Jan. 22, 1952 K. CLOUD ET AL 2,583,087

WINDER FOR YARN AND THE LIKE

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Fig. 1.

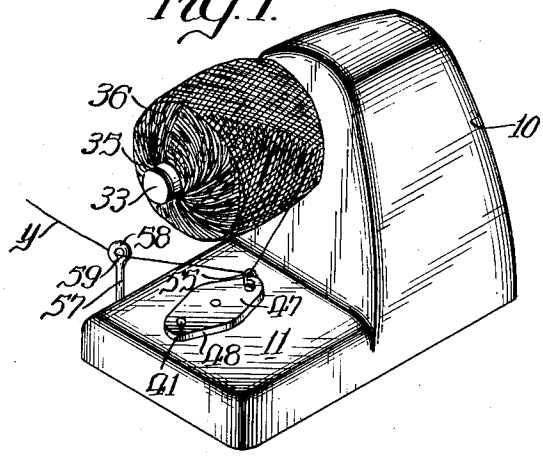
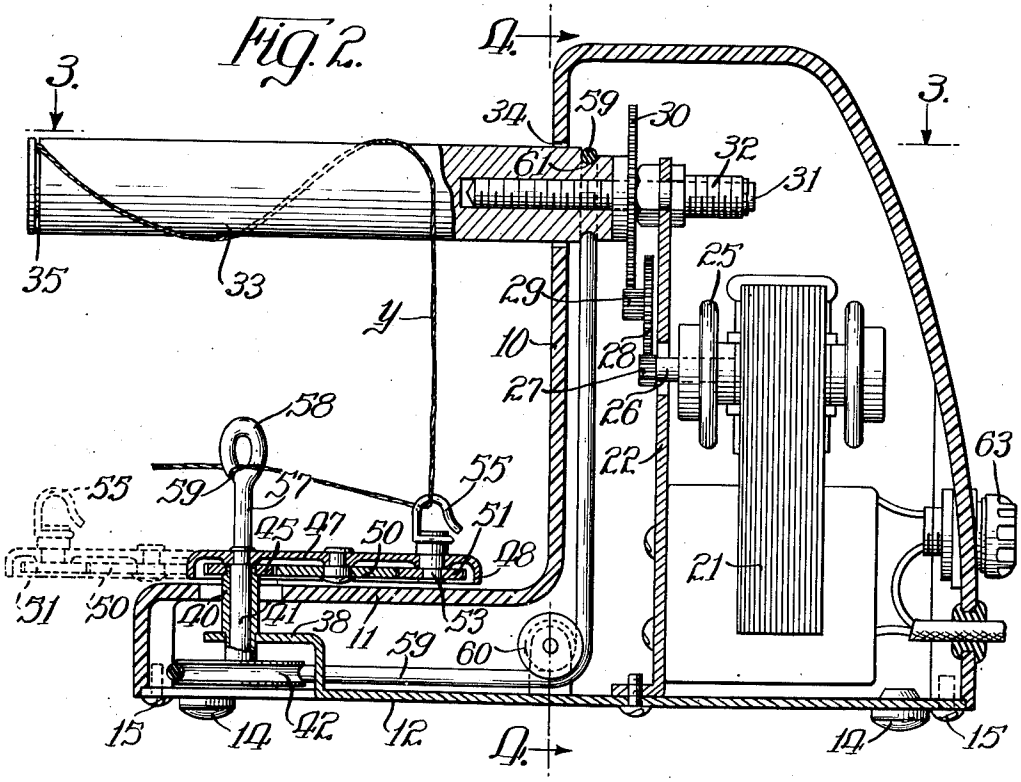



Fig. 2.




INVENTORS:
Kenneth Cloud
BY Russell J. Nadherny
Cumming & Cumming
Attys.

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Fig. 3.

