A. G. BREWER & E. H. HAWES.

BALL WINDING AND ROLLING MACHINE.

APPLICATION FILED NOV. 3, 1910.

999,482.

Patented Aug. 1, 1911.

4 SHEETS—SHEET 1.

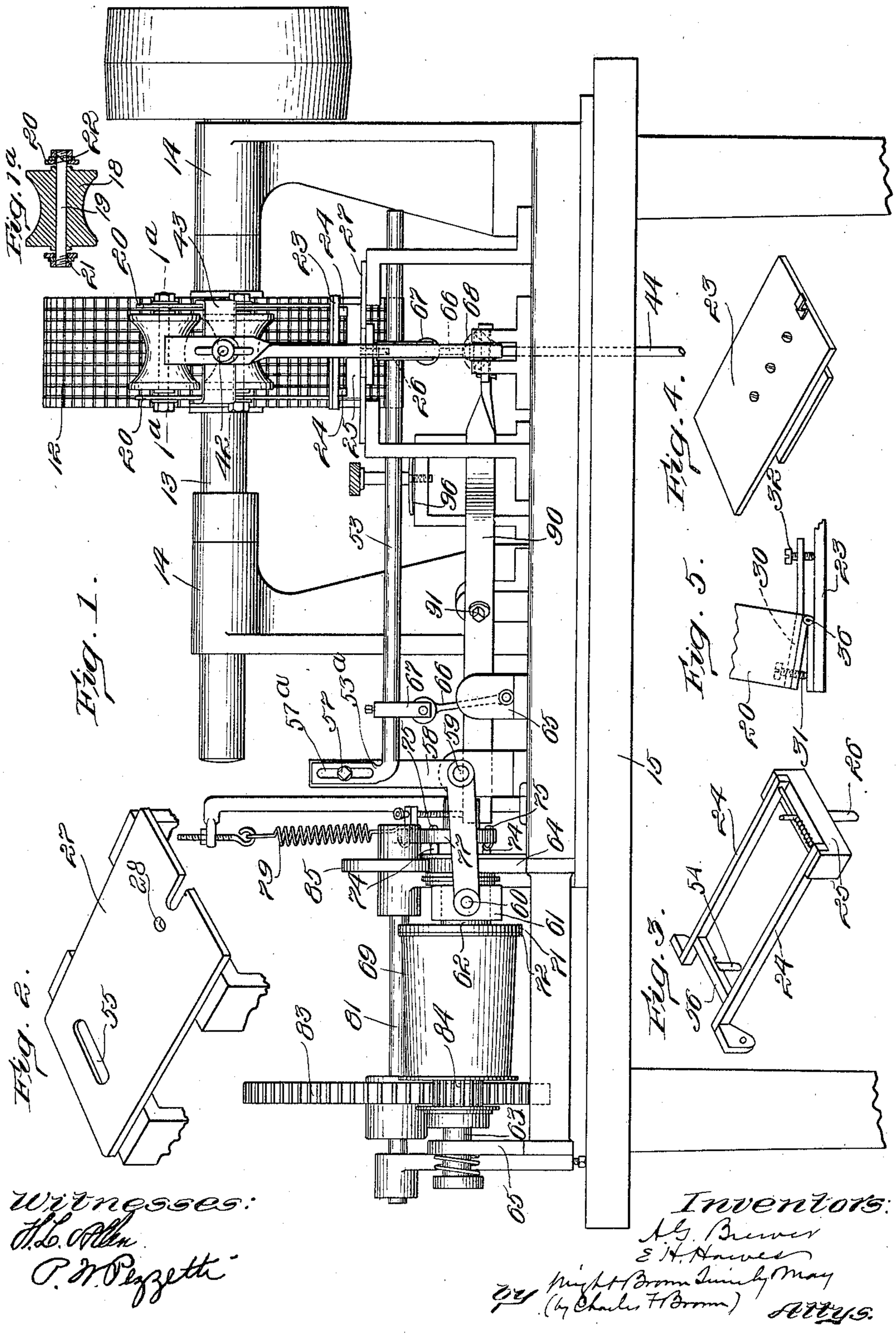

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

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4 SHEETS—SHEET 2.

Fig. 6.

