A. G. BREWER.
BALL WINDING AND ROLLING MACHINE.
APPLICATION FILED JULY 15, 1908.

923,762. Patented June 1, 1909.

4 SHEETS—SHEET 1.

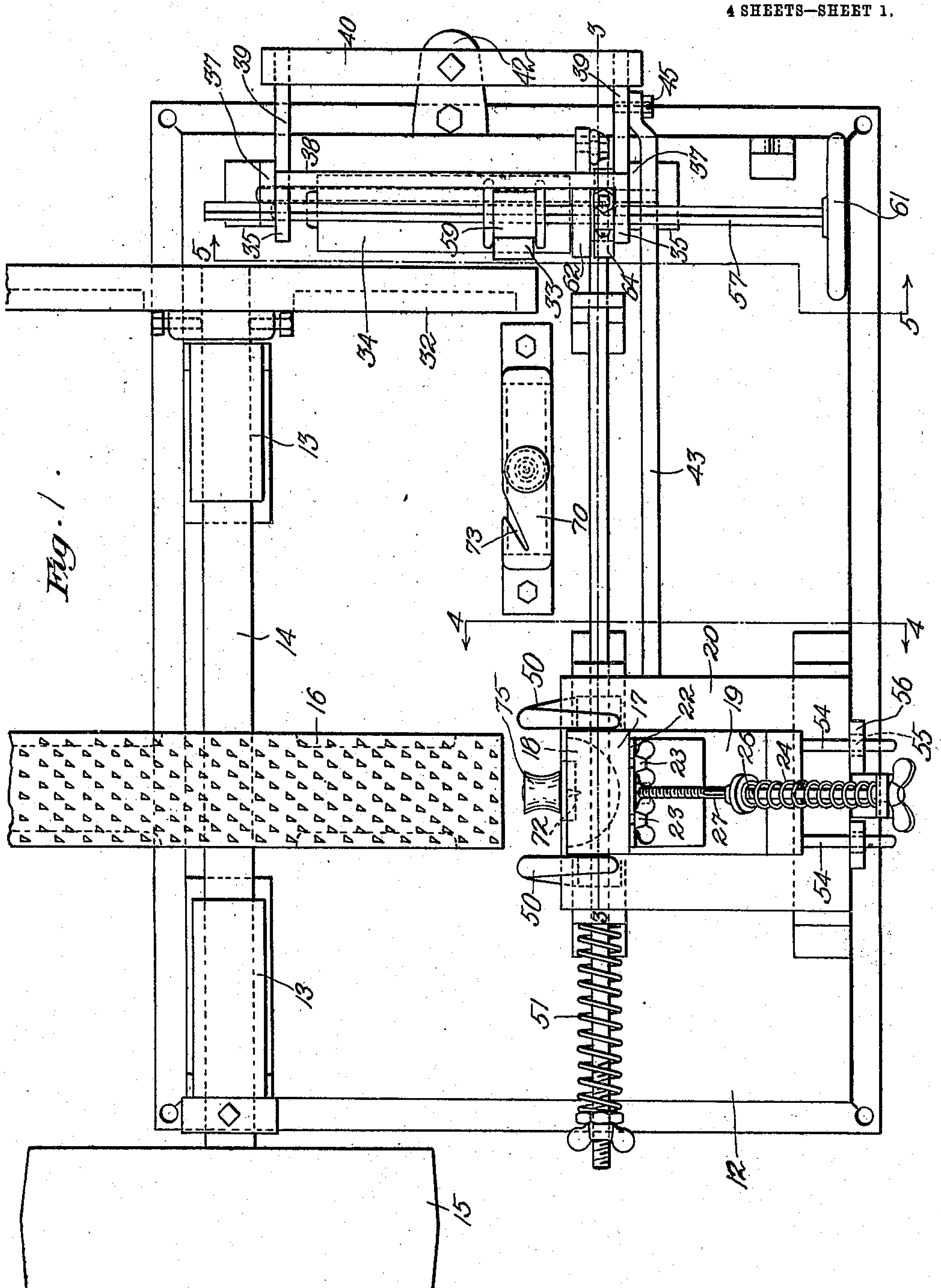

Fig. 1.