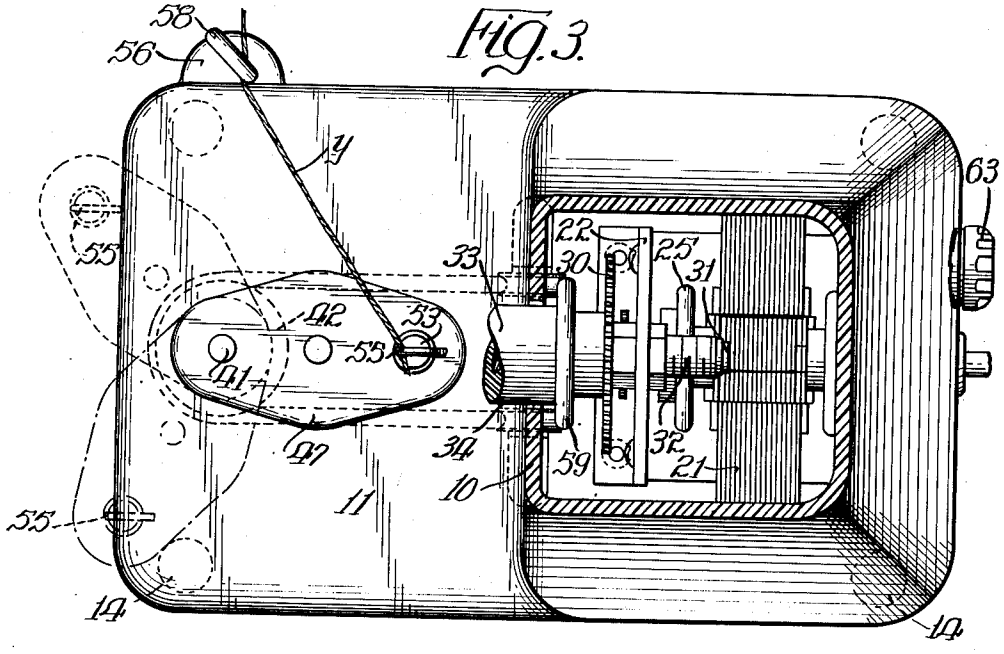



Fig. 4.

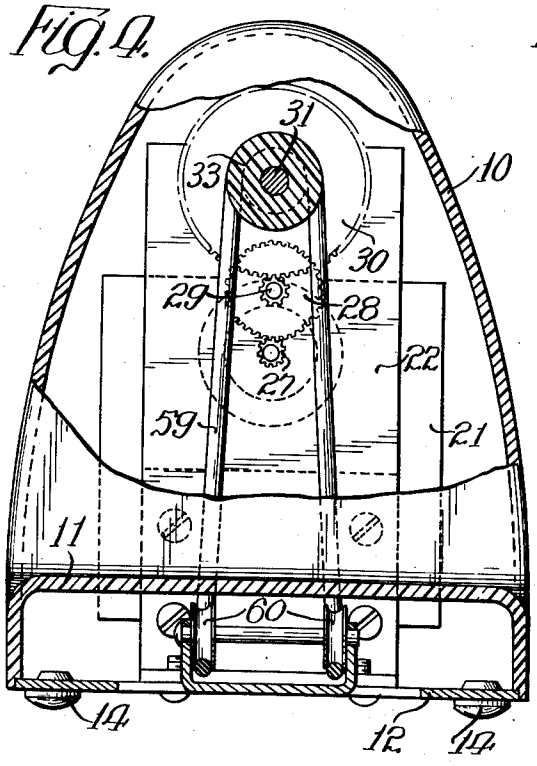
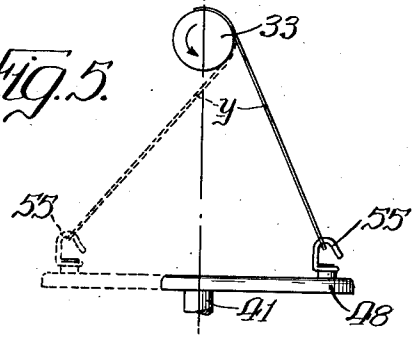



Fig. 5.



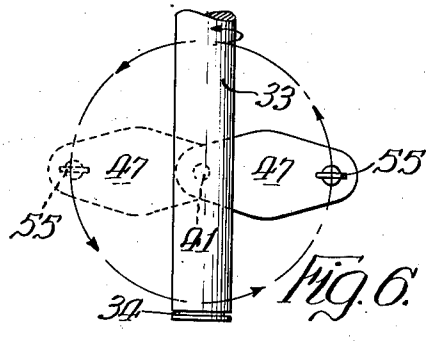




Fig. 6.