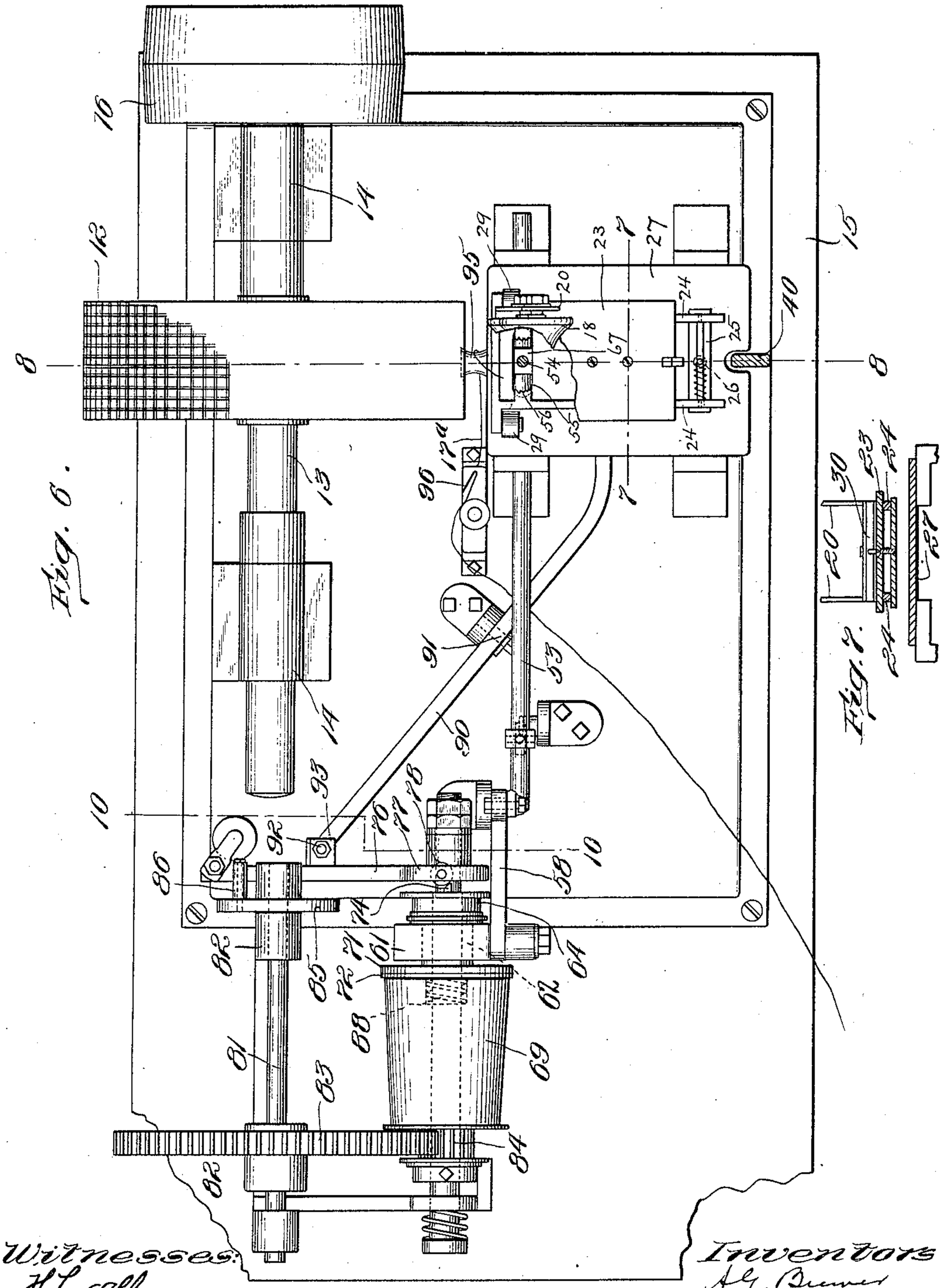

Fig. 7.

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4 SHEETS—SHEET 3.

