No. 833,335. PATENTED OCT. 16, 1906.

R. D. PERRY.

BALL WINDING MACHINE.

APPLICATION FILED FEB. 5, 1904.

5 SHEETS—SHEET 1.

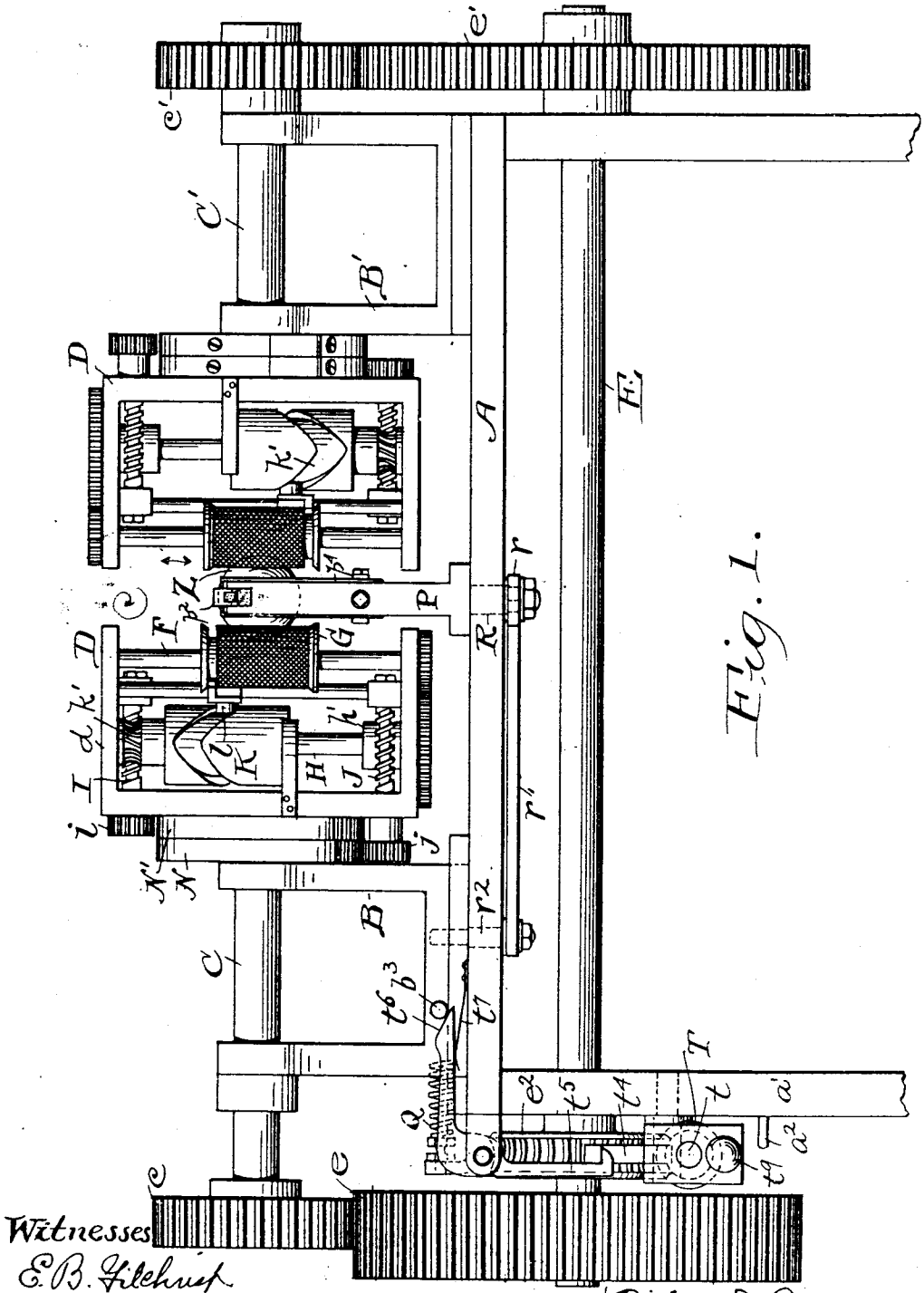

Fig. 1.

