No. 838,202. PATENTED DEC. 11, 1906.

M. McDAID.

MACHINE FOR WINDING THE CORES OF GOLF BALLS.

APPLICATION FILED MAY 2, 1904.

4 SHEETS—SHEET 1.

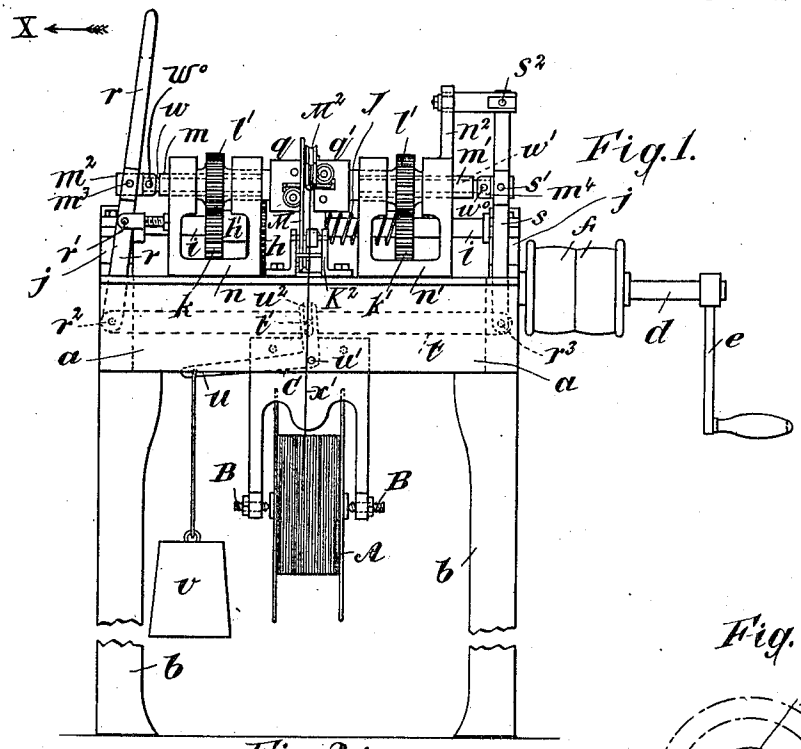


Fig. 1.

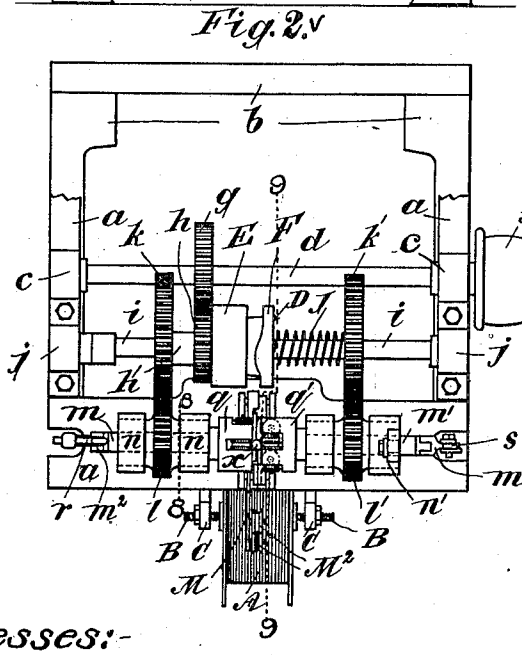


Fig. 2.

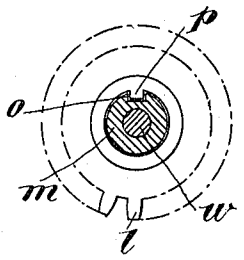


Fig. 8.

Witnesses:-
C. M. Crawford
L. Waldman

Inventor:-
Martin McDaid
by P. Singer
his Attorney

No. 838,202. PATENTED DEC. 11, 1906.

M. McDAID.

MACHINE FOR WINDING THE CORES OF GOLF BALLS.

APPLICATION FILED MAY 2, 1904.

4 SHEETS—SHEET 2.

Fig. 3.