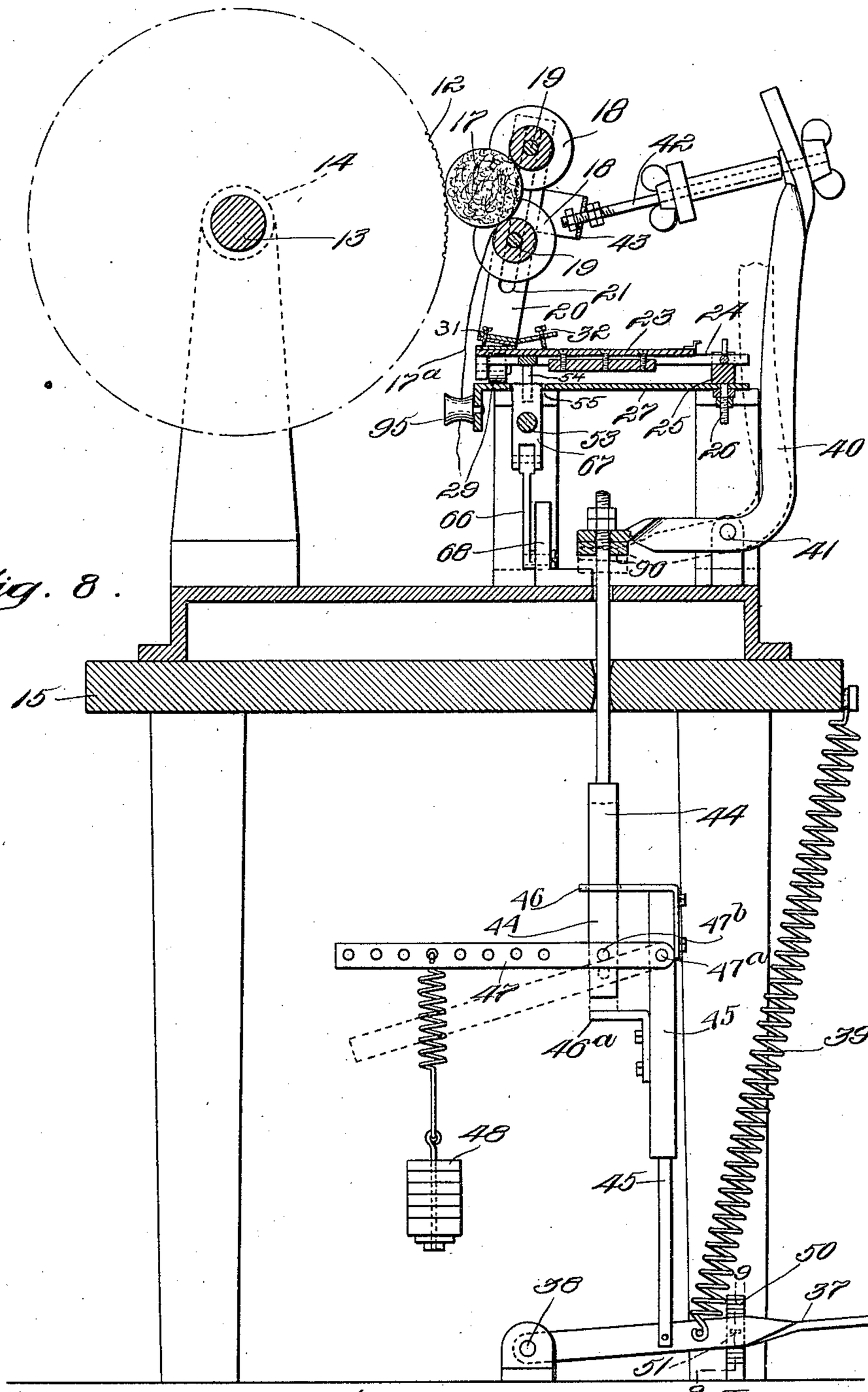

Fig. 8.

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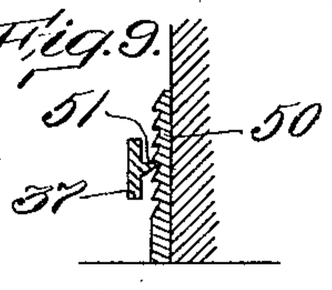
Fig. 9.



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4 SHEETS—SHEET 4.

Fig. 11.

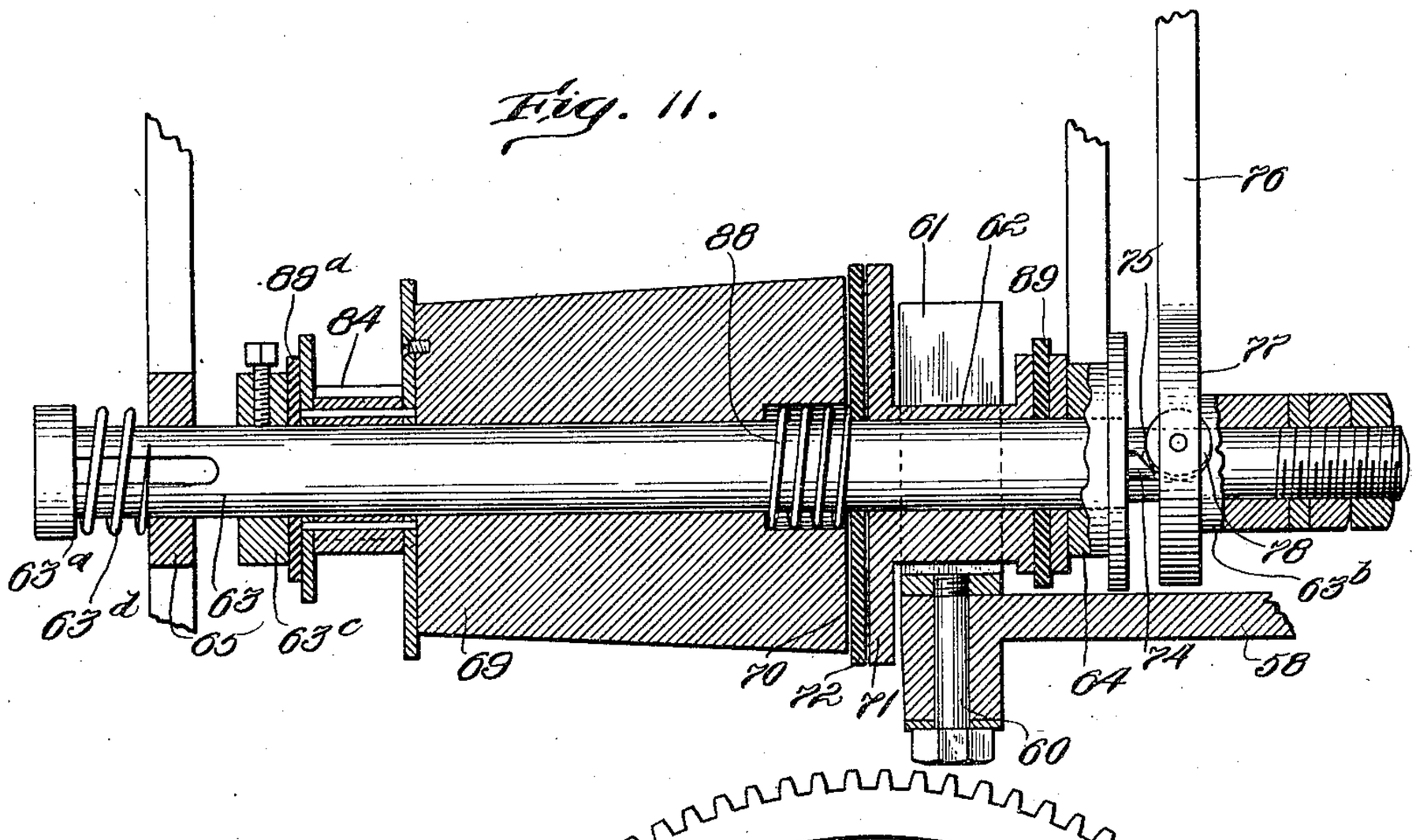

Fig. 10.

