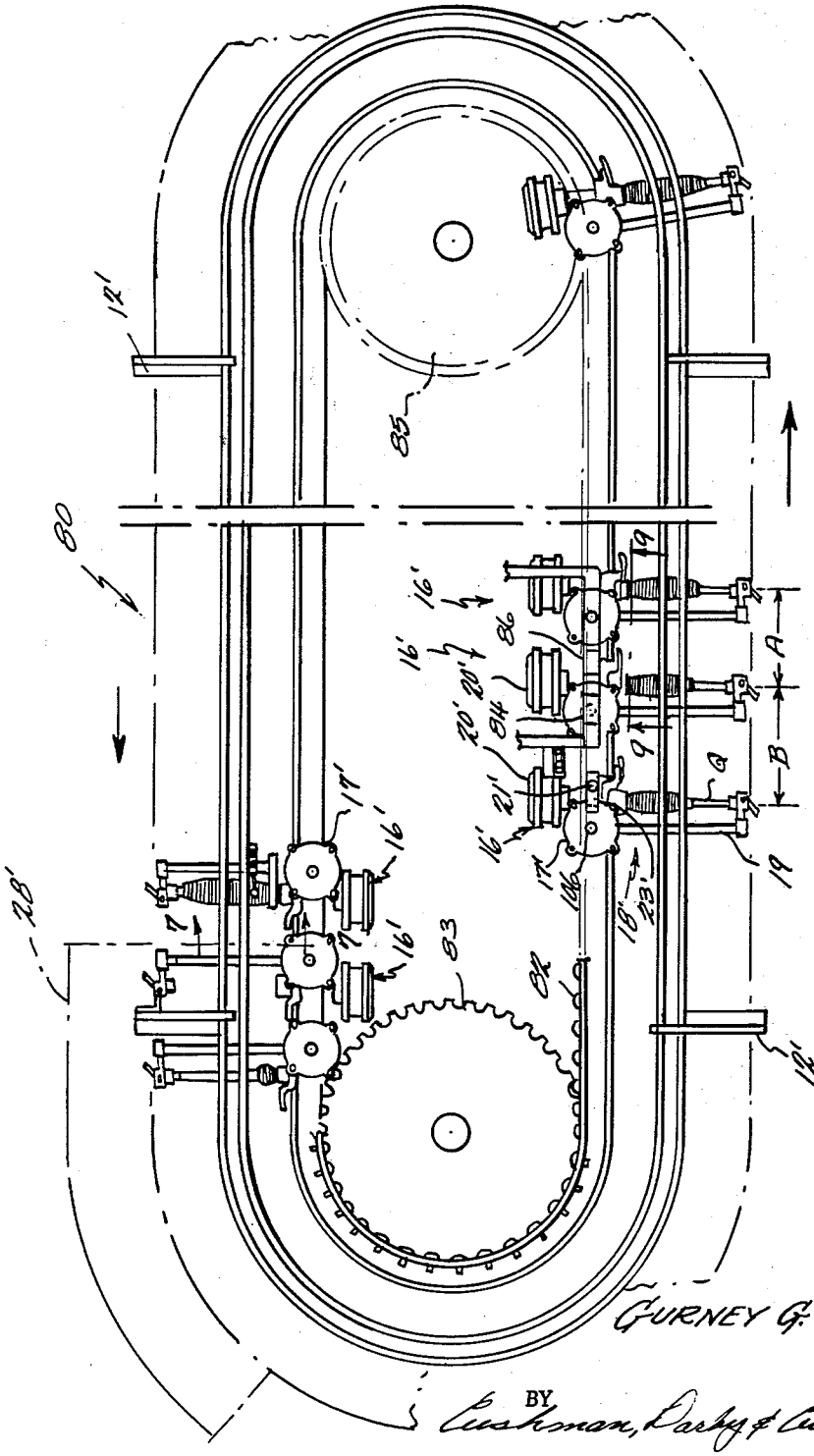

FIG. 6

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QUILL COUNTER FOR AUTOMATIC WINDING MACHINES

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FIG. 7

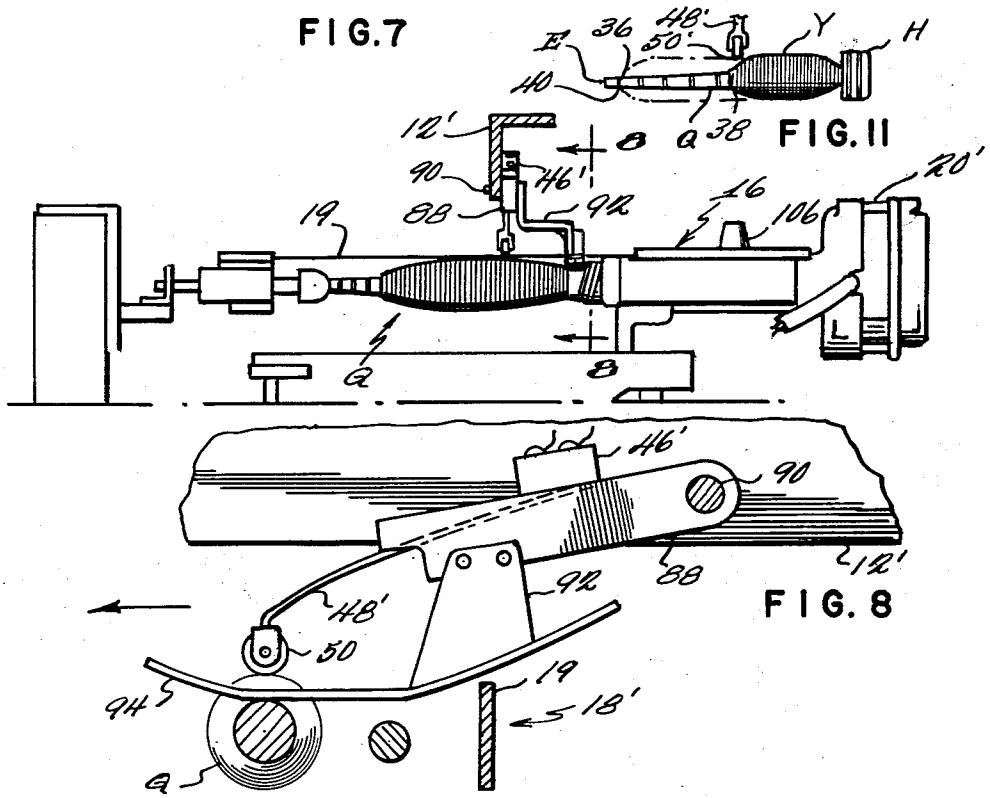

FIG. 8

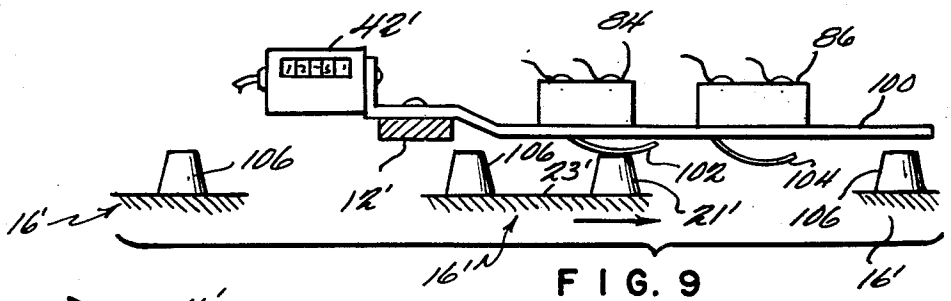

FIG. 9

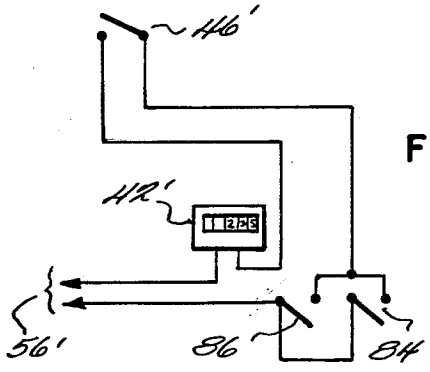

FIG. 10

FIG. 11

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United States Patent Office 3,151,818 Patented Oct. 6, 1964

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QUILL COUNTER FOR AUTOMATIC WINDING MACHINES

Gurney G. Davis, Greensboro, N.C., assignor to Burlington Industries, Inc., Greensboro, N.C., a corporation of Delaware

Filed Apr. 12, 1963, Ser. No. 272,766
19 Claims. (Cl. 242—35.5)

The present invention relates to an automatic winding machine for winding filling yarn on to empty quills or bobbins, and, more particularly, to an improvement in a counter and recording system for such automatic winding machines which will count only the usable quills produced by such winding machine.

There are generally two types of automatic winding machines used in textile plants for winding filling yarn on to quills or bobbins, the quills or bobbins later being used in the weaving room of the mill in the conventional weaving loom. The first type of automatic winding machine is commonly known as a radial quiller in that the winding units of such a machine move in a circular path about a vertical axis as filling yarn is wound onto the quills. Such a radial quiller may be of the type commonly known as the Abbott radial quiller, which is of the type generally disclosed in the United States Patent No. 2,670,-149, granted to Winthrop L. Perry on February 23, 1954. The radial quiller includes a rotary table having a plurality of winding units circumferentially spaced thereon adapted to rotate in step by step motion past a doffing station where the winding units receive an empty quill and, as they move about the table, the winding units rotate the quill on an axis parallel to a radius of the table and wind thereon filling yarn from a supply package or cheese. There is at least one supply package for each winding unit. When the winding unit returns to the doffing station, it discharges the previously-received quill and receives another empty quill.

A second type of automatic winding machine for winding filling yarn on quills is commonly known as the Abbott in-line or automatic quill and may be generally of the type disclosed in United States Reissue Patent No. 22,492, granted June 13, 1944, to E. J. Abbott. The automatic in-line quiller is provided with a conveyor mechanism having oppositely disposed straight and semi-circular runs, the conveyor mechanism carrying a plurality of winding units for movement therewith as well as a supply package positioned beneath each of the winding units for supplying filling yarn to quills received at a doffing station. The doffing station is usually located at the end of one of the straight runs of the conveyor mechanism and preferably on one of the semi-circular runs.