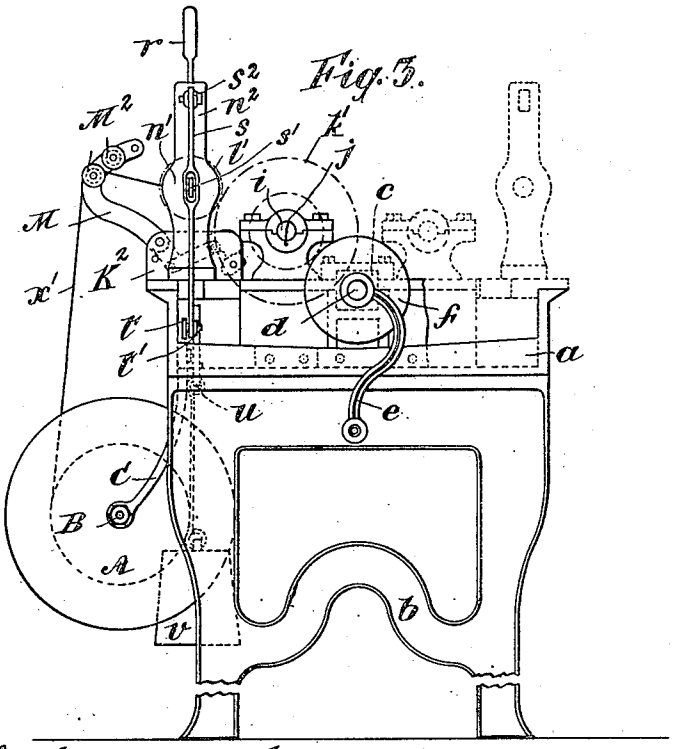


Fig. 6.

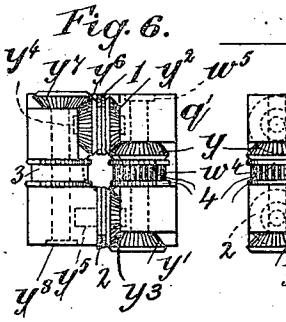


Fig. 4.

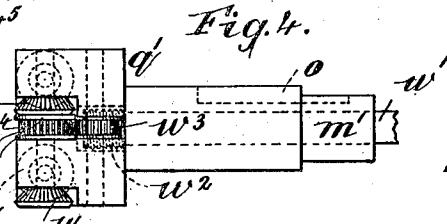


Fig. 5.

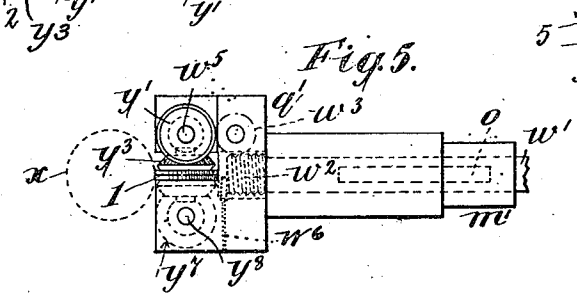
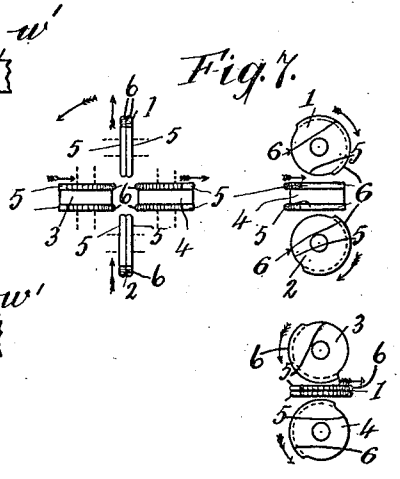


Fig. 7.



Witnesses:-
C. H. Crawford
L. Waldman

Inventor:-
Martin McDaid
by P. Kinger
his Attorney

No. 838,202. PATENTED DEC. 11, 1906.

M. McDAID.

MACHINE FOR WINDING THE CORES OF GOLF BALLS.

APPLICATION FILED MAY 2, 1904.

4 SHEETS—SHEET 3.

Fig. 9.