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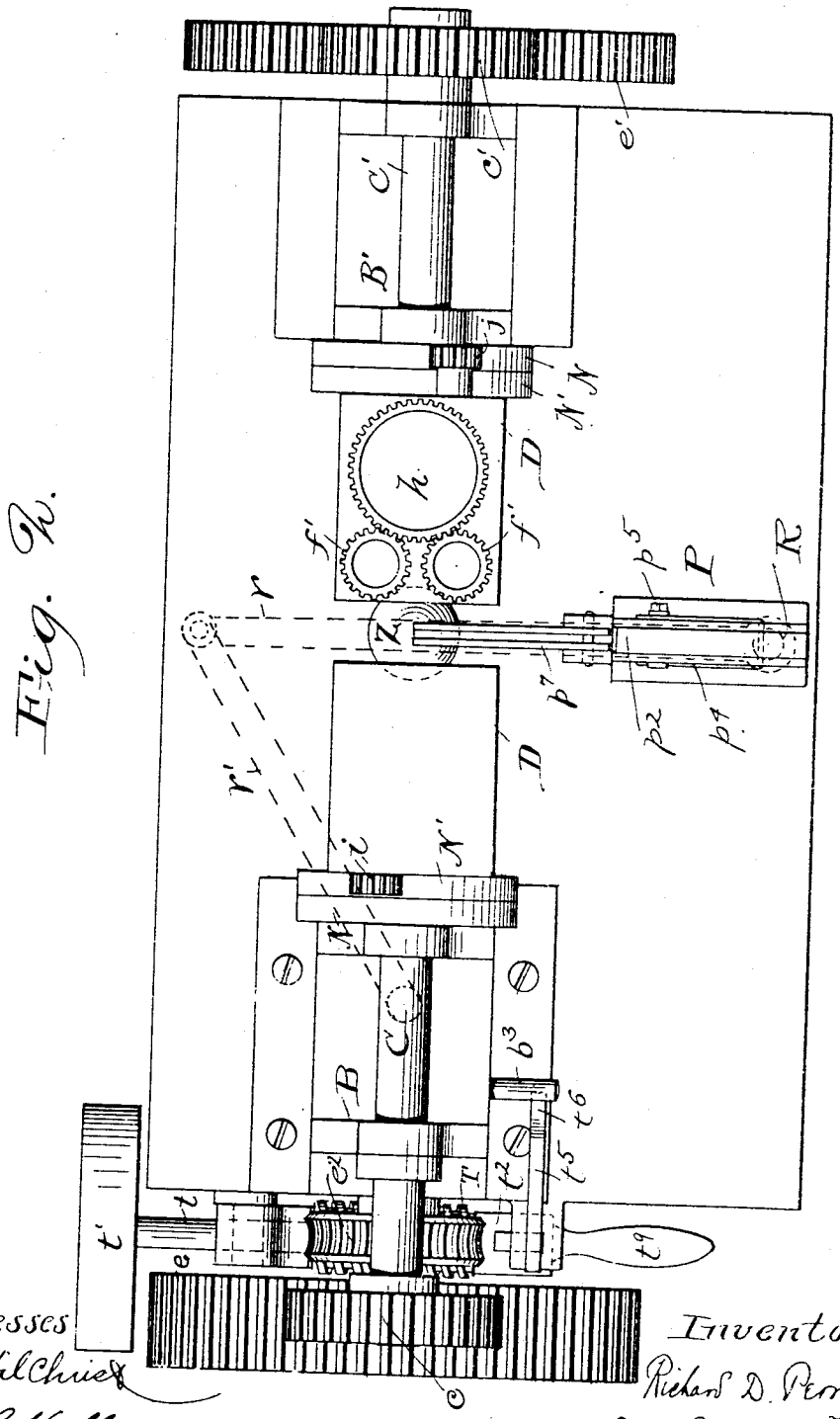
5 SHEETS—SHEET 2.

Fig. 2.



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5 SHEETS—SHEET 3.

Fig. 3.