Heretofore, the production of usable quills by a particular automatic winding machine was determined by a checker or inspector who would examine pin boards which receive the quills from a pin tray located at the doffing station. This necessitated the checker or inspector being on duty throughout a work shift going from one machine to another and manually recording the number of usable quills each machine produced so that the operator of the machine could be credited with the production for his machine and paid accordingly. Often times such means of checking production of the quills proved highly unsatisfactory in that the count was not always accurate and there was always the possibility of the inspector favoring one operator over another. Additionally, it was a matter of conjecture to the inspector as to what was or was not a usable quill as required by the particular requirement of the weaving loom of the textile plant. Often times a quill having sufficient filling yarn wound thereon was rejected by an inspector when in effect it could be used. Thus there was a loss in this amount of filling yarn as the quill had to be cleaned of the bunch before being returned to the supply hopper at the doffing station. Conversely, inspectors would pass as usable quills some quills which would not have enough filling yarn thereon to make it economically feasible to use the quill in the weaving loom. This cut down on the production of weaving looms and consequently increased the cost of over-all operation.

Efforts have been made to automatically count and record the quills produced by an automatic winding machine, but such prior efforts have also not proved entirely satisfactory. Where electrically operated counters have been used, it has been the practice to either engage the empty spool of the quill while it was being placed in position on the winding unit to make a count or to engage the spool of the quill as the quill was being doffed at the doffing station. In either case, there was no accurate determination of whether or not the amount of filling thread wound on to the quill constituted a usable quill and, thus, there was not a recording of the true production of the machine.

By "usable quill" as used throughout the specification and claims, it is meant that the quill has sufficient filling yarn wound thereon to make it practicable and economical in a weaving loom. It is a well-accepted practice in the textile field that the spool of the quill does not have to be wound the complete length of the same to be a "usable" quill. In other words, the quill does not have to be completely full of filling yarn but may be only partially filled to a predetermined amount to make it a "usable" quill.

A principal object of the present invention is to provide an improved automatic counting and recording system for automatic winding machines which will only record the number of "usable" quills or bobbins produced by the machine.

Another important object of the present invention is to provide an improvement in a counting and recording system for automatic winding machines wherein the count is made by a feeler which actually feels the amount of filling yarn wound on to the quill or bobbin.

Still another object of the present invention is to provide an improvement in a counting and recording system for automatic winding machines, the counting and recording system being rendered inoperative until such time as a quill with or without filling windings thereon is in a position where it can be counted if it has a sufficient amount of filling yarn. By so rendering the circuit to the counter inoperative until the instant when it is desired to make a count, there is no opportunity for the operator of the machine to register false counts and obtain a false production.

Still another object of the present invention is to provide a counting and recording system for a radial quiller wherein the circuit for the counter is rendered inoperative except when a quill is at the counting position, such means for rendering the circuit inoperative being positioned at a remote place on the machine and utilizing a portion of the machine for actuation.

Another object of the present invention is to provide a counter system for an in-line quiller wherein the circuit for the counter is rendered inoperative except when a quill is at the counting position, such means for rendering the circuit inoperative being positioned at a remote place on the machine and utilizing a portion of the machine for actuation.

A further object of the present invention is to provide an improvement in a counting and recording system for an automatic winding machine wherein the quill feeler arm and its switch are so arranged as not to interfere with any portion of the winding units of the machine as they pass the same.

Another object of the present invention is to provide a counting and recording system for in-line quillers having a plurality of winding units thereon spaced apart an equal distance with the exception of a pair of the same, the system being capable of uninterrupted operation during continuous operation of the machine.

These and other objects and advantages of the present invention will appear more fully in the following specification, claims and drawings, in which:

FIGURE 1 is a fragmentary side elevational view partly in section and partly schematic of a radial quiller illustrating the position of the switch and the quill feeler arm for feeling the quill as well as switch means for rendering the circuit to the counter inoperative except when a quill is in a position to actuate the quill feeler arm;

FIGURE 2 is an enlarged vertical sectional view through a portion of the rotary table of the radial winding machine of FIGURE 1 illustrating switch means for rendering the circuit to the counter inoperative except when the quill is in position to actuate the quill feeler arm;

FIGURE 3 is a sectional view taken substantially on the line 3—3 of FIGURE 2;

FIGURE 4 is a bottom plan view of the rotary table of the winding machine of FIGURE 1;

FIGURE 5 is a schematic view of the electric wiring diagram for the counting and recording system of the present invention;

FIGURE 6 is a top plan view of an in-line quiller and showing a modification of the counting and recording system of FIGURE 1;

FIGURE 7 is a view taken substantially along line 7—7 of FIGURE 6 and illustrating a quill at a position to actuate the quill feeler arm;

FIGURE 8 is an enlarged view taken substantially on the line 8—8 of FIGURE 7 and illustrating the means for elevating the quill feeler arm and its switch over portions of the winding unit;

FIGURE 9 is an enlarged view taken substantially on the line 9—9 of FIGURE 6, the view being partially schematic with respect to the winding units;

FIGURE 10 is an electric wiring diagram for the counting and recording system of modified form of the invention shown in FIGURES 6–9 inclusive; and

FIGURE 11 is a view of a typical usable quill, the view also illustrating in broken lines a full quill.