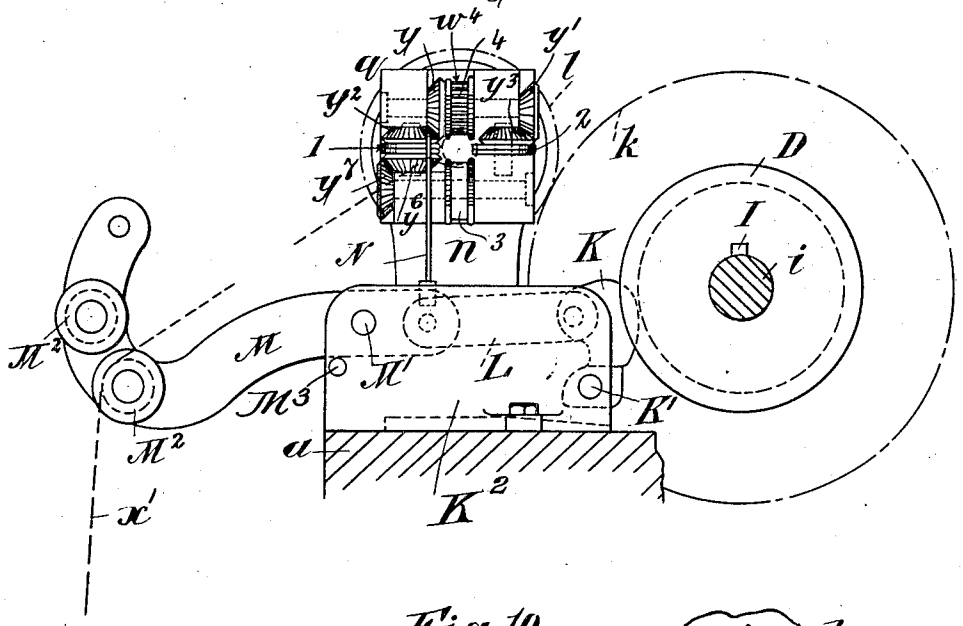
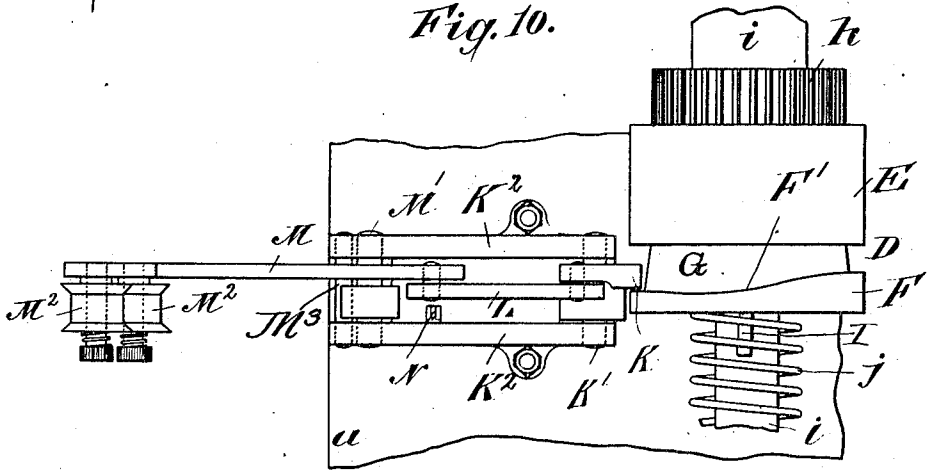


Fig. 10.



Witnesses:-
C. A. Crawford
L. Waldman

Inventor:-
Martin McDaid
by B. Singer his Attorney

No. 838,202. PATENTED DEC. 11, 1906.

M. McDAID.

MACHINE FOR WINDING THE CORES OF GOLF BALLS.

APPLICATION FILED MAY 2, 1904.

4 SHEETS—SHEET 4.

Fig. 11.

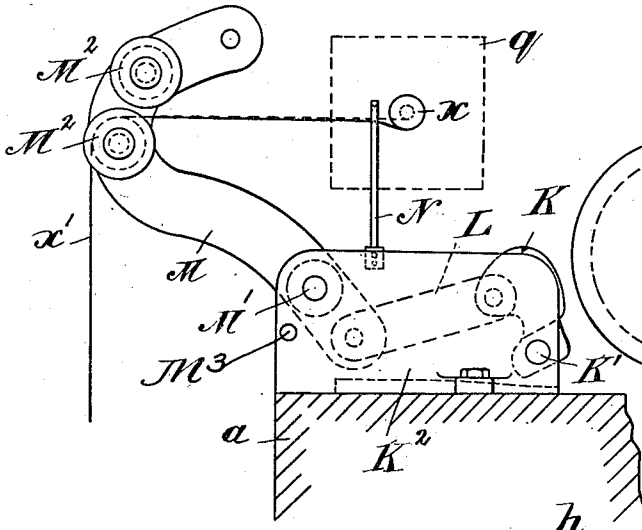


Fig. 12.

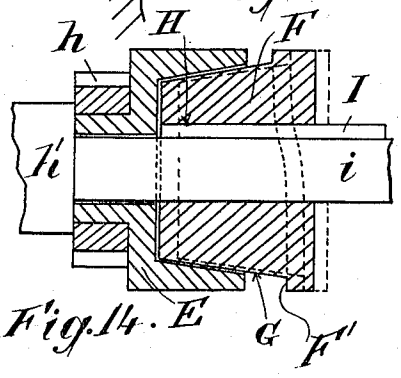


Fig. 13.