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UNITED STATES PATENT OFFICE.

ALBERT G. BREWER AND EDWARD H. HAWES, OF NATICK, MASSACHUSETTS, ASSIGNORS TO H. HARWOOD AND SONS, OF NATICK, MASSACHUSETTS, A FIRM.

BALL WINDING AND ROLLING MACHINE.

999,482. Specification of Letters Patent. Patented Aug. 1, 1911.

Application filed November 3, 1910. Serial No. 590,459.

To all whom it may concern:

Be it known that we, ALBERT G. BREWER and EDWARD H. HAWES, of Natick, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Ball Winding and Rolling Machines, of which the following is a specification.

This invention relates to machines for forming playing balls, and particularly base balls, by winding a continuous yarn or string to form a gradually increasing spherical body, a cup being employed in which the ball of yarn is formed by the rotation of the incipient ball or core by contact therewith of a winding wheel having a roughened periphery opposed to the cup, and so arranged relatively to the cup that as the ball increases in size, it recedes gradually from the axis of the winding wheel, means being employed to impart a lateral movement to the cup as the winding action progresses.

The invention is embodied in a machine which in some respects resembles the machine set forth in Letters Patent of the United States, No. 923,762 dated June 1, 1909, and is in other respects an improvement on the machine shown in said patent.

One object of the present invention is to provide a cup which permits the rotation of the ball by the winding wheel without frictional resistance, so that less power is required to operate the machine, and a relatively smooth surface is permitted on the winding wheel, enabling the ball to be smoothly wound.

Another object of the invention is to enable the transverse movement of the cup across the periphery of the winding wheel to be automatically interrupted at intervals for the purpose of changing the direction in which the convolutions of the yarn are wound.

To the above and other related ends the invention consists in the improvements which we will now proceed to describe and claim.

Of the accompanying drawings which form a part of this specification,—Figure 1 represents a front elevation of a ball-winding machine embodying our invention; Fig. 1ª represents a section on line 1ª—1ª of Fig. 1; Figs. 2, 3, and 4, represent fragmentary perspective views showing parts of the mechanism hereinafter referred to; Fig. 5 represents a fragmentary elevation showing the means for adjusting the ball-supporting standards hereinafter referred to; Fig. 6 represents a top plan view of the machine, parts being broken away; Fig. 7 represents a section on line 7—7 of Fig. 6; Fig. 8 represents a section on line 8—8 of Fig. 6; Fig. 9 represents a section on line 9—9 of Fig. 8; Fig. 10 represents a section on line 10—10 of Fig. 6; and Fig. 11 represents a section on line 11—11 of Fig. 10.

Similar reference characters indicate the same or similar parts in all the figures.

In the drawings, 12 represents a winding wheel, the shaft 13 of which is journaled in bearings 14 on a supporting frame or table 15, and is provided with a pulley 16 whereby it may be rotated, the wheel being affixed to the shaft and rotated thereby. The periphery of the wheel is slightly corrugated preferably by milling it or cutting shallow intersecting grooves therein, as indicated by Figs. 1 and 6.

The core or nucleus 17 of a ball is held against the periphery of the winding wheel by means of a cup which is adapted to support the ball in contact with the wheel and is movable toward and from the wheel to accommodate the varying sizes of the ball, and is movable crosswise of the periphery of the winding wheel, or in a direction parallel with its axis to cause a considerable variation in the direction in which the convolutions of the yarn are wound, and a proper distribution of said convolutions to give the ball the desired spherical shape. In the above-mentioned Letters Patent the cup is composed of a solid block or body having a semi-spherical recess which receives the ball, the ball when rotated by contact with the winding wheel being obliged to slip in contact with the non-rotating surface of the cup, so that there is considerable frictional resistance to the rotation of the ball. To obviate this, we have provided an anti-frictional cup composed of a plurality of longitudinally concave rolls 18, preferably two in number, so arranged relatively to the periphery of the winding wheel that their concave peripheries collectively form a cup adapted to engage the ball and hold it in rolling contact with the winding wheel. The rolls 18 are mounted to rotate loosely on axle rods 19 (Fig. 1ª) which are adjustably secured to standards 20 having longitudinal

slots 21 in which the axle rods are adjustable to vary the distance between the rolls and adapt them to the different sizes of balls. The axle rods 19 may be secured at any position to which they may be adjusted by means of nuts 22 engaged with threaded end portions of the rods and bearing on the outer sides of the standards 20.