Referring now to the drawings wherein like reference numerals and characters represent like or similar parts, and, more particularly, to FIGURES 1–5 inclusive, there is disclosed a radial type winding machine or quiller generally designated by the numeral **10**. The winding machine **10** has the usual stationary frame structure **12** on which is mounted a table **14** rotatable in step by step motion about a vertical axis. The winding machine **10**, which is known in the textile field as an Abbott radial quiller, is provided with a plurality of winding units **16** circumferentially spaced on the table **14** for winding filling yarn on quills having their axis parallel to radii of the table. Each of the winding units **16**, which may be of the type disclosed in the aforementioned United States Patent 2,670,149, is provided with a traversing mechanism generally indicated at **18**. A thread guide mechanism (not shown) such as shown in United States Patent No. 2,621,862, granted December 16, 1952, to William L. Perry, may be provided on the traversing mechanism. The traversing mechanism **18** is operable in the usual manner to cause the filling yarn to be wound on a spool of a quill Q from its head outwardly of the spool as the spool is held in the winding unit **16**. The usual electric motor **20** provided on the winding unit **16** causes the quill to rotate as the winding unit is carried with the rotary table **14**.

The rotary table **14** also supports a super structure **22** which carries a creel **24** or the like for supporting a

plurality of yarn supply packages or cheeses **26**, there being at least one package for each winding unit. The filling yarn from the supply packages **26** is fed through the thread guide mechanism to the traversing mechanism and onto the spool of the quill Q as the table rotates in its step by step motion.

In more detail, a doffing station schematically designated at **28** is adapted to insert the empty spool of a quill Q into the winding units **20** as the winding units stop in a dwell at the doffing station. The filling yarn from the supply package is automatically threaded onto the spool and as the table rotates carrying with it the winding unit **16**, the spool of the quill Q is caused to rotate on its axis which is generally parallel to a radius of the table. By the time the table has made a complete rotation, the filling yarn has been wound onto the quill Q and as the winding unit **16** returns in the doffing station **28**, the quill A is doffed from the winding unit onto the usual pin tray which normally carries eight quills. When eight quills have been doffed onto the pin tray, the quills are then automatically placed on a pin board located below the doffing station. The pin board carries a great number of quills, and, when it is full, it is then taken to the weaving room where the quills are used in the shutter of the loom.

The table **14** is caused to rotate in step-by-step rotary motion by the usual Geneva gear drive schematically shown at **30**, the Geneva gear drive mechanism **30** being provided with a locking pin **32** which is adapted to be received in a radial extending slot **34** provided in the bottom of the table. Each time the table **14** is in a dwell of the step-by-step motion, the locking pin **32** engages the slot so that the table is not inadvertently moved. When the locking pin is in the slot **34**, one of the winding units **16** is at the doffing station and the doffing action occurs, i.e., a full quill Q is doffed and an empty spool of a new quill is inserted in its place. Usually there are twelve winding units **16** provided on the rotary table **14** and if this is the case, then there would be the same number of locking slots **34** provided in the bottom surface of the table **14**.

The radial quiller or winding machine **10** thus far described is of the conventional type such as disclosed in the aforementioned Patent No. 2,670,149 and further detailed description of its parts or operation, other than in connection with the present invention, is not believed necessary.

Referring now to FIGURE 11, there is disclosed a typical quill Q having a head H which is adapted to fit into a driving head of the winding unit **16**. The spool of the quill Q is provided with a plurality of spaced rings **36** theeron extending from the head H outwardly to the end E of the quill which is held in a suitable spindle in the winding unit **16**. The filling yarn Y is wound in a bunch starting at the head and working outwardly toward the end E. A "usable" quill Q is one which has filling yarn Y wound to a predetermined point on the spool such as shown at **38**. This may be considered to be three or four rings along the spool length as determined by the particular requirement of the loom in which the quill is to be used. As can be seen from FIGURE 11, the quill Q normally is wound along the entire length of the spool to a point designated at **40**. While it is desirable that the quill be wound by filling yarn to the point **40**, it is also satisfactory if the filling yarn is wound to the point **38** and the operator of a particular machine is given credit for any quill which is wound at least to the point **38**. Often times, the quill Q will only be wound a portion of its length because of exhaustion of the filling yarn from the supply package **26** or because of yarn breakage during the process of winding. The operator is given credit for this quill if it has been wound to the point **38** and it behooves the operator to immediately determine the cause of the failure of the particular winding unit **16** so that such

failure can be corrected without too many unusable quills being discharged.

Referring now to FIGURE 5, it will be noted that the simplified electrical wiring diagram for the counter and recording system of the present invention is disclosed. In the improved system of counting and recording of the present invention, a conventional type of electrically operable recording counter 42, such as a Veeder-Root Dial counter is used. Since this counter is of the generally well-known lock and key reset magnetic type, a detailed description of the same is deemed unnecessary. The counter 42 is suitably mounted on the stationary frame structure 12 at a position just forward of the doffing station 28. Attached to stationary frame structure 12 is an elongated bracket 44 which extends beneath the path of movement of the winding units 16 with the table 14. A switch 46 is mounted on the stationary bracket 44 and is provided with an upwardly extending quill feeler arm 48 having a roller 50 thereon for engaging filling yarn on the quill Q just forward of the doffing station 28. The switch 46 and its quill feeler arm 48 are positioned radially relative to the quill at a position where the roller 50 of the quill feeler arm 48 engages filling yarn wound at least to a minimum point 38 for a "usable" quill. If the filling yarn has not been wound out to this point on the quill Q, then the roller 50 will not be engaged by yarn or the spool of the quill and the switch will not be actuated to a closed position to indicate a usable quill on the counter 42.