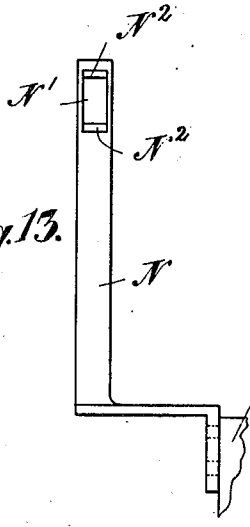
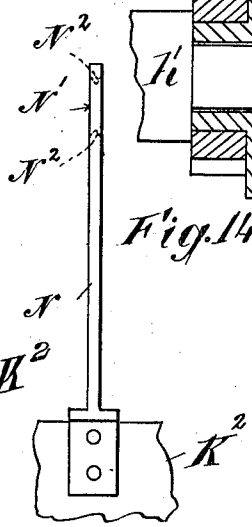


Fig. 14.



Witnesses:-
C. H. Crawford
L. Waldman

Inventor:-
Martin McDaid
by P. Singer
his Attorney

UNITED STATES PATENT OFFICE.

MARTIN McDAID, OF EDINBURGH, SCOTLAND.

MACHINE FOR WINDING THE CORES OF GOLF-BALLS.

No. 838,202. Specification of Letters Patent. Patented Dec. 11, 1906.

Application filed May 2, 1904. Serial No. 205,958.

To all whom it may concern:

Be it known that I, MARTIN McDAID, golf-club maker, a subject of the King of Great Britain, and a resident of Easter Road, Edinburgh, Scotland, have invented certain new and useful Improvements in Machines for Winding the Cores of Golf-Balls, of which the following is a specification.

My invention relates to improvements in machines for winding the cores of golf-balls, and relates more especially to the making of golf-balls provided with a central core or body forming a nucleus between which and an outer case is wound a quantity of suitable resilient material adapted to impart to the ball a rebounding action when driven.

The intermediate resilient material generally consists of a continuous length of rubber thread, rubber tape, or like material, which is wound about the core until the ball assumes the desired size, whereupon the outer covering is secured in place. The winding operation is usually attended by many difficulties, the principal one being that of uniformly and constantly turning the core so that the thread is so equally distributed as to form a true sphere.

In winding golf-balls by hand the operation is not only difficult, but is tedious and expensive, inasmuch as the tape or thread is usually of a very small size or gage. The core therefore requires a comparatively large quantity of the tape or thread before it assumes the required size.

It is the object of my invention to provide a machine for effecting the winding of the intermediate stratum of material on the core, which machine distributes the tape or thread under tension, so as to secure a compact structure of a prescribed size and of an accurate spherical formation. To this end I desirably mount the core-body between rotating heads provided with core-engaging members or disks operating in angular planes. Thus the core-body of the ball is not only rotated about an intermittently-changing axis, but is also rotated continuously about a single fixed axis, which in the preferred construction is the axis of rotation of said heads.

My invention will be more fully described in connection with the accompanying drawings and will be more particularly pointed out in the appended claims.

In the drawings, Figure 1 is the front elevation of a machine embodying the main features of my invention. Fig. 2 is the plan view of the machine shown in Fig. 1. Fig. 3 is an end elevation thereof. Fig. 4 is a detached view of one of the rotating heads between which the core-body is rotated. Fig. 5 is a view of the same in a changed position. Fig. 6 is an end elevation of one of said heads. Fig. 7 illustrates diagrammatically three different views of the core-engaging members of the rotating heads. Fig. 8 is a detailed sectional view on line 8 8 of Fig. 2. Fig. 9 is a sectional view taken on line 9 9 of Fig. 2. Fig. 10 is a plan view of the parts shown in Fig. 9. Fig. 11 is a sectional view similar to that shown in Fig. 9, showing the parts in a differently-adjusted position. Fig. 12 is a sectional view of a clutch member on line 12 12 of Fig. 11. Fig. 13 is a detailed view of an automatic cutting device for the thread. Fig. 14 is a side elevation of the part shown on Fig. 13.

Like characters of reference designate similar parts throughout the different figures of the drawings.