The standards 20 are supported by a slide 23 which is movable toward and from the winding wheel so that the cup may be adjusted toward the winding wheel at the commencement of the winding operation to hold a relatively small ball or core against the wheel, and may recede from the wheel as the diameter of the ball increases. The cup is movable crosswise of the periphery of the winding wheel to cause the convolutions of yarn to assume different angles during the winding operation and thus effect a gradual spherical enlargement of the ball, the cup and slide being reciprocated in a direction substantially parallel with the axis of the winding wheel. The slide 23 is reciprocated by a guide frame comprising parallel guides 24, 24, (Fig. 3) extending substantially at right angles with the axis of the winding wheel, and a crossbar 25 connected by a pivot bolt 26 with a fixed bed or support 27 mounted on the frame of the machine, the bolt 26 entering an orifice 28 (Fig. 2) in said bed. The outer end portion of the guide frame is provided with rolls 29 which run upon the support 27. The guide frame is oscillated by mechanism hereinafter described, its center of oscillation being the bolt 26. This oscillating movement of the guide frame and the rectilinear movement of the slide 23 thereon, cause the ball 17 to reciprocate crosswise of the periphery of the winding wheel, the ball being maintained in constant contact with the wheel.

The standards 20 are mounted on a base piece 30 (Figs. 4 and 5) which is hinged at 36 to the slide 23 and is adapted to be adjusted to impart a swinging adjustment to the standards 20, thus moving their upper end portions either forward or backward so that the standards may be held at various inclinations or in a substantially vertical position, the base piece being provided with front bearing screws 31 and rear bearing screws 32 located at opposite sides of the hinge axis 36. Said screws are adapted to support the standards in any position to which they may be moved by reason of their hinged connection with the slide.

In commencing the winding operation when a relatively small ball or core is interposed between the winding wheel and the cup, the standards 20 are adjusted to a backwardly inclined position. As the size of the ball increases, the standards are swung forward to or toward a vertical position. The cup is yieldingly pressed at all times toward the winding wheel by means hereinafter described, and is adapted at all times to yield backwardly to accommodate the increasing diameter of the ball.

We prefer to employ a series of machines for winding a complete ball, the adjustment of the standards 20 differing in each machine. In the first machine, the standards are backwardly inclined from the winding wheel and the machine is operated until the ball attains a predetermined diameter, when it is removed and placed in another machine in which the standards 20 are swung forward toward the winding wheel from the position occupied by the standards of the first machine. In this way we are able to make a complete ball without loss of time in adjusting the standards to the different positions required in making a complete ball. It is obvious that an entire ball may be made by one machine, suitable adjustments being made from time to time as the size of the ball increases.

37 represents a treadle pivoted at 38 to a fixed support and normally raised by a spring 39. The treadle is connected through the intermediate mechanism hereinafter described with the cup, the arrangement being such that, when the treadle is depressed, the cup is forced forward toward the winding wheel, and when the treadle is released, the spring 39, by raising the treadle, moves the cup away from the winding wheel. The said connecting mechanism includes a bell crank lever 40 pivoted at 41 to a fixed support, a connecting rod 42, connecting one arm of the lever 40 with the yoke 43 attached to the standards 20, and a flexible connection between the other arm of the lever 40 and the treadle. Said connection comprises an upper connecting rod member 44 engaged with the lower arm of the lever 40, and a lower connecting rod member 45 engaged with the treadle 37, and provided with a slotted ear or guide 46 in which the member 44 is movable, and with a bracket or stop 46^a adapted to support the lower end of the member 44.

47 represents a lever pivoted at 47^a to the member 45 and at 47^b to the member 44, said lever being provided with an adjustable weight 48. When the treadle is depressed to move the cup forward, the weight 48 and lever 47 hold the member 44 depressed upon the stop 46^a, as shown by dotted lines in Fig. 8, until the cup bears on the ball and the ball bears on the winding wheel, the members 44 and 45 acting as a continuous connecting rod to move the bell crank lever 40 in the direction required to force the cup toward the winding wheel. When the ball is under pressure between the winding wheel and cup, the cup yields backwardly, the member 44 rising from the

bracket 46[a] in the guide 46 so that the weighted lever 47 exerts a constant yielding pressure on the cup tending to force it toward the winding wheel. When the winding operation is started, the treadle is locked by a ratchet bar 50 and a tooth 51 on the treadle, adapted to engage the teeth of said ratchet, as shown by Figs. 8 and 9, the treadle and the member 45 being held against upward movement by the conjoint action of the ratchet bar and the spring 39 which holds the treadle tooth in engagement with the ratchet bar. As the size of the ball increases, the cup is forced backwardly, the connecting member 44 yielding in an upward direction by reason of its flexible connection with the member 45. At the same time, the weight 48, by yieldingly opposing upward movement of the member 44, maintains a constant yielding pressure on the lever 40 tending to oppose backward movement of the cup, and insuring a constant compression of the ball between the cup and the winding wheel, regardless of the position to which the cup was forced by the depression of the treadle.