In order that false counts cannot be made by the operator actuating the quill feeler arm 48, the switch 46 is placed in series with a second switch 52 having a switch arm 54. The switch 52 is positioned on the stationary frame structure 12 beneath the rotating table 14 and its switch arm 54 extends upwardly and rides against the undersurface of the table. As shown in FIGURES 2 and 3, the switch arm 54 of the switch 52 is adapted to move upwardly into one of the slots 34 to close the switch 52 and cause the circuit to the counter 42 to be completed when a quill Q is in a position and does actuate the quill feeler arm 48 to close the switch 46.

In more detail, the circuit for the counting and recording system of the present invention includes a suitable source of power 54 such as the 48 volt source of power which normally is used to drive the winding machine 10 and the motors 20 of the winding units 16. A conductor 58 extends from the source of power to a terminal 60 on the switch 52 and a second conductor 62 extends from a terminal 64 to a terminal 66 on the counter 42. A conductor 68 extends from a terminal 70 on the counter 42 to a terminal 72 on switch 46. Another conductor 74 extends from the terminal 76 on switch 46 to ground. As will now be evident, both switches 46 and 52 must be closed before the counter 42 can be actuated. It is preferable that the switch arm 54 engages the slot 34 to close the switch 52 when the table 14 is moving. This allows the switch 52 to be closed for only about one second, and thus, further eliminates the operator from making a false count which could possibly be accomplished if switch 52 was closed during the dwell of the table between its step-by-step motion.

As shown in FIGURE 1, the switch 46 and its quill feeler arm 48 are positioned forward of the doffing station 28 for counting the quills Q approaching the doffing station 28. After the quills Q pass the position of the switch 48 where the count is made if the quill is "usable," they then go into the doffing station 28 and are doffed from the winding units 16 as indicated in broken lines at Q'.

Referring now to FIGURES 6–10, inclusive, a modified form of the present invention is disclosed for use with an Abbott automatic in-line quiller such as the quiller disclosed in the aforementioned Reissue Patent No. 22,492. The in-line quiller or winding machine which is generally designated 80 includes an endless conveyor mechanism 82 passing about the sprocket 83 and 85. The endless conveyor mechanism 82 is adapted to support a plurality of winding units 16' which are substantially the same as the previously described winding units 16 in that they are each provided with an electric motor unit 20' and a traversing mechanism 18' having the usual thread guiding mechanism such as that disclosed in the aforementioned Perry Patent 2,621,862. It will be noted that the traversing mechanism 18' of each of the units is provided with the usual traversing rods 19 which trail behind the quill Q supported in the winding units 16'.

The in-line winding machine 80 has usually in the order of sixty winding units 16' thereon which travel in an endless path of oppositely disposed straight and semi-circular runs. The winding units 16' are all spaced an equal distance apart except for two which are spaced apart a distance greater than the distance between the other units. As shown in FIGURE 6, the winding units 16' are all spaced apart a distance identified at A with the exception of two of such units located in the bottom of the figure, the two units being spaced apart a distance of B which is greater than A. Immediately beneath each of the winding units 16' and also carried by the conveyor mechanism 82 is a platform (not shown) which carries the usual supply package of filling yarn (also not shown).

The doffing station which is identified at 28' is conveniently located adjacent the end of one of the straight runs and often times takes in part of one of the semi-circular runs. The doffing station 28' serves the usual purpose in that it has a hopper for a supply of empty quills which are received in the winding units 16' after a previously full quill has been doffed from the winding units.

Since the drive and operation of the automatic in-line winding machine such as the Abbott in-line winding machine is well known in the art, as shown by the prior United States Reissue Patent 22,492, as well as the prior United States Patent No. 2,377,367, granted June 5, 1945, to Winthrop L. Perry and Edward J. Abbott, a detailed description thereof is deemed unnecessary other than what has heretofore been given.

The circuit for the counting and recording system used for the winding machine 80 is best disclosed in FIGURE 10 and includes the usual source of power 56' such as the 48 volt source of power used to operate the conveyor mechanism 82 and the electric motors 20' of the winding units 16'. An electrically operable recording counter 42' is provided in series with a quill actuated switch 46' and a pair of safety switches 84 and 86 positioned at a remote or inaccessible position. The switches 84 and 86 are in parallel with one another and it is necessary that one or the other of these switches be closed in order to complete the circuit to the counter 42' when the switch 46' is closed. A more detailed description of the purposes of the parallel arranged switches 84 and 86 will follow later in the specification.