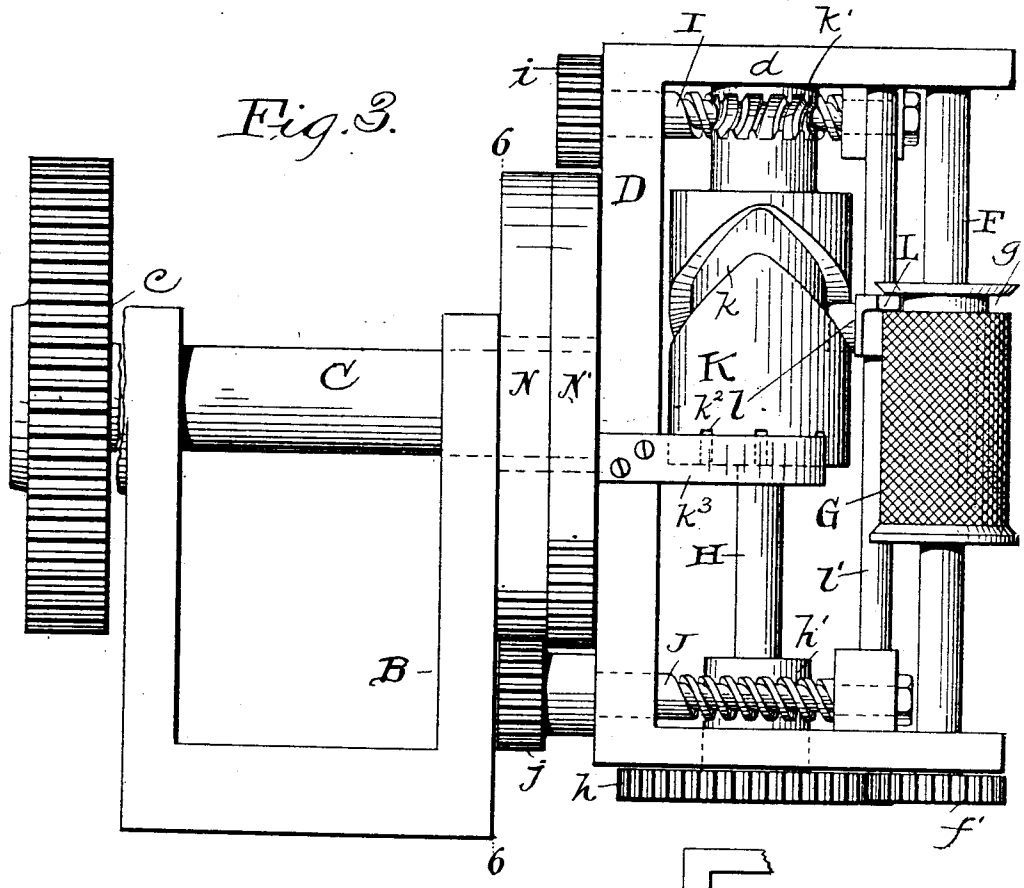
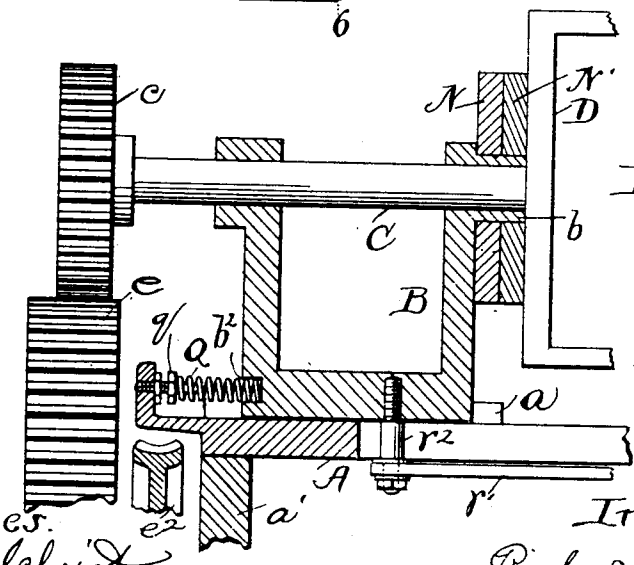


Fig. 4.



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5 SHEETS—SHEET 4.

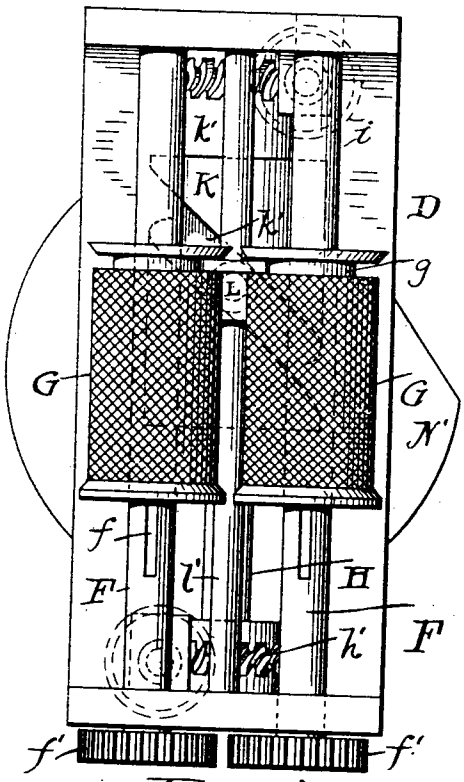

Fig. 5.