The guide frame supporting the cup-carrying slide 23, is oscillated by mechanism including a reciprocating rod 53, having an upwardly projecting stub 67 which extends through a slot 55 (Fig. 2) in the table 27, and receives a pin 54 on a crossbar 56 (Fig. 3) forming a part of the guide frame. Said rod has a bent end which is pivoted at 57 (Fig. 1) to one arm of a bell crank lever 58 which is fulcrumed at 59, and has its other arm pivoted at 60 to a forked head 61. The arms of said head bear on opposite portions of the periphery of an eccentric 62 (Fig. 10) which is mounted to rotate on a shaft 63 supported by fixed standards 64, 65, the rotation of said eccentric imparting an oscillating motion to the lever 58 which in turn reciprocates the rod 53. Said rod is preferably supported by swinging links 66 (Fig. 1) pivoted to ears 68 on the supporting frame. The length of the stroke or reciprocating movement of the cup may be varied as the size of the ball increases by adjusting the pivot 57 in two coinciding slots 57[a] formed respectively in the bent end portion 53[a] of the rod 53, and in the bell crank lever 58. When the ball is relatively small, the pivot 57 should be correspondingly near the fulcrum 59 and should be adjusted outwardly from said fulcrum from time to time as the size of the ball increases. The eccentric (hereinafter termed the driven member) is rotatable, through a clutch hereinafter described, by a driving member which is a pulley 69 adapted to be rotated by a belt (not shown), the pulley having a tapering periphery, so that it may be rotated at different speeds by adjusting the belt laterally. One end of the pulley 69 constitutes a clutch part 70 (Fig. 11) which coöperates with a complemental clutch part 71 formed by one side of a flange rigidly secured to the eccentric 62. A frictional disk 72, preferably of leather, is interposed between the clutch parts 70 and 71 and may be considered a portion or side of one of said parts, the arrangement being such that when the part 70 is pressed toward the part 71, a frictional engagement is set up between the clutch parts. The pulley 69, and shaft 63 are movable longitudinally to cause the engagement and disengagement of the clutch parts. The shaft is movable longitudinally in the standards 64 and 65 and is provided at one end with a shoulder 63[a] and at the opposite end with a shoulder 63[b], each affixed to the shaft. A collar 63[c] affixed by a set screw to the shaft 63 causes the pulley 69 to move with the shaft toward the clutch part 71 when the shaft is moved endwise for that purpose, as hereinafter described. A spring 63[d] interposed between the standard 65 and shoulder 63[a] is adapted to move the shaft endwise in the direction required to disengage the clutch parts. The clutch parts are normally held in engagement with each other by the means next described, said means having provisions for automatically permitting the separation of the clutch parts at regular intervals and thus causing a temporary cessation of the reciprocating movement of the ball winding cup to change the direction of winding the convolutions of yarn on the ball, the movement of the cup being automatically resumed after each cessation. The standard 64 is provided with studs 74 which project toward the collar 63[b], and have inclined faces 75 (Fig. 11) at their outer ends.

76 represents a clutch-controlling lever having a hub 77 which is mounted to turn on the shaft 63 between the collar 63[b] and the studs 74 and is provided with projections 78, preferably antifrictional rolls, journaled in the hub, and adapted to be brought, by a partial rotation of the hub, to a bearing on the inclined faces 75, the studs 74, which are fixed, being thus caused to force the hub 77 laterally against the collar 63[b], and thus move the shaft 63 and pulley 69 endwise toward the eccentric 62, thereby engaging the clutch parts and causing the rotation of the eccentric with the pulley. The lever 76 is normally held by a spring 79 (Fig. 10) in position to cause the engagement of the clutch parts in the manner above described, the lever 76 being held by the spring against a stop 80.

81 represents a shaft which is journaled in fixed bearings 82 and is provided with a relatively large gear 83 meshing with a relatively small gear 84 affixed to the pulley 69. The shaft 81 is provided with a face plate 85 on which is an eccentric pin 86 which is

revolved in a circular path by the rotation of the shaft 81, and is arranged to bear on the lever 76 and depresses the lever 76 from the position shown in Fig. 10, thus removing the projections 78 from the studs 74 and permitting the separation of the clutch parts 70 and 71. When the pin 86 releases the lever 76, the spring 79 restores said lever to its clutch-engaging position. The duration of the displacement of the lever 76 by the pin 86 may be varied by inserting said pin in either of a plurality of holes 87 (Fig. 10) formed in the face plate 85 at different distances from its center. The proportions of the gears 83 and 84 are such that a relatively slow rotation is imparted to the shaft 81. The lever-hub 77 is held in its clutch-engaging position by the spring 79 during a part of each complete rotation of the shaft 81, and is displaced from said position by the pin 86 during the remaining part of said rotation, the spring 63^d then acting to separate the clutch parts.

To prevent wear of adjacent surfaces of the eccentric 62 and the standard 64, we interpose an antifrictional washer 89 (Fig. 11) between said parts. 89^a represents a similar washer interposed between the gear 84 and the collar 63^c.

88 represents a spring adapted to separate the disk 72 from the end of the pulley when the clutch parts are separated.

It will now be seen that when the lever 76 is in its clutch-engaging position (shown by full lines in Fig. 10) the ball winding cup is continuously reciprocated, and that when the said lever is displaced (as shown by dotted lines in Fig. 10) the reciprocating movement of the cup ceases. While the cup is reciprocated the convolutions of yarn are wound upon it in directions inclined to the axis of rotation, and when the rotation ceases, the convolutions are wound at right angles with said axis, provision being thus made for distributing the convolutions so that a spherical increase in the size of the ball is automatically insured.