In the winding machine 80, the switch 46' is carried on a bracket arm 88 which is pivotally connected at 90 to a portion of the stationary frame structure 12' as shown in FIGURES 7 and 8. The switch 46' which is positioned just forward of the doffing station 28 is provided with a downwardly extending quill feeler arm 48' having a roller 50' thereon for engaging the filling yarn on a quill Q. The roller 50' is positioned relative to the path of movement of the quill Q so that it is engaged by filling yarn wound on the quill to the point 38 which determines the "usable" quill. If the yarn is wound to point 38 on the quill Q, then it will engage the roller 50' to raise the feeler arm and close the switch 46'.

Since each winding unit 16' is provided with a traversing bar or rod 19 which is positioned aft of the quill Q means must be provided to lift the switch 46' and

its quill feeler arm 48' upwardly so as to avoid engagement with such traversing rod. In order to accomplish this, the bracket 88 is positioned with an offset member 92 having a shoe 94 which depends downwardly in an area where it will miss the quill Q passing therebeneath but which will engage any obstruction on the winding unit such as the traversing rod 19. The shoe 94, when it engages the rod 19, causes the switch 46' and its quill feeler arm 48' to elevate. This occurs after a count has been made for the quill Q carried with the particular winding unit 16'.

Referring now specifically to FIGURES 6 and 9, it will be noted that the switches 84 and 86 are carried on a bracket 100 suitably mounted on the stationary frame structure 12'. The switches 84 and 86, which are in parallel with each other, are provided with downwardly depending switch arms 102 and 104 arranged in alignment with each other in the direction of travel of the winding units 16' therebeneath. The switches 84 and 86 being positioned on an opposite run from the position of the switch 46' to thereby make it impossible for the operator to falsely actuate the same as well as the switch 46'.

It is necessary to provide the two switches 84 and 86 with their feeler arms 102 and 104 arranged in alignment with one another in order to compensate for the space B between two of the units of the winding units 16'. In other words, for one-half of the cycle of operation, one switch 84 is being closed simultaneously with a quill Q reaching a position where it may or may not actuate the switch 46' to give a count whereas during the other half of the cycle, the other switch 86 is being closed simultaneously with a quill reaching a position wherein it may or may not actuate the switch 46'.

As shown in FIGURES 6 and 9, the traverse gear housing 17' of each winding unit 16' is provided with an upwardly extending knob 106. The knobs 106 for each of the traverse gear housings 17' are equally spaced from one another with the exception of the two knobs on the gear housings 17' of the winding units 16' which are further apart than the rest of the winding units. In order that there may be an uninterrupted count made during the entire cycle of operation, the gear housing 17' of the winding unit 16' which is the trailing, of the two winding units which are spaced further apart than the rest of the winding units, is provided with a false knob 21' carried on a bracket 23'. By providing the false knob 21', a transfer from one switch 84 to the other switch 86 may be made thereby keeping an unbroken cycle of timing between the actuation of the switch 46' and one or the other of the switches 84 or 86.

In more detail, and assuming that all of the winding units 16' have centers spaced apart 9 and ¾" with the exception of the two winding units which have centers spaced further apart at 12 and ¾", then the false knob 21' will be positioned 3" forward of the knob 106 on the gear housing 17' on which it is attached. In this respect, the false knob 21' will be 9 and ¾" from the knob 106 of the immediately preceding winding unit 16' and it will engage and close the switch 84 just as the knob 106 of the immediately preceding winding unit 16' closed the switch 84 when a quill was in proper position for counting. The knob 106 on the winding unit 16' which carries the false knob 21' will then close the switch 104 as the next quill Q is in position for counting and for the next half of the cycle a knob 106 for succeeding winding units 16' will close the switch 86. The feeler arms 102 and 104 of the switches 84 and 86 respectively are spaced apart 6 and ¾" in order to obtain the proper timing with the actuation of the switch 46'.

When the two winding units 16' spaced apart a distance B approach the area where their respective quills are to be counted, the winding unit 16' preceding the winding unit 16' having the false knob will have its quill Q counted by actuation of the switch 46' when the switch 86 is closed. However, since there is a distance of 12 and ¾" between it and the following quill, a knob 106 will have moved into a position to engage the switch arm 102 and close the switch 84 when the following quill is in a position to actuate the switch 46' if such quill is a usable quill.

As will now be evident, the counting and recording system described hereinabove fully accomplishes the objectives and advantages of the present invention. It will be apparent that such a system provides a simplified, economical and accurate means for counting only the "usable" quills produced on either a radial or in-line winding machine.

While the invention has been described in its preferred embodiments, various changes may be made without departing from the spirit and scope of the invention. Therefore, the terminology used in the specification is for the purpose of description and not limitation, the scope of the invention being defined in the claims.

What is claimed is:

1. In a winding machine of the type having a plurality of winding units thereon travelling in an endless path past a doffing station where each winding unit discharges a previously received quill and receives an empty quill in its place, the quills being rotated during the travel of the winding units and having yarn wound thereon from a supply package travelling with the winding unit, the improvement comprising: an electrically operable recording counter for recording the number of usable quills, switch means positioned forward of the doffing station and adjacent the path of travel of quills carried by the respective winding units, said switch means having a quill feeler arm thereon extending at a predetermined position into the path of and engageable only by yarn wound to a predetermined point on the quill for momentarily closing said switch means and completing a circuit to said counter to indicate a usable quill, and means positioned at a remote point from said switch means for rendering the circuit to said counter inoperative except when a quill is in position to actuate said switch means.