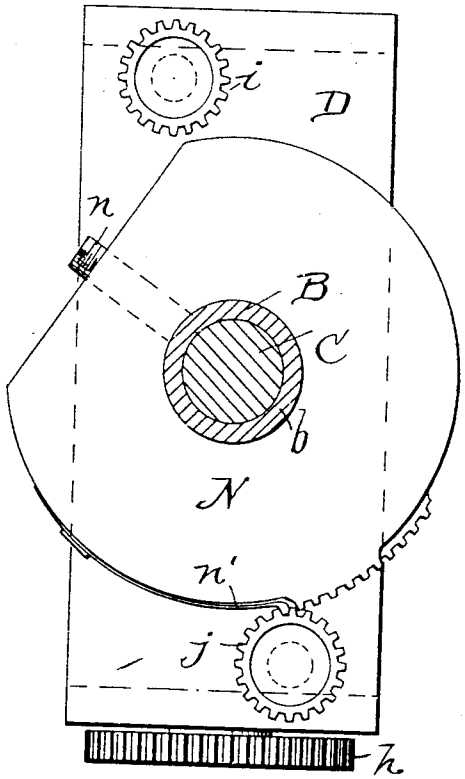

Fig. 6.

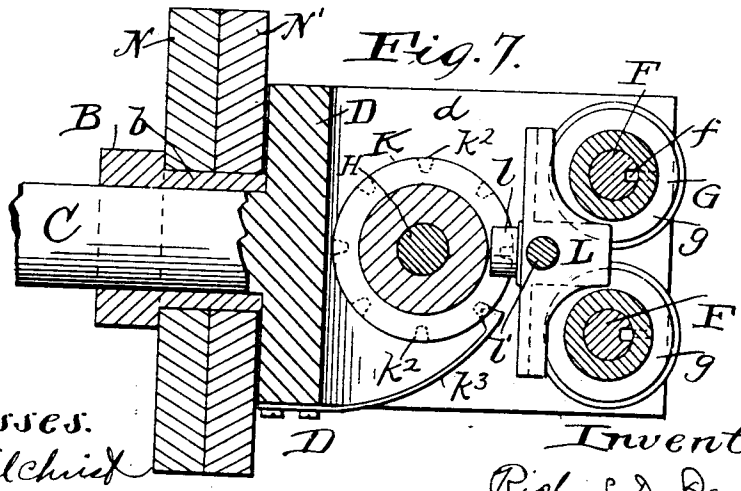

Fig. 7.

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5 SHEETS—SHEET 5.

Fig. 8.

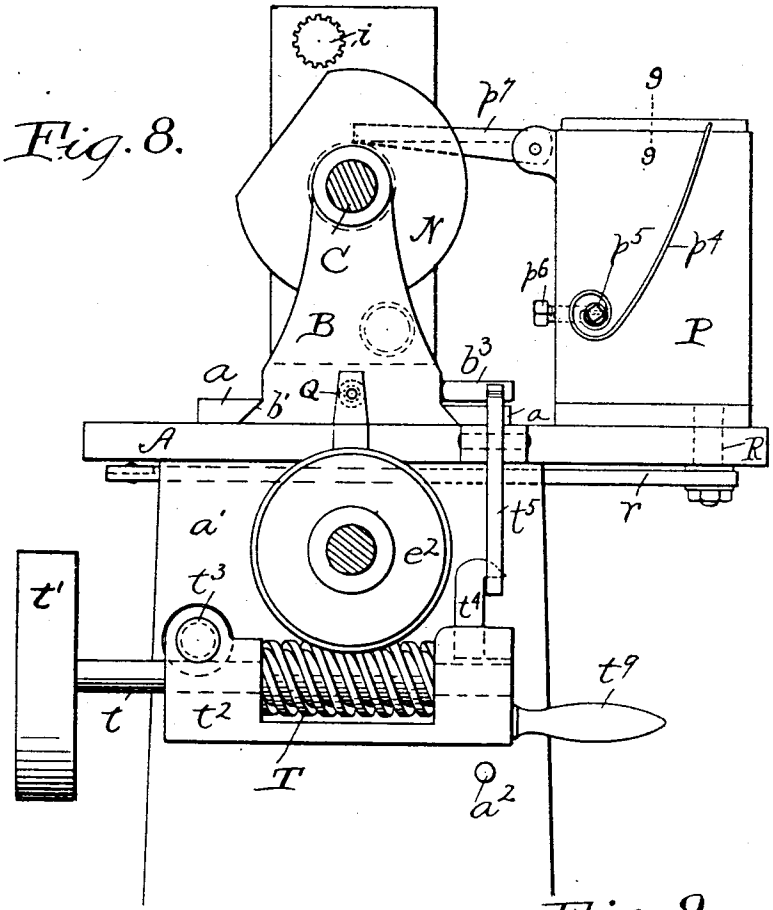


Fig. 10.