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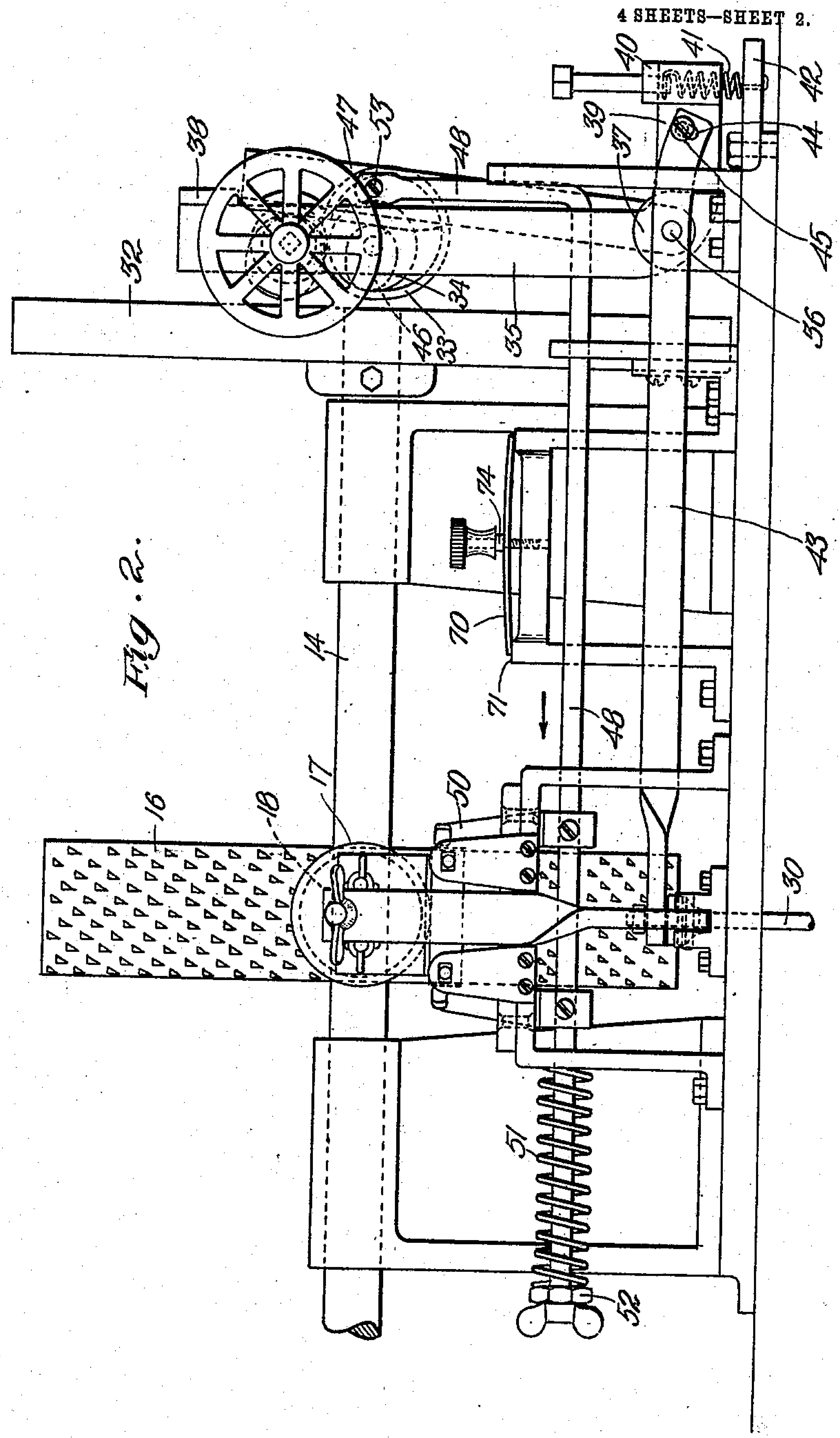

Fig. 2.