INVENTORS:
Kenneth Cloud
Russell J. Nadherny
BY
Cumming & Cumming
Attys.

Jan. 22, 1952 K. CLOUD ET AL 2,583,087

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Fig. 7.

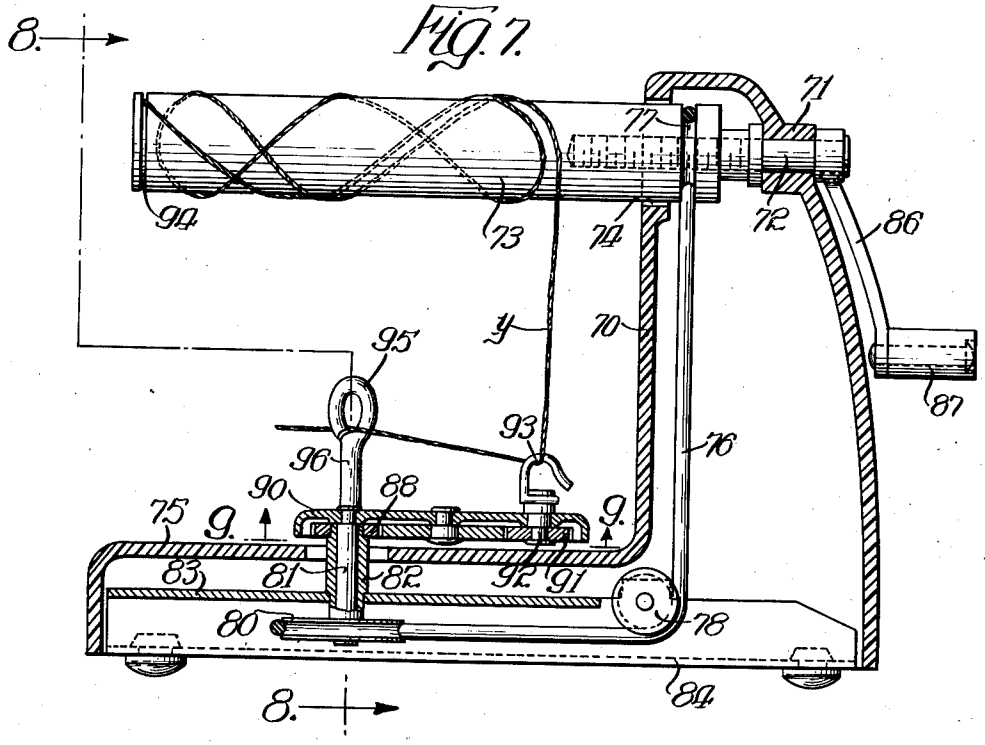



Fig. 8.

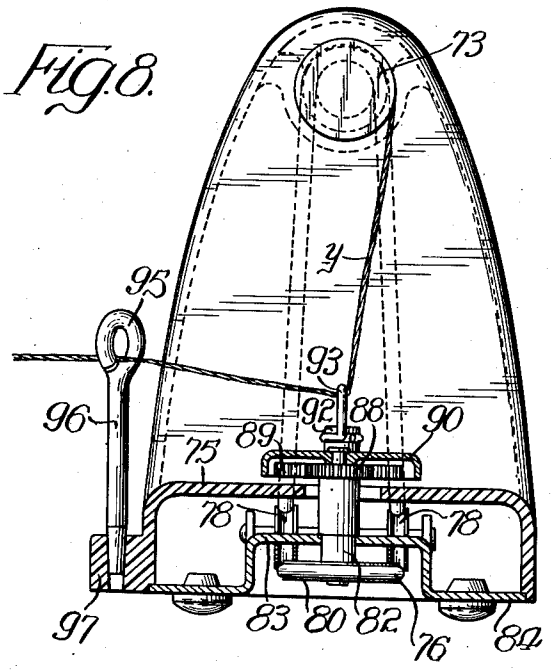
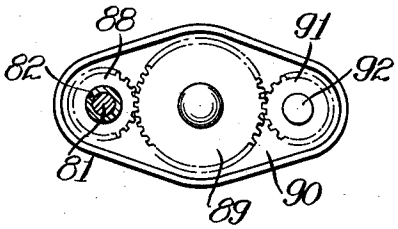



Fig. 9.