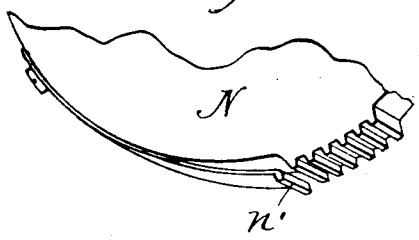
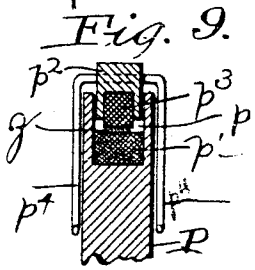


Fig. 9.



Witnesses.
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J. R. Hull.

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UNITED STATES PATENT OFFICE.

RICHARD D. PERRY, OF ELYRIA, OHIO.

BALL-WINDING MACHINE.

No. 833,335. Specification of Letters Patent. Patented Oct. 16, 1906.

Application filed February 5, 1904. Serial No. 192,085.

To all whom it may concern:

Be it known that I, RICHARD D. PERRY, a citizen of the United States, residing at Elyria, in the county of Lorain and State of Ohio, have invented a certain new and useful Improvement in Ball-Winding Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

The object of this invention is to provide in a simple and efficient form an automatic machine for winding balls. The machine, while being of use in winding various sorts of balls, has been designed especially for the winding of rubber thread or bands to make the interior of golf-balls.

The invention comprises, broadly, a pair of rotating heads turning in the same direction to give the ball a continuous movement to wind on the material and at the same time, there being means for oppositely moving the faces of those heads which engage the ball so as to turn it on another axis. This movement within the head is in two directions, so that the ball is turned about two axes other than the axis of rotation of the heads. The mechanism by which this is accomplished, as herein shown and hereinafter described and definitely set out in its essential features in the claims, is likewise included within my invention.

The drawings illustrate a very satisfactory embodiment of my invention.

Figure 1 is a side elevation, and Fig. 2 a plan, of the complete machine. Fig. 3 is a side elevation of one of the rotating heads. Fig. 4 is a vertical longitudinal section along the driving-shaft of this head. Fig. 5 is a face view of the head. Fig. 6 is an opposite view of the head, being a vertical cross-section on the line 6 6 of Fig. 3. Fig. 7 is a transverse cross-section of the head through its driving-shaft, the plane of the section being twisted to follow the groove in the shifting-cam. Fig. 8 is an end view of the machine looking from the left-hand end in Figs. 1 and 2. Fig. 9 is a detail in cross-section on the line 9 9 of Fig. 8. Fig. 10 is a detail, being a perspective view showing the spring-tooth on the stationary gears.

The same letters of reference designate the same part in each figure.

Referring to the parts by letters, A represents a suitably-supported bed-plate. On this plate are mounted a pair of standards B and B′. These standards carry alined shafts C C′, on the proximate ends of which are the rotating heads D D, which turn the ball. The shafts C C′ are driven in the same direction at the same speed by gears *c* and *c′* on the shafts which mesh with gears *e* and *e′* on the main driving-shaft E. This shaft E is rotated in any suitable manner, the means herein shown and hereinafter described being found very satisfactory.

The heads D, which cause the various rotations of the ball, are just alike, except that they are oppositely placed, and a description of one will of course do for both. The frame of each head is made in the form of a U-shaped plate, which is rigidly secured to the end of the corresponding shaft C or C′. Rotatably mounted in the two projecting arms *d* of the U-shaped plate are a pair of parallel shafts F. Slidable longitudinally on these are rolls G. These rolls have their exteriors suitably roughened or otherwise formed to sufficiently grasp the ball. They are splined to the shafts F by suitable keys taking into grooves *f* in these shafts, as shown in Figs. 5 and 7. Rigidly secured to the ends of the shafts F are gears *f′* of the same size, each of which meshes with a gear *h*, which is rotatably mounted on the frame member *d* by having its hub *h′* extend through that member. This hub *h′* is a worm-wheel, with which meshes a worm J, journaled in the frame and having on its free end a pinion *j*. Now if this pinion *j* be rotated the worm rotates the gear *h*, and this through the gears *f′* drives the rolls G each in the same direction of rotation. Rotatably mounted on a shaft H, which extends into the hub *h′* and at its other end bears in the other frame member *d*, is a sleeve K, having rigid with it a hub constituting a worm-wheel *k′*. With this worm-wheel meshes a worm I, on the free end of whose shaft is a pinion *i*. A continuous inclined cam-groove *k* is formed in the surface of the sleeve K, and into this groove takes a roller *l* on a yoke L, which slides on a rod *l′*, carried by the frame. This yoke extends into peripheral grooves *g* in the two rolls G. From this it results that if the pinion *i* is ro-

tated the cam-sleeve K is thereby rotated, and this drives the two rolls G longitudinally of their supporting-shafts F.