My invention consists generally of a pair of rotatively-mounted heads adapted to operate in alinement and about a fixed axis. Both of said heads are longitudinally movable and are held yieldingly in contact with the core when the same is being wound. Both of the heads are also provided with pairs of positively-driven core-actuating members, which directly engage the core-body and serve to rotate the same about different axes. The core-engaging members are rotatively mounted in the rotating heads and preferably comprise alined pairs of disks, each head preferably having two alined pairs operating in angular planes. The said heads are positively driven by gear connection in order to maintain a prescribed alinement between given pairs of disks of each head, so that the core-body during the process of winding the thread thereon will be driven as near as possible through a prescribed course, thereby more generally effecting a uniform distribution of the winding material. Thus in the operation of winding the core two pairs of disks of each head will simultaneously engage the core and turn it in a given direction, whereupon engagement will be released and the core will be engaged by other two pairs of disks operating in planes angular to the first-mentioned pair, so as to revolve it in another direction. The core will therefore be bodily rotated about a fixed axis coinciding with the axis of rotation of the heads, also about a

second axis at right angles thereto caused by engagement therewith of pairs of core-engaging disks, and will be further rotated about another axis by the remaining pairs of core-engaging disks. Thus the second and third axes will intermittently change during the alternate engagement of the core by respective pairs of angularly-disposed disks. I also provide means whereby the winding material will not only be wound upon the core-body under tension, but also means whereby when the cord breaks or when the core-body has assumed the desired size the winding material will be automatically severed and the machine stopped.

Now referring more specifically to the construction of the machine shown, the same is provided with a base *a*, supported by the legs *b*. A main and constantly-driven shaft *d* is shown journaled in bearings *c* and is provided on its outer end with fast and loose belt-pulleys *f* or a hand operating-crank *e*. Said shaft carries between its bearings a gear-pinion *g*, meshing with a pinion *h*. Shaft *i* is journaled in bearings *j* and is disposed in parallel relation with the shaft *d*. Means are provided whereby the shaft *i* may be thrown into and out of gear with the constantly-driven shaft *d*, which means in the preferred construction consists of a frictional clutch D. Said clutch is provided with a member E, rotatively mounted on the shaft, and a companion member F, slidably and non-rotatively mounted on said shaft by means of a groove-and-feather connection H and I. Said member E carries on its outer end the pinion *h* and is held in position by means of the feather I and a shoulder *h'*. Said shaft *i* also carries pinions *k k'*, which mesh with pinions *l l'*, and thereby impart rotary motion to heads *q q'*. Between the pinion *k'* and the clutch member F is interposed an expansively-acting spring J, which serves to hold the clutch members F and E in engagement, thereby normally effecting constant rotation of the gearing just described. Means are provided whereby the machine may be automatically stopped, as before stated, either when the thread breaks or when the ball has assumed the desired size, which means operates directly upon a cam-surface F' of the clutch member F, the operation of which will be hereinafter more fully described.

Next describing the construction of the core engaging and rotating mechanism, the same, as shown, consists of rotating heads *q q'*, which are formed integral with sleeves *m m'*, which are in turn journaled upon alined spindles *w w'*. Said sleeves *m m'* desirably carry the pinions *l l'* and are rotatively mounted in bearing-standards *n n'*. Said pinions *l l'* are non-rotatively and slidable mounted upon the sleeves *m m'* by a feather-and-groove connection *p* and *o*, (Shown in Figs. 4, 5, and 8.) The grooves *o* are desirably of greater length than the width of the pinions *l l'* over and above the hubs thereof in order to permit the desired longitudinal movement of said heads *q q'*, the pinions *l l'* obviously being at all times held in mesh with the pinions *k k'*. The non-rotative spindles *w w'* are rotatively connected and longitudinally fixed at their inner ends in the heads *q q'*. Thus it will be seen that the sleeves *m m'* of the heads *q q'* are longitudinally movable in the bearings *n n'* and are slidably connected with the gears *l l'*, the slidable connection permitting longitudinal movement of said heads with respect to said gears. The longitudinal movement of the heads toward and away from each other not only permits the insertion and removal of the finished and unfinished cores, but also permits the heads to separate while the winding operation is being carried on and as the core enlarges in size. In order to effect operative engagement at all times between the heads and the finished or partially-finished core-body, permitting the same to be inserted and removed and also effecting a yielding engagement whereby as the core-body enlarges the heads are permitted to separate, I provide the following mechanism: Said shafts *w w'* are pivotally secured in jaws at w^0 w^0, formed in members m^2 m^4, which are connected at m^3 and *s'* to levers *r s*. Said lever *s* is pivoted at s^2 upon a projection secured to leg n^2 of the bearing *n'* and extends downwardly in the base *a* of the machine, where it is connected at r^3 with a horizontal link *t*, the latter being connected at r^2 to lever *r*. Said lever *r* is pivoted at *r'* to a rigid projection extending outwardly from the bearing *n*. It will be noted that the pivotal engagement of the lever *s* is above the axis of the shafts *w w'*, while the pivotal connection *r'* is below the same. Therefore when the operator grasps the upper end of the lever *r* and pulls the same outwardly in the direction of the arrow X it will cause an outward movement of both the heads *q q'*, whereas when the lever *r* travels inwardly a correspondingly inward movement of the heads will be effected. In order to normally hold the heads *q q'* in an inward position, I provide a bell-crank lever pivoted to the frame *a* at *u'*, one of the arms *u* being connected to a weight *v*, the other arm having slotted connection with a trunnion *t'* on the link *t*. Thus by reference to Fig. 1 it will be seen that the weight *v* normally tends to move the link *t* toward the left of the machine, thereby serving to bring the heads *q q'* together.