INVENTORS:
Kenneth Cloud
BY Russell J. Nadherny
Dunning & Dunning
Attys.

Patented Jan. 22, 1952

2,583,087

# UNITED STATES PATENT OFFICE

2,583,087

## WINDER FOR YARN AND THE LIKE

Kenneth Cloud and Russell J. Nadherny, Chicago, Ill., assignors, by direct and mesne assignments, to Cloud Foundation, Inc., Chicago, Ill., a corporation of Illinois

Application June 10, 1949, Serial No. 98,293

10 Claims. (Cl. 242—2)

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This invention relates to a simple form of winding device by which yarn coming off a skein may be readily wound into a ball. The construction is simple, inexpensive, light, and compact so that the winder is admirably suitable for home use.

It is an important object of our invention to provide, in a winder of the character specified, means for guiding the yarn or other like material back and forth lengthwise of a revolving spool so that the yarn will be laid evenly as the winding progresses; to maintain in a simple and effective manner an even tension on the yarn so that the resultant windings on the spool will make up into a ball which is free of hard and soft spots; to direct the yarn in its passage to the spool through a guide which is revolved through a circular path, but which remains substantially parallel with the spool axis, the purpose being to avoid twisting and snarling of the yarn with a consequent unevenness in its tension; and to provide a mounting structure for the spool and for the revolving guide in which the operating parts are completely enclosed so as to be removed from the view and from contact by the user. This last consideration is important because the winder is designed as a home appliance where it will ordinarily be used by unskilled persons.

The winding mechanism is one which lends itself to operation manually or by power. The changes required for manufacture of the winder, either hand or power operated, are inconsequential. The housing in which the operating parts are enclosed may be of the same general contour in each case, although where power is employed the space within the housing should be somewhat enlarged for the accommodation of an electric motor. The present construction is advantageous, therefore, from a manufacturing standpoint, and also because it retains the same general appearance whether the device be hand or power operated.

Certain suggestive embodiments of our invention are set forth in the accompanying drawings wherein:

Figure 1 is a view in perspective of the yarn winder in a form which provides for power operation;

Fig. 2 is an enlarged central vertical section longitudinally thereof;

Fig. 3 is a horizontal section, taken on line 3—3 of Fig. 2;

Fig. 4 is a vertical section, taken on line 4—4 of Fig. 2;

Figs. 5 and 6 which are semi-diagrammatic

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views show the approach and lay of the yarn when the traversing arm has completed the first 90° of its rotative movement;

Fig. 7, which is a view similar to Fig. 2, shows the yarn winder modified for hand operation;

Fig. 8 is a vertical section, taken on line 8—8 of Fig. 7; and

Fig. 9 is a detail in section, taken on line 9—9 of Fig. 7;

The yarn winder of this invention utilizes an upstanding housing 10 at one end of a chambered base 11 over whose open bottom is affixed a closure plate 12 having feet 14 to rest upon a table or other support. The closure plate is removably secured in place as by screws 15. Such a housing may be conveniently produced from plastic or other suitable material to enclose within its interior certain of the operating parts which desirably should be protected.

Upstanding from the closure plate is a mounting plate for a power unit such, for example, as is shown in Figs. 2 and 3. This unit comprises an electric motor having a field 21, a rotor 25 fast on a shaft 26 which extends through an aperture in the mounting plate 22 to carry a pinion 27 at or near its outer end, and a gear train 28, 29, and 30, the latter affixed to a horizontal spindle 31 which is journaled for rotation within a bushing 32 which is secured to the mounting plate near its upper end. The spindle 31 which is threaded engages axially with a spool 33 which extends outwardly through an aperture 34 in one wall of the housing 10 at an elevation well above the base 11 and in parallelism therewith. Near the outer end of the spool is a narrow circumferential groove 35 for receiving and holding the end portion of the yarn $y$ that is to be wound into a ball 36.