The ball being wound (indicated by Z) is held between the faces of the two rolls G on one head and the two rolls G on the other head, and the shafts C and C′ continuously turn this ball about the axial line of those shafts to wind on the material. Now to turn the ball during its winding to keep it perfectly spherical the two pairs of rolls G should be collectively shifted in opposite directions at the same speed to turn the ball about an axis at right angles to the axis of the shafts. As described, this shifting can be caused by the rotation of the pinions *i*. Likewise during the winding the ball should be turned about a third axis at right angles to the two mentioned, and this can be caused by rotating the rolls G, each pair of rolls collectively turning in the same direction to move their opposed faces oppositely, and this can be caused by rotating the pinions *j*. Now to rotate the pinions *i* and *j* while the heads are rotating I provide a pair of stationary gears N and N′, which are secured on hubs *b*, extending from the standards B and B′. These gears being stationary, the pinions *j* and *i*, meshing with them during the rotation of the heads, are driven thereby to turn and shift the rolls, as stated. The number of teeth on the gears N and N′ varies with the proportions of the worms and other gearing and with the kind of material of which the ball is wound. The heavier the material the more the ball should be cross-turned with each winding rotation. As shown in the drawings, there are but few teeth on the gears N and N′, so that they operate to turn the ball only at intervals during each winding rotation. These gears are independently adjustable about the hubs *b*, being clamped by suitable set-screws *n*. In the embodiment shown the pinions *i* and *j* are engaged alternately, thus giving the rolls G their rotation and longitudinally shifting at different times. This has been found satisfactory in practice.

The pinions *j* and *i* being sometimes out of mesh with the gears N and N′, it is desirable to provide means to prevent their jamming just as they come into mesh, and this I accomplish by mounting the first tooth of each gear on a spring *n*′, secured to the periphery of the gear. If the pinions do not stand just right for their teeth to mesh with the gear, the spring gives backward as a tooth of the pinion presses on the tooth carried by the spring, and in this movement the tooth of the pinion slides off the nose of the spring one way or the other, which, springing into a space between teeth on the pinion, brings it into just the right position for meshing with the rigid teeth on the stationary gear.

If the shifting mechanism in one head should be proportioned slightly differently from that of the other, one pair of rolls G might be shifted a little faster than the other, which differences accumulating might get them out of their opposite positions. To prevent this, I make in the periphery of each cam-sleeve K a series of V-shaped notches k^2, and I provide a leaf-spring k^3, having a V-shaped nose adapted to engage one side or the other of a notch k^2, giving the cam-sleeve a slight turn in one direction or the other, so that it always comes into a definite position, and thus any difference in rotation between the two cams is neutralized.

As heretofore stated, this machine is particularly well adapted to winding the interior of golf-balls which are made of continuous rubber thread or bands. This rubber must be kept under tension. At the same time it is very desirable not to have the rubber touched by the operator's hand, for the rubber absorbs the moisture of the hand, which gives it a tendency to deteriorate. Therefore I have provided a device for guiding rubber to the ball-core and keeping tension on the rubber. This guiding device consists of a block P, having in its upper edge a groove *p*, in which is seated a strip of felt *p*′. Loosely mounted in the groove *p* is a bar p^2, having a groove on its lower face, into which is set a strip of leather p^3. These two surfaces of felt and leather are drawn toward each other by a U-shaped spring p^4, which passes through the bar p^2 and is secured to a stud p^5, carried by the block P. This stud has a squared end to allow it to be turned and a set-screw p^6 secures it in place. The rubber, which is preferably in the form of a flat band *z*, passes between the felt and leather strips *p*′ and p^3 and is guided by a trough-shaped member p^7, hinged on a horizontal pivot and leading from the block P to the ball. This trough, as shown, rests at its end on the ball and the base of the trough comes to a thin edge in the vertical longitudinal plane through the center of the ball. The rubber band comes from a suitable spool or other supply (not shown) and is given just the desired tension by the spring p^4 and the surfaces of felt and leather and is guided to the ball without being touched by the hand. Practice has shown that coöperative felt and leather surfaces very efficiently hold and guide the rubber.