Next describing the construction of the heads *q q'* and the disks thereof, which directly engage the core, the same consists of the following parts, reference being had to Figs. 4, 5, 6, and 7: Each of said heads is provided with alined pairs of core-engaging

disks 1 2 and 3 4, respectively, as shown in Figs. 6 and 7. Each pair of disks 1 2 comprises two distinct disks located closely adjacent and in operating alinement, while the disks 3 4 are also adjacent and arranged in operating alinement, one disk (designated by 4) constituting the driving member of the group and having a gear w^4, which, as shown in Fig. 4, meshes with a worm-gear w^3. Said worm-gear w^3 in turn meshes with a worm w^2, formed on the inner end of a shaft w', the said worm w^2 being held in a longitudinally-fixed position in the heads by means of pins w^6 (shown in dotted lines in Fig. 5) and by a reduction of the shaft w' at the outer end of said worm, which engages a shoulder formed in the sleeve m'. By means of this construction when the sleeves m m' are rotated on their spindles the worm-gears w^3 of the heads, rotating bodily about the worms w^2, effect rotation of the disk 4 and the remaining disks 1, 2, and 3 of each head in the following manner: Said disk 4 of each head is mounted on a gear-spindle w^5, Fig. 6, which carries between its ends a beveled gear y and at its outer end a second beveled gear y'. The core-engaging disk 2 is mounted on a spindle y^5, carrying a beveled gear y^3, which meshes with wheel y', also mounted on spindle w^5. The disks 1 are mounted on a spindle y^4, carrying a beveled gear y^2, which meshes with gear y, and a second gear y^6, meshing with gear y^7, the latter being mounted on spindle y^8, carrying disks 3. From the foregoing it will be obvious that the several pairs of core-engaging disks are continuously and positively driven in unison from the driving worm-gear w^3 and that they continuously rotate throughout the operation of winding the core. In order to effect alternate engagement of pairs of disks with the core, and thereby simultaneously rotate the same in varying directions, I preferably provide each of the disks with an engaging and non-engaging periphery, which will be more clearly seen by reference to Fig. 7. The disks 1 2 and 3 4, as shown, are provided with knurled or roughened peripheries 6 6, extending throughout one half of the circumferential length of the disk, the other halves of said disks being provided with radially-reduced preipheral portions 5 5, which are unprovided with knurled or roughened edges and which, because of their decreased diameter, do not engage the core during one-half of their revolution. Said reduced and increased portions of the disks constitute means whereby alternate engagement between the core and pairs of disks is automatically effected.

I preferably set the heads so that the alined disks 1 and 2 of one head will coöperate and engage the core with disks 3 and 4 of the opposite head. By thus arranging the heads the narrow disks 1 2 of the one head are opposite to the broad disks 3 4 of the other head, and the core is thereby prevented from shifting out of position during the winding operation.