For the purpose of automatically stopping the reciprocating movement of the cup when the treadle 37 is released to permit its spring 39 to retract the slide 33 and the ball-winding cup from the winding wheel and permit the removal of the ball, we provide a lever 90 which is fulcrumed at 91 and is connected at one end by a rod 92 (Fig. 10) with an ear 93 on the lever 76, its other end being engaged with the connecting member 44, as shown in Fig. 8. The arrangement of the lever 90 is such that when the treadle 37 is raised by its spring 39, the end of the lever 90 connected with the member 44 is also raised, and its opposite end connected with the lever 76 is depressed, thus moving the lever to the position shown by dotted lines in Fig. 10, the spring 39 being of greater strength than the spring 79. The yarn 17^a which forms the ball, is guided to the cup by a pulley 95, a tension device 96 being provided between the pulley 95 and the source of yarn supply.

We claim,—

1. A ball-winding machine comprising a winding wheel having a frictional periphery, and an antifrictional cup movable relatively to the wheel and composed of a plurality of concave rolls the axes of which are substantially parallel with the axis of the winding wheel.

2. A ball-winding machine comprising a winding wheel having a frictional periphery, an antifrictional cup movable relatively to the wheel and composed of a plurality of concave rolls the axes of which are substantially parallel with the axis of the winding wheel, and adjustable supports for said rolls having means for varying the distance between the axes of the rolls to vary the capacity of the cup.

3. A ball-winding machine comprising a winding wheel having a frictional periphery, an antifrictional cup movable relatively to the wheel and composed of a plurality of concave rolls, the axes of which are substantially parallel with the axis of the winding wheel, and roll-supporting standards having means for varying the distance between the axes of the rolls.

4. A ball-winding machine comprising a winding wheel having a frictional periphery, an antifrictional cup movable relatively to the wheel and composed of a plurality of concave rolls, the axes of which are substantially parallel with the axis of the winding wheel, slotted roll-supporting standards at opposite ends of the rolls, roll axles adjustable in the slots of said standards, and means for securing said axles to the standards at different distances apart.

5. A ball-winding machine comprising a winding wheel having a frictional periphery, an antifrictional cup movable relatively to the wheel and composed of a plurality of concave rolls, the axes of which are substantially parallel with the axis of the winding wheel, hinged standards supporting the rolls, and adapted to have a swinging adjustment toward and from the winding wheel to vary the positions of the rolls relatively to each other and to the winding wheel, and means for securing the standards at any position to which they may be thus adjusted.

6. A ball-winding machine comprising a winding wheel, a fixed bed adjacent thereto, guides pivoted to said bed and adapted to swing on said bed crosswise of the winding wheel, a slide movable on said guides toward and from the periphery of the winding wheel, means for oscillating said guides, a cup carried by the slide, and means for moving the slide on the guides.

7. A ball-winding machine comprising a winding wheel, a fixed bed adjacent thereto, guides pivoted to said bed and adapted to swing on said bed crosswise of the winding wheel, a slide movable on said guides toward and from the periphery of the winding wheel, means for oscillating said guides, standards pivoted to the slide and adapted to have a swinging adjustment thereon toward and from the winding wheel, means for positively securing said standards in any position to which they may be thus adjusted, and a cup composed of concave rolls supported by the standards and adjustable therewith.

8. A ball-winding machine comprising a winding wheel, a cup, a treadle, connections between the treadle and the cup whereby the cup is moved toward the winding wheel by the depression of the treadle, a spring acting to normally raise the treadle and retract the cup, and means for locking the treadle against the action of the spring, the said connections having provisions for maintaining a yielding pressure on the cup when the treadle is locked.

9. A ball-winding machine comprising a winding wheel, a cup, a slide supporting the cup and movable toward and from the wheel, and mechanism for moving the cup toward the wheel and maintaining a constant yielding pressure thereon, said mechanism including a bell crank lever connected with the slide, a treadle, a lower connecting rod member engaged with the treadle and provided with a guide and a stop, an upper connecting rod member engaged with the bell crank lever and movable endwise in said guide, and a weighted lever pivoted to said members and adapted to hold the upper member yieldingly against said stop.

10. A ball-winding machine comprising a winding wheel, a cup movable relatively to the wheel, mechanism for reciprocating the cup crosswise of the periphery of the wheel, and automatic means for periodically rendering said mechanism inoperative and periodically stopping the movement of the cup.

11. A ball-winding machine comprising a winding wheel, a cup movable relatively to the wheel, mechanism for reciprocating the cup crosswise of the periphery of the wheel, said mechanism including a driving member, a driven member, and connections between the driven member and the cup, the driving and driven members having complemental clutch parts, and automatic means for alternately engaging and separating said clutch parts to periodically stop the movement of the cup.

12. A ball-winding machine comprising a winding wheel, a cup movable relatively thereto, a longitudinally movable shaft, a driving pulley rotatable on said shaft and movable longitudinally therewith, said shaft having a clutch part, an eccentric rotatable on said shaft adjacent to the pulley and having a complemental clutch part with which the clutch part of the pulley is engageable, a forked head engaged with said eccentric and reciprocated by the rotation thereof, connections between said head and the cup, whereby a reciprocating motion is imparted from the head to the cup, an oscillatory clutch-operating lever having a hub mounted to rock on the shaft and provided with lateral projections, a fixed standard interposed between the hub and the eccentric and provided with laterally projecting studs, a clutch-lever-controlling spring which normally holds said lever and its projections in engagement with said studs to hold the clutch parts connected, and automatic means for periodically displacing said lever to separate its projections from the studs and permit the separation of the clutch parts.