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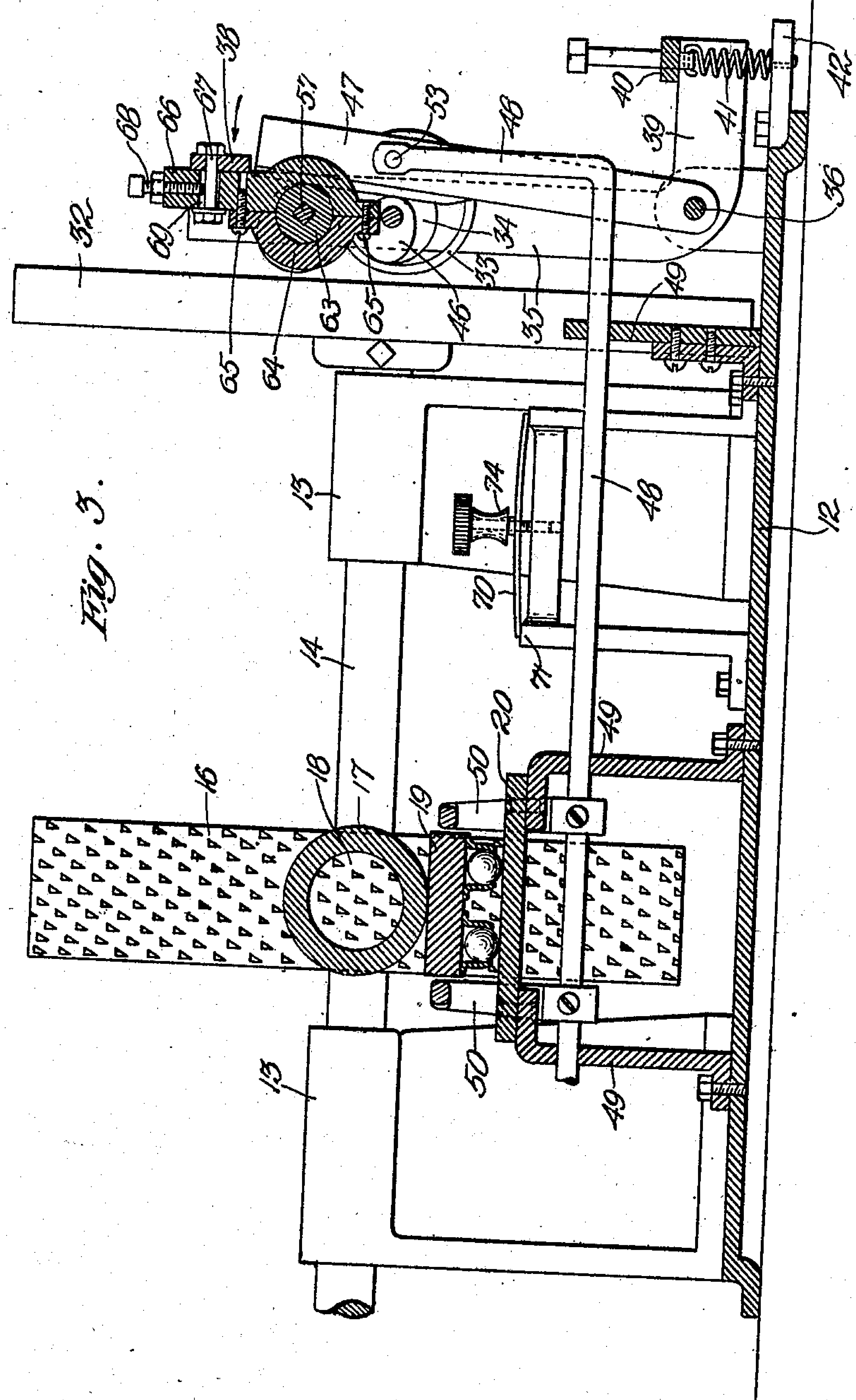

Fig. 3.