I will now refer to the mechanism whereby the rubber thread or winding is fed to the core and also to the automatic mechanism whereby the machine is instantly thrown out of operation when the thread breaks and also when the core has assumed the desired or prescribed size, reference being had more especially to Figs. 9 to 14, inclusive. In Figs. 1, 2, and 3 it will be seen that the thread may be fed from a rotatively-mounted drum A, mounted in brackets secured to the frame of the machine. The drum is mounted upon a suitable spindle B, having bearings in brackets C. Any suitable form of breaking or retarding means may be provided to prevent the drum from unwinding too rapidly. The thread x' is trained upwardly from the drum A over one of pulleys M^2. When the operator starts the winding operation of a core, he will draw the thread over the pulley M^2 through the aperture N' in the cutter N and will wind a few turns of the thread about the core. The core will then be inserted in position between the heads q q' by separating the same through the medium of the lever r. When the core has been inserted, the lever r will be released and the weight v will automatically bring the heads together, so that the core-actuating disks impinge on the body of the core and hold the same in position. By reference to Figs. 9 and 10 it will be seen that the machine is equipped with a rigidly-mounted frame provided with vertical lateral members K^2. A lever M, pivotally mounted at M' and connected at its inner end with a link L, is provided, said link in turn being connected with a cam-knuckle K, pivoted at K' and adapted to project into the path of and engage the cam-surface F', formed on clutch member F. Downward movement of the outer end of the lever M is limited by stop M^3. The parts in Figs. 9 and 10 are shown in a non-operating position, or, in other words, in a position which the parts would assume when the thread x' is broken or when the core has assumed desired size and the machine is automatically thrown out of gear. In Fig. 11 the parts are shown in an operating position. In this figure it will be noted that the lever M occupies an elevated position and is therein maintained by the thread x'. The weight of the lever M serves to provide the desired tension for the thread and is sufficiently heavy to secure a relatively tight winding without breaking the thread. Said lever exerts a continuous and uniform tension, and should the thread at any point be imperfect or weak it would immediately be severed. Therefore it will be seen that by my improved device winding material below a prescribed quality can easily be detected.

Next describing the operation whereby the thread is severed when the core has reached the desired size, reference being had especially to Fig. 11, it will be seen that there is shown in dotted lines a core when first inserted, and the winding or thread (indicated by dotted lines) passing to said core, as shown, is out of contact with the knife-edge N^2 of the part N. The aperture N′ permits the thread to vary its position freely without bringing it into contact with the knife-edges until it has reached a size, for example, such as is shown by full lines in Fig. 11. At this point it will be seen that the thread in reaching the core is forced downwardly or upwardly into engagement with the knife-edge N^2, and as the thread passes over the same it will be cut in two. When the cord or thread is cut, the lever M will drop, forcing the cam-knuckle K in a rearward position, as shown in Fig. 9, and into the path of the cam F. By reference to Fig. 10 it will be seen that the cam-knuckle K having no lateral movement will engage the cam F and force the clutch member F out of the engagement with the clutch member E, thereby permitting the member E to rotate freely on the shaft *i* and stop the machine. This operation will also take place when the thread breaks because of any weakness in the material of which it is formed. The standard N, in which the aperture N′ and knife-edges N^2 are formed, as herein shown, is secured to one of the lateral members K^2.

It will be obvious that, if desired, the winding mechanisms may be increased in number and more than one core-ball at a time may be wound on a single machine and that a plurality of winding mechanisms could be operated by the continuously-driven shaft *d*.

The machine is designed to quickly and effectively wind the cores of golf-balls or balls of like construction and is so constructed that the winding operation may be at any stage inspected. The parts are so arranged that in cases of repair they are easily accessible and easily removed, while the automatic cut-out insures the production of balls having intermediate windings composed of prescribed-grade material. It will also be obvious that the automatic stop mechanism not only insures a definite size for all of the cores, but it permits the operation of a large number of machines by a single operator, it being understood that where two or more cores are finished the machine is automatically stopped to await the insertion of new cores.

While I have herein shown and described a specific embodiment of my invention, it will be understood that changes may be readily made therefrom without departing from the spirit of the invention, and I therefore do not wish to be limited to the precise form shown; but,

Having shown and described this particular construction, what I desire to secure by Letters Patent is—

1. In a machine for winding rubber thread or tape for forming the cores of golf-balls, mechanism which imparts to the core motion in three directions, namely, a rotary motion about a longitudinal axis and also rotary motions about axes at an angle to one another and to said longitudinal axis so as to wind the tape or thread evenly all round the core as it grows in size.

2. A machine for winding rubber thread or tape for forming the cores of golf-balls comprising, in combination, horizontally-arranged rotating shafts, means for rotating the shafts, gripping-rollers on the shafts for gripping and holding the core, and means for actuating the gripping-rollers so that they may revolve the core in different directions while it is being rotated by the shafts.

3. A machine for winding rubber thread or tape for forming the cores of golf-balls comprising, in combination, two rotating shafts arranged in line and capable of a longitudinal movement, means for rotating the shafts, means for moving the shafts longitudinally, heads on the shafts, gripping-rollers in the heads and means for actuating the gripping-rollers so that they may revolve the core in different directions while it is being rotated by the shafts.