As the ball increases in size it is necessary for one or both of the heads D to give backward. I prefer to mount one head, as B′, stationary on the frame and have the entire movement confined to the other head B. This head B has along its lower edges beveled ribs *b*′, which take under coöperative stationary gibs *a*, carried by the bed-plate. A spring Q, seating in a recess b^2 in the stand-

ard B, presses the standard toward the ball, but allows it to give backward as the ball increases in size. This spring is adjustable by a nut q on a screw-threaded stud mounted in a bracket secured to the bed-plate.

Since the increase in diameter of the growing ball moves backward one head only, the center of the ball changes position. To therefore keep the guide p^7, leading directly to the medial plane of the ball, so as to always direct the material to a great circle thereof, I provide mechanism which shifts the guide p^7 correspondingly. This is accomplished by pivoting the block P on a short rock-shaft R, vertically journaled in the frame, to the lower end of which is secured beneath the frame the operating-arm r. A link r' connects this arm r with a pin r^2, depending from the movable standard B. Thus as the standard moves the rear end of the arm r is moved correspondingly, (the distance is so slight that the angularity of the pull of the link r' is immaterial,) and this swings the block P and the guide p^7. The arm r is of such a length that as the standard B moves the point of the guide p^7 will be continually kept over the center of the ball.

The gear e on the main shaft E is made extra wide, so that the pinion c may travel crosswise of it and remain in mesh with it as the head B moves backward.

In order to automatically stop the machine when the ball reaches the proper size, I provide the following mechanism: On the shaft E is a worm-wheel e^2, which drives it. This worm-wheel meshes with a worm T, the shaft t of which extends to the rear and has rigidly mounted on it the main driving-pulley t'. The shaft of this worm is mounted in a block t^2, which is pivoted at t^3 to one of the supports a' of the bed-plate. Near the forward end of this block t^2 is an upwardly-extending hook t^4, which is adapted to engage the hooked lower end of a bell-crank t^5, pivoted to the bed-plate A. When the bell-crank and hook are in engagement, the worm is held in engagement with the worm-wheel, and the rotation of the belt-pulley t' drives the shaft E and through it the rotating heads. When the ball reaches the proper size, however, the head B has been shoved backward such distance that a pin b^3, projecting from that head, engages the beveled end t^6 of the bell-crank, forcing it downward against the force of a spring t^7. This swings outward the hooked lower end of the bell-crank and releases the hook t^4, whereupon the block t^2 drops, releasing the worm T from the worm-wheel e^2 and stopping the machine. This dropping movement of the block t^2 is small enough so that it does not interfere with the belt on the pulley t'. A suitable stop a^2, projecting from the upright a', limits the downward movement of the block, and a handle t^9 furnishes convenient means for raising the block when it is desired to restart the machine.

In starting the machine a suitable core is used. The rubber band to be wound upon it is passed through the tension device and its end wound a few times about the core, which is then placed between the rolls G, the shiftable head being slightly shoved back by hand to allow the placing of the core. When the ball has been completed, the rubber band is cut off and the free end thereof tucked under one of the preceding wraps, which prevents the ball unwinding.

Having described my invention, I claim—

1. 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, mechanism for shifting said rolls longitudinally during the rotation, the two rolls in each head being shifted in the same direction and the pairs being shifted oppositely.

2. 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 heads, the two rolls in each head turning in the same direction but each pair turning their opposed faces oppositely, mechanism for shifting said rolls longitudinally during the rotation, the two rolls in each head being shifted in the same direction, but the pairs being shifted oppositely.

3. In a ball-winding machine, the combination of a rotatable head, a cam carried therein, a pinion, gearing connecting the same with said cam, a stationary gear for causing the driving of the pinion when the head rotates, and a member adapted to engage the ball and connected with said cam to be shifted thereby.

4. In a ball-winding machine, a rotatable head, a pair of rolls providing the surface to engage the ball, a yoke connected with said rolls for shifting them together, a cam adapted to move said yoke, and mechanism for rotating the rolls about their own axes and moving the cam when the head rotates.

5. In a ball-winding machine, the combination of a rotatable head, a pair of shafts carried therein, rolls splined to said shafts, a yoke for shifting said rolls, a grooved cam engaged by said yoke, and mechanism for rotating the cam and for rotating said shafts during the rotation of the head.