Witnesses:

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4 SHEETS—SHEET 4.

Fig. 4.

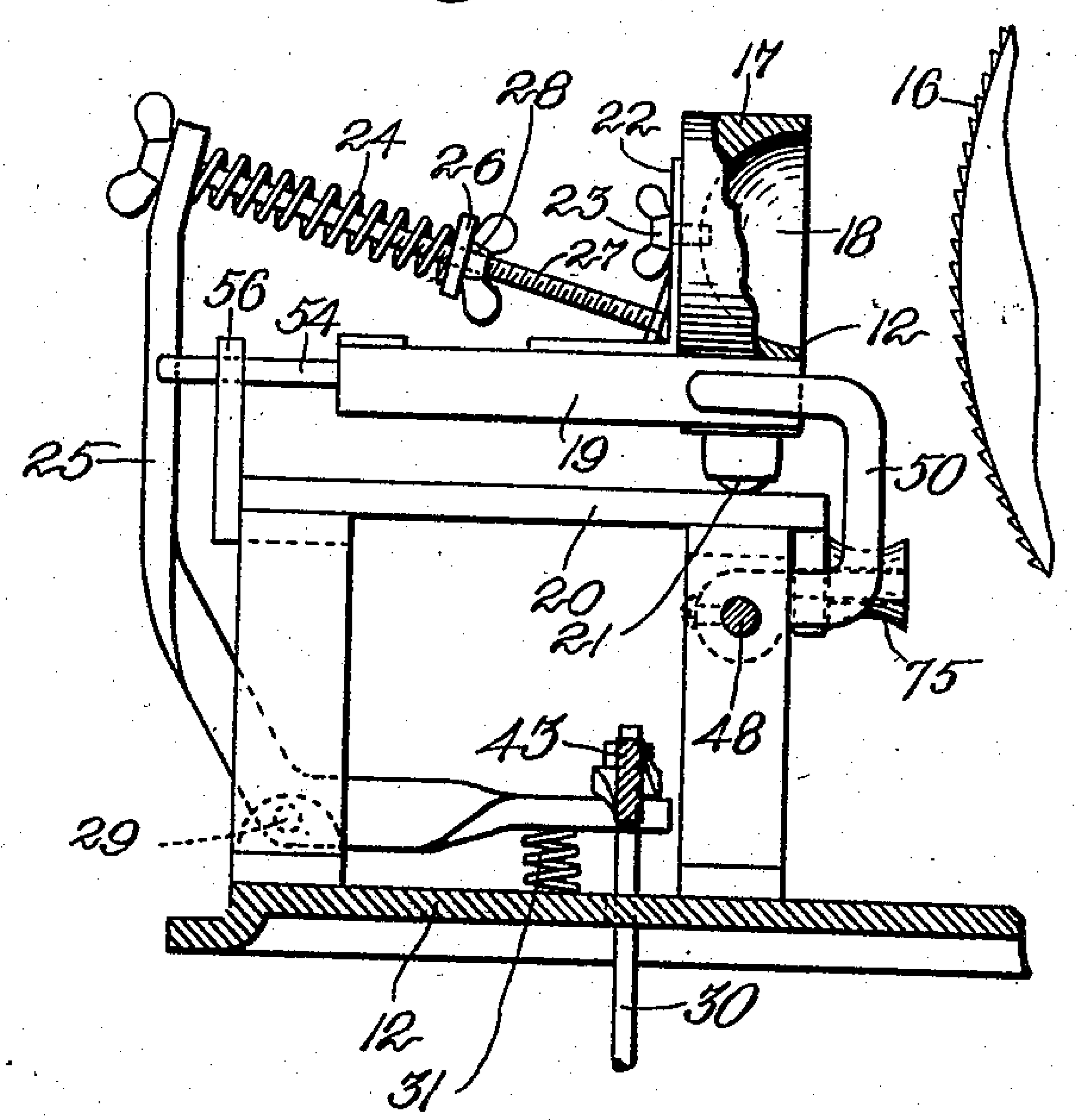