The closure plate 12 terminates in an upwardly offset ledge 38 wherein is supported a fixed vertical bushing 40 through which is extended a shaft 41 mounting a pulley 42 fast at its lower end. A pinion 45 is carried fast near the upper end of the fixed bushing 40. A traversing arm 47 having a depending rim 48 is mounted near the top of the shaft 41 to rotate therewith. The point at which the shaft joins with the arm is near one end of the latter. Upon the under side of the traversing arm within the confines of its depending rim 48 are mounted two meshing pinions 50 and 51, the former being meshed with the shaft pinion 45. The pinion 51 is carried fast on a stub shaft 53 which upstands from the traversing arm 47 near its end opposite that which is secured fast to the shaft 41.

At the top of the stub shaft is an eye **55** open to receive the yarn *y* that is to be wound into the ball **36** upon the spool **33**. A boss **56** which is extended laterally from the base **11** is provided with a tapered socket having a vertical axis to receive the tapered lower end portion of an upstanding pin **57** (of plastic or the like) whose upper end is formed with an apertured head **58** constituting a guide. Through a lateral slit **59** the yarn may be inserted to lie within this head-guide. Yarn passing through this guide and then through the eye **55** passes on up to the spool **33** where it is secured within the groove **35** before start of the winding operation. An endless belt **59** which passes around the pulley **42** extends around a pair of sheaves **60** at the base of the housing **10** and thence upwardly and around a circumferential groove **61** in the spool **33**, thereby to interconnect the pulley and traversing arm for concurrent operation. A control switch **63** mounted at the side of the housing is in circuit with the motor and a source of electrical energy (not shown) whereby operation of the winder may be started or stopped at will.

In operation, the motor drives the spool and with it the traversing arm which rotates with the shaft **41**. The eye **55** which is mounted near the free end of the arm describes a wide circle, but in so doing remains in a fixed position which desirably is one which parallels the spool axis. Because of the gear connection which the eye maintains with the stationary pinion **45**, the eye position is unchanged while rotation of the traversing arm proceeds. Yarn which passes through the guide **58** and then through the eye **55** is accordingly shifted back and forth lengthwise of the revolving spool to which the leading end of the yarn is connected. As the operation proceeds the yarn thus drawn upon the spool is wound into a ball, the windings being spaced according to a definite pattern and with an even tension. This tension may be controlled by adjusting the pin **57** to a desired rotative position thereby varying the friction to which the yarn is subjected in its movement through the guide **58**.

The semi-diagrammatic showings in Figs. 5 and 6 will assist in an understanding of a condition which is effectively met by the present winder. The spool is represented as rotatable in a counter-clockwise direction, and the traversing arm may be assumed to rotate in the same direction as viewed from above. Its center of rotation, as shown, is slightly off the longitudinal center of the spool toward its outer end where the end of the yarn is secured. At the commencement of operation the yarn is secured to the spool, and the yarn guiding eye is desirably positioned rotatively to lie opposite that same end of the spool. As herein indicated, the speed of rotation of the spool is slightly more than twice that of the traversing arm.

When rotation starts the yarn will pay out through the eye of the traversing arm with a variable speed which ranges upwardly from the peripheral speed of the spool as a minimum. The yarn advances upon the spool from one side only (see Fig. 5), its angle of approach varying according to the rotative position of the eye. When the spool has rotated through about 180° the traversing arm will have rotated through about 90°, and the first layer of windings on the spool up to this point will be disposed substantially as shown in Fig. 6; with continued rotation of the spool through another 180° the initial yarn lay will appear about as shown in Fig. 2. There



is a constant change in the angle of approach of the yarn as it leaves the eye to be wound upon the spool, first increasing progressively and then decreasing progressively as the traversing arm proceeds through the first and second quarters of its circular path of movement. The first layer of yarn windings will tend to shift toward the spool end whereon the lay was started, i. e. where the yarn is secured to the spool. The succeeding winding layers will build on the first layer, the latter determining the endwise position of the center of the ensuing ball. It is important, therefore, to locate the center of eye movement slightly toward the spool end where the approach angle of the yarn is the least, i. e. where the spacing of the first windings is the closest.