6. In a ball-winding machine, in combination, a head, a pair of parallel shafts carried thereby, rolls splined on said shafts, a cam carried by the head and rotatable on an axis

parallel with said shafts and having a longitudinally-inclined groove in its periphery, a yoke engaging said groove and said rolls whereby the rotation of the cam shifts the rolls, mechanism for rotating the cam, mechanism for rotating said shafts, and mechanism for rotating the head.

7. In a ball-winding machine, in combination, a rotatable head, a pair of shafts carried thereby, rolls splined on said shafts, a cam carried by the head, a member connecting said cam and said rolls whereby the rotating of the cam shifts the rolls, a pair of pinions, gearing connecting one of them with said cam and the other with said shafts, and mechanism engaging said pinions as the head rotates to cause the local rotation of the cam and shafts.

8. In a ball-winding machine, in combination, a driving-shaft, a head thereon, a stationary gear concentric with the shaft, a pinion carried by the head adapted to mesh with said gear, a worm connected with said pinion, worm-wheel connected with said worm, a movable member adapted to engage the ball, and an operative connection between the same and said worm.

9. In a ball-winding machine, in combination, a driving-shaft, a head secured thereto, a pair of worms journaled in said head, worm-wheels engaging said worms, a cam secured to one worm-wheel, a gear secured to the other worm-wheel, a pair of shafts, pinions thereon meshing with said gear, rolls splined on said shafts, a yoke connecting said rolls with said cam, and mechanism for driving said worms during the rotation of the head.

10. In a ball-winding machine, the combination of a pair of oppositely-facing heads, means carried by each head for grasping the ball, a cam on each head adapted to shift the said means, said cams being oppositely positioned in the two heads, means for rotating the two heads in unison, and springs acting on said cams and adapted to preserve their proper interrelation.

11. In a ball-winding machine, the combination of a pair of heads facing each other, shafts in axial alinement with each other for driving the same, a main shaft geared to each of the shafts first mentioned to drive them in the same direction, one of said heads being movable toward and from the other, means for driving said main shaft, and means operated by the movement of said movable head to throw out such driving means.

12. In a ball-winding machine, the combination of a pair of oppositely-facing heads, shafts for rotating the same to wind up the ball, standards in which said shafts are journaled, one of said standards being stationary and the other movable, a main shaft having two gears thereon, gears on the shafts first mentioned meshing with the gears on the main shaft, one of the gears connecting the main shaft with the shaft in the movable standard being of wider face than the other of said gears to allow constant intermeshing notwithstanding the movement of said standard.

13. In a ball-winding machine, in combination, a rotatable head, a movable member thereon for engaging the ball, a pinion carried by the head for moving such member, and a stationary gear, whose teeth are interrupted, adapted to be periodically engaged by said pinion.

14. In a ball-winding machine, in combination, a rotatable head, a movable member thereon for engaging the ball, a pinion carried by the head for moving such member, a stationary gear whose teeth are interrupted for periodically engaging such pinion, and a spring carrying the first tooth of said interrupted gear.

15. In a ball-winding machine, in combination, a rotatable head, a movable member thereon for engaging the ball, a pinion carried by the head for moving such member, a stationary gear whose teeth are interrupted for periodically engaging such pinion, and a leaf-spring secured to the periphery of said interrupted gear and carrying at its free end a rib acting as a tooth of the gear.

16. In a ball-winding machine, the combination of a pair of heads adapted to grasp the ball between them, means for rotating said heads in the same direction, a tension device for tensioning the material being wound, means for allowing one of said heads to give backward as the ball grows, and means for moving the tension device accordingly to constantly feed the material to a great circle of the ball.

17. In a ball-winding machine, the combination of a pair of rotatable heads facing each other, one of said heads being allowed to give backward as the ball grows, a movable tension device, and an operating connection between the same and the head which gives backward.

18. In a ball-winding machine, the combination of a pair of rotating heads facing each other and adapted to grasp a ball between them, a pivoted tension device, a pivoted guide adapted to rest at its free end on the ball for directing the material to the ball, and means for swinging said tension device on its pivot to constantly feed the material to great circles of the ball.

19. In a ball-winding machine, in combination, means for rotating the ball, a tension device comprising a block and a bar carrying on their opposed faces frictional material, a spring bearing on the bar, a stud carried by the block to which said spring is secured, and means for clamping said stud in various adjusted positions.

20. In a ball-winding machine, in combi-

nation, means for rotating the ball, tension members for the material to be fed to the ball, a pivoted trough leading from the tension members to the ball, and means for moving said trough laterally as the ball grows, the trough also swinging on its pivot in a direction transverse to such movement.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

RICHARD D. PERRY.

Witnesses:
ALBERT H. BATES,
J. B. HULL.