4. A machine for winding rubber thread or tape for forming the cores of golf-balls comprising, in combination, two hollow rotating shafts arranged in line, spindles with worms at the ends arranged within the shafts, means for moving the spindles longitudinal, means for rotating the shafts, heads on the shafts, gripping-rollers in the heads, and means for driving the rollers in different directions independent of the rotary motion imparted to them by the shafts, substantially as described.

5. A machine for winding rubber thread or tape for forming the cores of golf-balls comprising, in combination, rotating shafts arranged in line, means for rotating the shafts, heads on the shafts, four gripping-rollers in each head and mechanism for driving two of the rollers in one direction and the other two in another direction, substantially as described.

6. A machine for winding rubber thread or tape for forming the cores of golf-balls comprising, in combination, rotating shafts arranged in line, means for rotating the shafts, heads on the shafts, four gripping-rollers in each head the rollers being set at right angles to one another and mechanism for driving two of the rollers in one direction and the other two in another direction, substantially as described.

7. A machine for winding rubber thread or tape for forming the cores of golf-balls com-

prising, in combination, rotating shafts arranged in line, means for rotating the shafts, heads on the shafts, four gripping-rollers in each head, each roller having a projecting roughened surface or edge which extends partially round the circumference, and mechanism for driving the rollers, substantially as described.

8. A machine for winding rubber thread or tape for forming the cores of golf-balls comprising, in combination, two hollow rotating shafts arranged in line, spindles having worms at the one end arranged within the shafts, means for rotating the shafts, heads on the shafts, four gripping-rollers arranged at right angles to one another in each head, bevel-gears for driving the rollers in different directions, worm-wheels for driving the bevel-gears, said worm-wheels gearing with the worms on the end of the aforesaid spindles, substantially as described.

9. A machine for winding rubber thread or tape for forming the cores of golf-balls comprising, in combination, rotating shafts arranged in line, means for rotating the shafts, heads on the shafts, gripping-rollers in each head, means for driving the rollers in different directions, a guide for the thread or tape and means whereby when the thread or tape breaks the mechanism for rotating the shafts is thrown out of gear, substantially as described.

10. A machine for winding rubber thread or tape for forming the cores of golf-balls comprising, in combination, rotating shafts arranged in line, means for rotating the shafts, a clutch having a cam-face, a pivoted cam-lever, a link, a pivoted thread or tape guide, heads on the shafts, gripping-rollers in the heads, and means for revolving the gripping-rollers in different directions, substantially as described.

11. In a ball-winding machine, the combination of a pair of heads adapted to engage a ball between them, mechanism for rotating said heads in the same direction to wind up the ball, and other mechanism for moving the engaging face of one head relative to the other to turn the ball to bring different diameters thereof into the plane of winding.

12. In a ball-winding machine, in combination, a pair of heads facing each other and adapted to engage a ball between them, mechanism for rotating said heads in the same direction at the same speed, and mechanism for moving the engaging faces of said heads in opposite directions.

13. In a ball-winding machine, in combination, a pair of heads facing each other and adapted to engage a ball between them, mechanism for rotating said heads in the same direction, and other mechanism for shifting the engaging faces of said heads in two directions to turn the ball about two axes other than the axis of the rotating heads.

14. In a ball-winding machine, in combination, a pair of heads facing each other, mechanism for rotating the same, each head presenting opposite the other a pair of rolls, between which four rolls the ball is grasped, and mechanism for turning said rolls upon their axes during the rotation of the head, the two rolls in each head turning in the same direction, and each pair turning to move their opposed faces oppositely.

15. In a ball-winding machine, the combination of a pair of rotatable heads, a pair of rolls constituting the engaging face of each head, a pinion on each head, gearing connecting the same with rolls, and a stationary gear causing the individual rotation of said pinion when the head rotates.

16. In a ball-winding machine, the combination of a driving-shaft, a head secured thereto, a stationary gear, a pinion carried by the head adapted to mesh with said gear, a member carried by the head and adapted to engage the ball, and a connection between the same and said pinion whereby the rotation of the pinion moves such member.

17. In a ball-winding machine, a pair of heads facing each other and adapted to grasp a ball between them, mechanism for rotating said heads, and mechanism partly on a head and partly on a member with reference to which it rotates for shifting the engaging faces of such head during the rotation thereof.

Signed at Edinburgh, Scotland, this 19th day of April, 1904.

MARTIN McDAID. [L. S.]

Witnesses:

ROBERT F. SCOTT,

FREDERICK PIATT.