This invention relates to improvements in ball winding machines.

The main objects of this invention are:

1. To provide a ball winding machine which

5 is especially desirable for the winding of golf balls.

2. To provide a ball winding machine for winding golf balls which is mainly automatic in its operation and produces wound golf ball bodies

10 that are uniformly spherical.

3. To provide a ball winding machine in which the strands are very uniformly laid to produce a spherical ball.

4. To provide a ball winding machine which is of very large capacity.

5. To provide a ball winding machine having these advantages which is compact and comparatively simple in structure and requires very little manual attention other than the removing

20 of the wound ball and the placing of the core.

6. Objects relating to details and economies of the invention will appear from the description to follow. The invention is defined and pointed out in the claims.

25 A structure which is a preferred embodiment of the invention is illustrated in the accompanying drawings, in which:

Fig. 1 is a front elevation of a ball winding machine embodying the features of my invention.

Fig. 2 is an end elevation looking from the left

30 of Fig. 1.

Fig. 3 is an enlarged fragmentary view mainly in longitudinal section on line 3—3 of Fig. 4.

Fig. 4 is an enlarged detail view on line 4—4 of Fig. 3 illustrating the means for positioning the core, the support or positioning member being shown in full lines in one position and by dotted lines in another position.

Fig. 5 is an enlarged detail partially in section showing the relation of the parts during the winding operation with a partially wound ball.

Fig. 6 is an enlarged fragmentary front elevation of a somewhat modified form of my invention with the parts in stopped position or to the position to which the parts are actuated by the work when it has reached a predetermined position.

Fig. 7 is a fragmentary view on line 7—7 of Fig. 6.

Fig. 8 is an enlarged detail view partially in section on line 8—8 of Fig. 6 showing details of the driving means.

Fig. 9 is a fragmentary view partially in section showing details of the clutch operating mechanism.

Fig. 10 is a front elevation of one of the winding heads provided with a modified form or embodiment of winding rollers.

Fig. 11 is an enlarged detail view on line 11—11 of Fig. 10.

Fig. 12 is a fragmentary view showing the coacting relation of the pairs of winding rollers of the embodiments of Figs. 10 and 11.

Fig. 13 is a front elevation of a winding head provided with another form or embodiment of winding roller.

Fig. 14 is a fragmentary view mainly in section on line 14—14 of Fig. 13.

In the embodiment of my invention illustrated, the bed or table 1 is provided with suitable legs 2 supporting the operating parts at a convenient elevation or height for the operator. The bed 1 is provided with spaced brackets 3 carrying the rod-like rails 4 upon which the carriages 5 are mounted for reciprocatory movement to and from each other. These carriages are provided with grooved carrying wheels 6 arranged in opposed pairs, the pulleys of the pairs engaging opposite sides of the rails so that the carriages are firmly supported for reciprocatory movement. The rails project at each side of the brackets 3 and the pairs of wheels are arranged on opposite sides thereof thus providing a very firm support, at the same time permitting free vibratory movement.

The carriages are preferably formed as castings chambers at 7 to receive the cylindrical winding heads 8 and also chambers at 9 to receive the gears 10. These heads are rotatably supported in the carriages by means of tubular shafts 11, roller bearings 12 and 13 being provided at opposite sides of the gears 10.

The driving shaft 14 is supported in suitable roller bearings 15 on the table or bed in parallel relation to the shafts 11, the driving shaft being provided with gears 16 meshing with the gears 10 so that the winding heads are both driven from the shaft 14.

The winding heads are chambered to receive winding rollers and the driving gear trains therefor. The winding rollers 17 are arranged within the carriages in coating pairs, the shafts or spindles 18 being supported in suitable bearings in the winding heads. These rollers are spool-shaped or concavely curved and are provided with longitudinal slideways 19 opening at 20 into the faces of the winding rollers or into the barrel portions thereof. Slides 21 are arranged in these ways, the slides having knurled or serrated or otherwise suitably roughened faces 22 presented through the openings in the winding
rollers. The slides project from one end of the winding rollers, as clearly shown in Figs. 4 and 5, and have cammed ends 33 which successively engage the actuating cam 24 as the rollers rotate. These rollers are also provided with cam-engaging studs 25 which coast with the cam 26 on the spindles 18 so that as the rollers are rotated the slides are reciprocated in their ways in the roller tracks.