2. A winding machine as claimed in claim 1 in which the plurality of winding units are mounted on a rotary table for rotation in a circular path in step-by-step movement past the doffing station with quills being in a dwell at the doffing station, said rotary table having a plurality of slots on its under surface equal to the number of winding units for receiving a locking member to lock the same during the dwell of the winding units at the doffing station, and wherein said means positioned at a remote point from said switch means for rendering the circuit to said counter inoperative except when a quill is in a position to actuate said switch means includes a switch positioned beneath said table and having a switch arm extending upwardly against the underneath surface of said table and arranged to move into one of said lock slots when one of the quills is in position to actuate the quill feeler arm of said switch means.

3. A winding machine as claimed in claim 2 in which said switch means having said quill feeler arm and said switch having the arm for engaging said slots are positioned relative to one another and to said rotary table so that said table is moving when said quill feeler arm is actuated and the switch arm of the switch beneath said table engages the slot to render the circuit operative.

4. A winding machine as claimed in claim 1 in which the plurality of winding units are mounted on a rotary table for rotation in a circular path in step-by-step movement past the doffing station with the quills being in a dwell at the doffing station, said means positioned at a remote point from said switch means for rendering the circuit to said counter inoperative except when a quill is in position to actuate said switch means including a switch positioned beneath said rotary table and having a switch arm for opening and closing the same, said rotary table having means on its under surface for actuating said

switch arm each time one of the quills carried by one of the winding units is in a position to actuate the quill feeler arm.

5. A winding machine as claimed in claim 4 wherein said means on the underneath surface of said table includes a plurality of circumferentially spaced slots, there being the same number of slots as there are winding units.

6. A winding machine as claimed in claim 1 wherein the endless path in which the winding units travel includes opposite straight and semi-circular runs, said switch means being positioned adjacent one of said straight runs, and said means positioned at a remote point from said switch means for rendering the circuit to said counter inoperative except when a quill is in position to actuate said switch means being positioned adjacent the other of said straight runs.

7. A winding machine as claimed in claim 6 in which each of said winding units includes a traversing mechanism having a traversing rod extending parallel to and to the rear of the quill supported thereby, and elevator means carrying said switch means for raising the same over said rod after the quill travelling with the winding unit passes the position where it may actuate said switch means.

8. A winding machine as claimed in claim 7 wherein said elevator means includes a pivotal bracket on which said switch means is mounted and a shoe carried by said bracket and laterally offset with respect to said switch means for engaging said rods to pivot the bracket and said switch means out of the path of the same.

9. A winding machine as claimed in claim 6 in which said winding units are equally spaced apart except for a pair of the same and wherein said means positioned at a remote point from said switch means for rendering the circuit to said counter inoperative except when a quill is in position to actuate said switch means includes means for maintaining an unbroken cycle of timing of the feeler quill arm during continuous movement of the winding units through the endless path.

10. A winding machine as claimed in claim 9 wherein said last-mentioned means includes a pair of switches arranged in parallel, each of said pair of switches having a switch arm for engagement with the winding units, said switch arms being arranged in alignment with each other and spaced apart a predetermined distance so that one switch arm is always being actuated to a closed position when a quill carried by one of the winding units is in a position to actuate said quill feeler arm.

11. A winding machine as claimed in claim 6 wherein said plurality of winding units are equally spaced apart except for a pair, and wherein said means positioned at a remote point from said switch means for rendering the circuit to said counter inoperative except when a quill is in a position to actuate said switch means includes a pair of switches arranged in parallel and each having a switch arm, said switch arms being arranged in alignment with each other and in the path of said winding units, one of said switch arms being actuated by engagement with said winding units during one portion of a cycle of all of the quills past said quill feeler arm and the other of said switch arms being actuated by engagement with said winding units during another portion of the cycle of the quills past said quill feeler arm.

12. In a winding machine for winding yarn on quills, the combination comprising: a frame structure, a rotary table carried by said frame structure and rotatable in step-by-step motion, a doffing station, a plurality of winding units circumferentially spaced on said rotary table and adapted to travel in an endless path past the doffing station where during a dwell in the step-by-step motion a quill is doffed and an empty quill is replaced therein, an electrically operable recording counter for recording the number of usable quills, switch means positioned forward of the doffing station and adjacent the path of travel of quills carried by the respective winding units, said switch means having a quill feeler arm extending at a predetermined position into the path of and engageable only by yarn wound to a predetermined point on the quill for momentarily closing said switch means and completing a circuit to said counter to indicate a usable quill, and means positioned beneath said table at a remote point from said switch means and inaccessible to an operator of the machine for rendering the circuit to said counter inoperative except when a quill is in position to actuate said switch means.