13. A ball-winding machine comprising a winding wheel, a cup movable relatively thereto, a longitudinally movable shaft, a driving pulley rotatable on said shaft and moving longitudinally therewith, said shaft having a clutch part, an eccentric rotatable on said shaft adjacent to the pulley and having a complemental clutch part with which the clutch part of the pulley is engageable, a forked head engaged with said eccentric and reciprocated by the rotation thereof, connections between said head and the cup, whereby a reciprocating motion is imparted from the head to the cup, an oscillatory clutch-operating lever having a hub mounted to rock on the shaft and provided with lateral projections, a fixed standard interposed between the hub and the eccentric and provided with laterally projecting studs, a clutch-lever-controlling spring which normally holds said lever and its projections in engagement with said studs to hold the clutch parts connected, automatic means for periodically displacing said lever to separate its projections from the studs, and means for moving the shaft and pulley to separate the clutch parts.

14. A ball-winding machine comprising a winding wheel, a cup movable relatively thereto, a longitudinally movable shaft, a driving pulley rotatable on said shaft and movable longitudinally therewith, said shaft having a clutch part, an eccentric rotatable on said shaft adjacent to the pulley and having a complemental clutch part with which the clutch part on the pulley is engageable, a forked head engaged with said eccentric and reciprocated by the rotation thereof, connections between said head and the cup, whereby a reciprocating motion is imparted from the head to the cup, an oscillatory clutch-operating lever having a hub mounted

to rock on the fixed shaft and provided with external projections, a fixed standard interposed between the hub and the eccentric and provided with laterally projecting studs, a clutch-lever-controlling spring which normally holds said lever and its projections in engagement with said studs to hold the clutch parts connected, and a rotary shaft geared to the driving pulley to receive a relatively slow rotation therefrom, and provided with an eccentric stud adapted to periodically displace said lever to separate its projections from the studs and permit the separation of the clutch parts.

15. A ball-winding machine comprising a winding wheel, a cup movable relatively thereto, a longitudinally movable shaft, a driving pulley rotatable on said shaft and movable longitudinally therewith, said pulley having a clutch part, an eccentric rotatable on said shaft adjacent to the pulley and having a complemental clutch part with which the clutch part on the pulley is engageable, a forked head engaged with said eccentric and reciprocated by the rotation thereof, a bell crank lever pivoted to said head and oscillated thereby, a rod pivoted to and reciprocated by said lever, connections between the rod and cup whereby the latter is reciprocated with the rod, an oscillatory lever having a hub mounted to rock on said fixed shaft, and provided with lateral projections, a fixed standard interposed between the hub and eccentric and provided with laterally projecting studs, a spring which normally holds said lever and its projections in engagement with said studs to hold the clutch parts connected, and automatic means for periodically displacing said lever to separate its projections from the studs and permit the separation of the clutch parts.

16. A ball-winding machine comprising a winding wheel, a cup movable relatively thereto, a longitudinally movable shaft, a driving pulley rotatable on said shaft and longitudinally movable therewith, said pulley having a clutch part, an eccentric rotatable on said shaft adjacent to the pulley and having a complemental clutch part with which the clutch part on the pulley is engageable, a forked head engaged with said eccentric and reciprocated by the rotation thereof, connections between said head and the cup, whereby a reciprocating motion is imparted from the head to the cup, an oscillatory clutch-operating lever having a hub mounted to rock on the fixed shaft and provided with external projections, a fixed standard interposed between the hub and the eccentric and provided with laterally projecting studs, a clutch-lever-controlling spring which normally holds said lever and its projections in engagement with said studs to hold the clutch parts connected, a rotary shaft geared to the driving pulley to receive a relatively slow rotation therefrom, and provided with an eccentric stud adapted to periodically displace said lever to separate its projections from the studs and permit the separation of the clutch parts, a treadle and connections between it and the cup, whereby depression of the treadle is caused to move the cup toward the winding wheel, a treadle-controlling spring which normally holds the treadle in position to retract the cup from the shaft through said connections, said spring being stronger than the spring which controls the clutch-operating lever, and means for imparting movement from the treadle-controlling spring to the clutch-operating lever to render the latter inoperative and permit the separation of the clutch parts.

17. A ball-winding machine comprising a winding wheel, a cup movable relatively to the wheel, and mechanism for reciprocating the cup crosswise of the periphery of the wheel, said mechanism including a bell crank lever having a slotted arm, means for oscillating said lever, a connecting rod having a slotted bent end, and a pivot connecting said bent end with the slotted arm of the bell crank lever, said pivot being adjustable toward and from the fulcrum of the lever to vary the stroke of the cup.

In testimony whereof we have affixed our signatures, in presence of two witnesses.

ALBERT G. BREWER.
EDW. H. HAWES.

Witnesses:
C. F. BROWN,
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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."