The rollers are provided with pinions 27 meshing with a pinion 28 of a suitable train of gears driven from the worm 29 on the shaft 30 disposed longitudinally through the tubular shaft 31. The shaft 30 is provided with a gear 31 meshing with the gear 32 on the driving shaft 14. With this arrangement, the winding heads and the winding rollers are simultaneously driven from the shaft 14.

The carriages are yieldingly urged toward each other by means of the weight 35 which is suspended from rollers 34 on the rockshaft 33. This rockshaft is connected by the arm 36 to one of the carriages, see Fig. 3, the other carriage having a lever 37 pivoted thereto at 38 and connected by the link 39 to the arm 36. With this arrangement of parts, the carriages are yieldingly urged toward each other.

The opposed pairs of winding rollers are adapted to receive a golf ball core indicated at 40, means for positioning the core being provided consisting of the rocker arm 41 having coacting spring fingers 42 and 43 disposed to receive the ball and to position it between the winding rollers. The arm is provided with a stop 44 which coacts with the ends of the segmental slot 45 to support the arm in ball positioning and in retracted position—see Fig. 4.

The weight indicated is made up of a plurality of segments as shown in Fig. 2 so that it may be varied as desired.

The machine is provided with a supporting spindle 47 adapted to receive the spool of rubber strands 48. The rubber strand is passed over rollers 49 and 50 and then through rollers 51, 52, the roller 51 being of substantial size and provided with a brake drum 53 with which the brake shoe 54 coacts. This brake shoe is urged against the brake drum by the spring 55. From the tension roller or drum 51, the rubber strand is passed over the pulley 56 and the latter being positioned to lead the strand designated 58 to the ball being wound designated 59—see Fig. 5.

To retract the carriages for the positioning of the core and for the removal of the completely wound ball, a foot actuated lever 60 is provided mounted on the rock-shaft 61 which is connected by an arm 62 to one of the carriages. The link 63 is provided with a foot-hold 64.

The machine is driven from a motor 65 connected by the belt 66 and suitable pulleys to the driving shaft, the motor shaft being provided with a pulley 68 while the driving shaft is provided with a pulley 65.

In Figs. 6 and 7, the carriage 5 is provided with rollers 69 and thrust rollers 692 engaging the supporting spindles 88 supported in brackets 3. It will be understood that as the ball increases in diameter the carriages are moved apart against the pull of the weight and when the predetermined diameter is reached, the lever 60 engages the tripping lever 70 which is pivoted at 71 releasing the pawl 70' which cooperates with the shifting lever 72. This shifting lever engages the combined clutch and brake member 73 which is adapted when in the position shown in Fig. 9 to engage the fixed brake disk 74, and when in actuated position to engage the clutch disk 75 on the pulley 88—see Figs. 8 and 9. The member 73 is urged to braking position by means of the spring 76. The member 73 is splined to the shaft 14. The clutch disk 75 is yieldingly supported by the coiled springs 77. The tappet 78 on the lever 60 is preferably adjustable so that actuation of the member 73 to release or disengage the clutch may be timed—that is, the machine may be adjusted so that it is automatically stopped when the ball being wound has reached a predetermined diameter.

The reciprocation of the slides 21 as the rollers rotate causes the axis of rotation of the ball to change—that is, it imparts a compound rotative movement to the ball, one movement however being relatively slight as compared to the other so that the strands are wound not only as to produce a spherical ball but also they are very uniformly laid with a result of density and resiliency throughout the ball.

In the modification shown in Figs. 10, 11 and 12, the pairs of winding rolls 79 and 80 are mounted and driven as described but in this embodiment the slides are omitted and the member 79 is provided with a plurality of cam-like projections 81 adjacent one end thereof, these cam-like projections extending into the faces of the coacting rollers and merging into the cylindrically curved surface thereof at approximately the center of the rollers. These cams also serve to shift the axis of rotation of the ball being wound and result in a uniform laying on of the strands. This embodiment has the advantage that previously described of very great simplicity and economy of manufacture and is further highly satisfactory in commercial practice, this being the embodiment which is now being used commercially.