13. In a winding machine for winding yarn on quills the combination comprising: a frame structure, a rotatable table carried by said frame structure, a doffing station, a plurality of winding units circumferentially spaced on said rotary table and adapted to travel in an endless path past the doffing station where a quill is doffed and an empty quill is replaced therein, an electrically operative recording counter for recording the number of usable quills, switch means positioned forward of the doffing station and adjacent the path of travel of the quills carried by the respective winding units, said switch means having a quill feeler arm extending at a predetermined position into the path of and engageable only by yarn wound to a predetermined point on the quill and momentarily closing said switch means and completing a circuit to said counter to indicate a usable quill, a second switch means positioned beneath said rotary table and inaccessible to an operator of the machine, and normally rendering the circuit to said counter inoperative except when a quill is in position to actuate the quill feeler arm of said first switch means, said second switch means having a switch arm, and means on said rotary table for actuating the switch arm of said second switch means to close the same each time one of the quills carried by one of the winding units is in a position to actuate the quill feeler arm.

14. In a winding machine for winding yarn on quills, the combination comprising: a frame structure, a rotatable table carried by said frame structure and rotatable in step-by-step motion, a doffing station, a plurality of winding units circumferentially spaced on said rotary table and adapted to travel in an endless path past the doffing station where during a dwell in the step-by-step motion a quill is doffed and an empty quill is replaced therein, an electrically operative recording counter for recording the number of usable quills, a switch operatively carried by said frame structure forward of said doffing station and immediately beneath the path of travel of quills carried by the respective winding units, said switch having an upwardly extending quill feeler arm disposed at a predetermined position into the path of and engageable only by yarn wound to a predetermined point on the quills for momentarily closing said switch and completing a circuit to said counter to indicate a usable quill, a second switch carried by said frame structure beneath said rotary table and inaccessible to an operator of the machine for rendering the circuit to said counter inoperative except when a quill is in position to actuate said first switch, said second switch having an upwardly extending switch arm normally engaging an under surface of said table to maintain said second switch open, said table having a plurality of radially extending slots in its under surface equal to the number of winding units on the table, said switch arm for said second switch engaging said slots to close said second switch in timed sequence with a quill being in a position to actuate said first switch.

15. A winding machine as claimed in claim 14 wherein the quill feeler arm of said first switch and the switch arm of said second switch are positioned relative to one another and to said doffing station so that said table is moving when said quill feeler arm is in a position to be actuated and said switch arm of said second switch engages one of the slots to render the circuit to the counter operative.

16. In a winding machine for winding yarn on quills, the combination comprising: a frame structure, endless

conveyor means carried by said frame structure and having opposite straight and semi-circular runs, a plurality of winding units carried by said conveyor means, a doffing station, each of said winding units having a traversing mechanism for winding yarn outwardly on a quill carried thereby from a supply package also there travelling with the winding unit, said traversing mechanism including at least one traversing rod extending parallel to and to the rear of the quill supported in the winding unit, an electrically operative counter for recording the number of usable quills, a switch carried by said frame structure forward of the doffing station, said switch being positioned above the path of travel of quills carried by the respective winding units along one of the straight runs of the same and having a quill feeler arm extending downwardly at a predetermined position into the path of and engageable only by yarn wound to a predetermined point on the quill for momentarily closing said switch and completing circuit to said counter to indicate a usable quill, and means positioned along the other of the straight runs at a remote point from said switch and successively actuated by winding units to render a circuit to said counter operative only when a quill is in position to actuate said quill feeler arm.

17. A winding machine as claimed in claim 16 including a bracket pivotally mounted to said frame structure, said bracket carrying said switch, and a shoe carried by said bracket spaced transversely from said switch for engaging said traversing rod to elevate said switch and its quill feeler arm above said rod.

18. In a winding machine for winding yarns on quills, the combination comprising a frame structure, endless conveyor means carried by said frame structure and having opposite straight and semi-circular runs, a plurality of winding units carried by said conveying means and spaced an equal distance apart except for one pair, a doffing station, an electrically operative counter for recording the number of usable quills, a switch carried by same frame structure forward of the doffing station, said switch being positioned along one of the straight runs of the conveyor means and having a quill feeler arm extending at a predetermined position into the path of and engageable only by yarn wound to a predetermined point on the quill for momentarily closing said switch and completing a circuit to said counter to indicate a usable quill, a pair of switches in parallel with each other and each having a switch arm, the switch arms of said pair of switches being arranged in alignment with each other and spaced apart a predetermined distance, said switch arms extending into the path of movement of the winding units on the other run, each of said winding units having an abutment thereon to engage said switch arms of said pair of switches, and one of said pair of winding units having a false abutment thereon spaced from the abutment of the other of said pair a predetermined distance substantially equal to the equal distances between winding units whereby at least one of said pair of switches is closed simultaneously with a quill reaching the position to actuate said quill feeler arm.

19. A winding machine as claimed in claim 18 including a bracket pivotally connected to said frame structure, said bracket carrying said switch forward of the doffing station and its quill feeler arm, a shoe carried by said bracket, said shoe being arranged to engage the winding units after said quill feeler arm passes the position where it may be actuated by the quill so as to pivot said arm and lift the switch and quill feeler arm above any portion of the winding unit.

References Cited in the file of this patent

UNITED STATES PATENTS

Re. 22,492	Abbott	June 13, 1944
2,670,149	Perry	Feb. 23, 1954
2,670,150	Perry et al.	Feb. 23, 1954
2,961,178	Chambley	Nov. 22, 1960