Other factors affecting winding of the yarn are the spool diameter and the relative speeds of rotation of the spool and the traversing arm. These may be varied within rather wide limits, the principal effect being to modify the shape of the yarn ball which is wound onto the spool. The second layer of windings, when laid over the first, will stabilize the position of the first layer, and will not build out endwise therebeyond. Succeeding layers of windings will build over one another, the result being a criss-crossing of the yarn windings in the formation of a ball having the general contour shown in Fig. 1. The completed ball will be self-sustaining, and permit release of the yarn from its interior without collapse of the ball structure until there is only a thin shell of two or three criss-crossed windings remaining. In this withdrawal of the yarn, no twisting or fouling will take place at any time, due to the regular pattern with which the windings were laid when the ball was made.

A similar construction of winder, but modified for hand operation, is illustrated in Figs. 7 and 8. Here the chamber of the housing **70** is somewhat less in size since there is no motor to be accommodated. Instead, there is journaled for rotation in a bearing **71** a spindle **72** which is screw threaded for coaxial connection with a spool **73** that extends through an aperture **74** in the housing to overlie the chambered base **75** from which the housing upstands. An endless belt **76** which is trained around a circumferential groove **77** in the spool extends downwardly therefrom and then around a pair of sheaves **78** to drive a pulley **80** which is affixed to a vertical shaft **81** that is journaled for rotation in a bushing **82** having a fixed mounting in the upwardly offset ledge **83** of a closure plate **84** that is affixed to the base upon its open under side. To the end of the spool spindle **72** which lies exteriorly of the housing is affixed a crank arm **86** with a handle **87** at its free end. By this means we provide for manual rotation of the spool and of the vertical shaft **81** as well.

A pinion **88** is carried fast at the upper end of the bushing **82** in mesh with a pinion **89** that is mounted on the under side of a traversing arm **90** which, near one end, is affixed to the shaft **81** to rotate therewith. A third pinion **91**, in mesh with the intermediate pinion **89**, is carried by a stub shaft **92** extending upwardly through the traversing arm to support at its upper end an eye **93** through which is threaded the yarn *y* to be wound on the spool where it is secured in a groove **94** near its outer end. A guide **95** in the form of a slitted eye at the top of a pin **96** upstands from a socketed boss **97** at the side of the base **75** oppositely of the shaft **81** to receive the yarn en route to the eye **93** and thence to the

spool. As shown in Fig. 7, the spool has completed three revolutions following commencement of the winding operation, the traversing arm having rotated one and a half times to produce three endwise lays of the yarn.

The construction herein disclosed in slightly different forms is advantageous in respect of such features as simplicity and compactness. The device is also light in weight, and so may be readily moved about or placed away, as desired. Its operating parts are enclosed within the housing so as to be completely protected, and also to safeguard the user whose fingers might otherwise come in contact with the moving parts.

We claim:

1. A winder for yarn or the like comprising supporting structure mounting a rotatable spool, an arm rotatable about an axis substantially normal to that of the spool intermediately of its ends, means interconnecting the spool and arm for concurrent operation, a yarn guiding eye on the arm at a point removed from its axis of rotation and mounted for movement relative thereto whereby the eye, during rotation of the arm, is moved through a circular path having a diameter terminating inwardly of the spool ends, and means in connection with the eye for holding the same stationary while moving through its circular path in response to rotation of the arm, the eye being thereby maintained in a single position while guiding the yarn back and forth between the ends of the spool.

2. A winder according to claim 1 in which the arm is provided with a peripheral wall defining on one side of the arm a space wherein is confined the means in connection with the eye for holding the same stationary during rotation of the arm, the eye being mounted to project from the opposite side of the arm toward the spool.

3. A winder according to claim 1 in which the supporting structure includes a chambered housing and base enclosing the means interconnecting the spool and arm, and in which the arm includes a wall enclosing the means in connection with the eye for holding the same stationary during rotation of the arm.