In the embodiment shown in Figs. 13 and 14, the winding rollers 82 are formed of members 83 and 84 the tensioning roller 85 being formed of an inner member 83 being provided with inclined shoulders 85 while the outer member has a series of holes 86 constituting cages for the balls 87 which are supported on the shoulders 85, the holes at their outer ends being of less diameter than the ball they are to receive and retained with the parts are assembled, as shown in Fig. 14. These balls constitute projecting lugs which function to rotate or shift the ball so that its axis of rotation is changed to properly lay on the strands.

My improved ball winding machine is of very large capacity and results in a very uniform distribution of the strands—that is, they are laid on so as to produce well balanced spherical balls of uniform density. It will be understood that the tension at which the strand is wound is varied as may be desired.

I have illustrated and described certain very practical embodiments of my invention but have not attempted to illustrate or describe other embodiments or adaptations which I contemplate as it is believed that this embodiment will enable those skilled in the art to embody or adapt my improvements as may be desired.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a ball winding machine, the combination of oppositely disposed carriages mounted for reciprocation toward and from each other, facing
winding heads rotatably mounted on said carriages, concaved winding rollers mounted on said heads in opposed pairs with their axes transverse to the axis of the heads, certain of said winding rollers being provided with circumferentially disposed projections adjacent one and only one of the concaved surface thereof, said projections being adapted to engage a core supported by the rollers to shift the axis of rotation of the core during winding thereof, means for simultaneously rotating said heads and rollers, and means acting to yieldingly urge the carriages toward each other.

2. In a ball winding machine, the combination of oppositely disposed carriages mounted for reciprocation toward and from each other, facing winding heads rotatably mounted on said carriages, concaved winding rollers mounted on said heads in opposed pairs with their axes transverse to the axis of the heads, certain of said winding rollers being provided with projections protruding radially substantially from said adjacent ones only of the concaved surface thereof, said projections being adapted to engage a core supported by the rollers to shift the axis of rotation of the core during winding thereof, means for simultaneously rotating said heads and rollers, means acting to yieldingly urge the carriages toward each other, and means for simultaneously stopping the heads and the rollers when they are separated a predetermined amount by the increase in the diameter of the ball being wound.

3. In a ball winding machine, the combination of oppositely disposed carriages mounted for reciprocation toward and from each other, winding heads rotatably mounted on said carriages, spool-shaped concavely curved winding rollers journaled within said heads in opposed pairs, at least one winding roller of each pair being provided with a projection on its face protruding radially substantially from and adjacent one end only of the concaved surface thereof, said projection being adapted to engage a core supported by the rollers to shift the axis of rotation of the core during winding thereof, means for simultaneously rotating said heads and winding rollers and means acting to urge said carriages yieldingly toward each other.

4. In a ball winding machine, the combination of carriages mounted to reciprocate to and from each other, winding heads mounted on said carriages in opposed relation, concavely curved winding rollers mounted on said heads in opposed pairs, at least one of said winding rollers being provided with cam-like projections on its face adjacent one end only of the concaved surface thereof acting when a ball engages therewith to shift the rotating axis of the ball, and means for simultaneously rotating said heads and winding rollers.

5. In a ball winding machine, the combination of oppositely disposed carriages mounted for reciprocation toward and from each other, winding heads rotatably mounted on said carriages, spool-shaped winding rollers mounted on said heads in opposed pairs, at least one of said winding rollers being provided adjacent one end thereof with an annular series of balls mounted so that portions thereof project from the face of the roller providing a series of spherically curved lug-like projections, means for simultaneously rotating said heads in said winding rollers, means acting to urge said carriages yieldingly toward each other, and means for simultaneously stopping the rotation of the heads and the rollers when the carriages are separated to a predetermined extent when the predetermined diameter of the ball is reached.

6. In a ball winding machine, the combination of oppositely disposed carriages mounted for reciprocation toward and from each other, winding heads rotatably mounted on said carriages, spool-shaped winding rollers mounted on said heads in opposed pairs, at least one of said winding rollers being provided adjacent one end thereof with an annular series of balls mounted so that portions thereof project from the face of the roller providing a series of spherically curved lug-like projections, and means for simultaneously rotating said heads and said winding rollers.

7. In a ball winding machine, opposed rotatable winding heads, winding rollers rotatably mounted in said heads in opposed pairs, the surface of said winding rollers being spool-shaped, at least one winding roller of each pair being provided with projections adjacent one end only of the surface thereof, said projections being adapted to engage a core supported by said rollers to shift the axis of rotation of the core during winding thereof, and means for rotating said heads and winding rollers.

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