4. A winder for yarn or the like comprising an enclosed supporting structure mounting a rotatable spool, an arm mounted to rotate about an axis substantially normal to that of the spool intermediately of its ends, the spool and arm being disposed exteriorly of the structure enclosure, a yarn-guiding eye on the arm at a point removed from its axis of rotation, a train of three gears, one coaxial with the eye and fast therewith, another coaxial with the arm mounting and held against rotation therewith, and the third intermediately of the other two, the arrangement being such that the eye gear is also held against rotation when the arm is rotated about its axis whereby yarn passing through the eye to the spool is moved back and forth between the ends thereof, and means within the structure enclosure interconnecting the spool and arm for concurrent operation.

5. A winder according to claim 4 in which the arm is provided with means enclosing the gear train.

6. A winder for yarn or the like comprising a housing upstanding from a hollow base open on its under side, a plate detachably affixed to the base upon its under side, a winding spool mounted on the housing to rotate about a horizontal axis above the base, a traversing arm mounted on the base plate to rotate about a vertical axis, the traversing arm being positioned above the base and below the spool, operating means for the spool, means extending wholly within the housing and base providing a power transmission from the spool to the traversing arm, a yarn-guiding eye carried by the traversing arm at a point removed from its axis of rotation for guiding the yarn evenly in its movement to the rotating spool, and means carried by the traversing arm in connection with the yarn-guiding eye to hold the same from turning relative to its own axis.

7. A winder for yarn or the like comprising supporting structure mounting a rotatable spool with yarn-securing means near one end thereof, an arm rotatable about an axis substantially normal to that of the spool intermediately of its ends but slightly closer to the end whereon the yarn-securing means is located, means interconnecting the spool and arm for concurrent operation with provision for rotating the spool faster than the arm, a yarn-guiding eye on the arm at a point removed from its axis of rotation and mounted for movement relative thereto whereby the eye, during rotation of the arm, is moved through a circular path having a diameter terminating inwardly of the spool ends, and means in connection with the eye for holding the same stationary while moving through its circular path in response to rotation of the arm, the eye being thereby maintained in a single position while guiding the yarn back and forth between the ends of the spool.

8. A winder for yarn or the like comprising supporting structure mounting a rotatable spool, an arm rotatable about an axis substantially normal to that of the spool intermediately of its ends, means interconnecting the spool and yarn for concurrent operation, a yarn-guiding eye carried by the arm at a point removed from its axis of rotation for movement through a circular path having a diameter terminating inwardly of the spool ends, means in connection with the eye for holding the same stationary while moving through its circular path in response to rotation of the arm, and a yarn guide positioned outside the orbital path of the arm and adjustable relative to the yarn passing therethrough for engagement therewith with a variable frictional pressure whereby to subject the yarn to a desired tension during its advance to the eye.

9. A winder according to claim 8 in which the yarn guide comprises a tapered pin, the supporting structure being provided with a tapered socket for receiving the tapered pin and supporting the same frictionally in a selected rotative position of adjustment.

10. A winder for yarn or the like comprising a housing upstanding from a hollow base open on its under side, a plate detachably affixed to the base upon its under side to provide a closure therefor, a mounting plate affixed to the closure plate and extending upwardly within the housing, a winding spool rotatable about a horizontal axis together with operating means therefor carried upon the mounting plate, a traversing arm carried by the closure plate and rotatable about a vertical axis at a point from within the base, the traversing arm being positioned above the base and below the spool, means extending wholly within the housing and base providing a power transmission between the spool and traversing arm, and a yarn-guiding eye carried by the traversing arm at a point above the base, the traversing arm being positioned above the base and be-

low the spool, means extending wholly within the housing and base providing a power transmission between the spool and traversing arm, a yarn-guiding eye carried by the traversing arm at a point removed from its axis of rotation for guiding the yarn evenly in its movement to the rotating spool, and means for holding the yarn-guiding eye against turning relative to its own axis.

KENNETH CLOUD.
RUSSELL J. NADHERNY.



## REFERENCES CITED

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


FOREIGN PATENTS

| Number | Country | Date |
|---|---|---|
| 111,304 | Australia | Apr. 16, 1940 |
| 477,786 | Great Britain | Jan. 6, 1938 |
| 846,925 | France | June 19, 1939 |