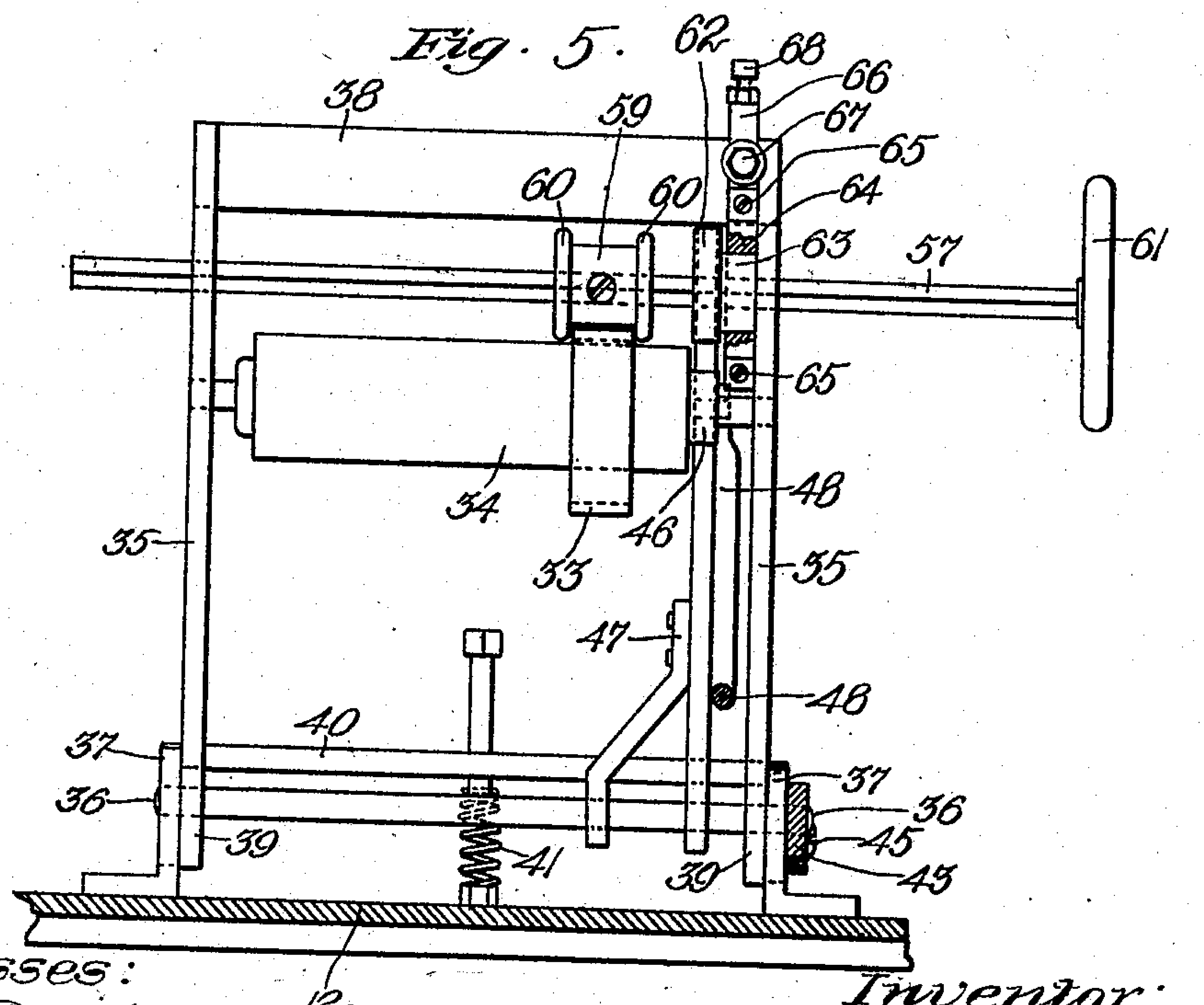


Fig. 5.



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UNITED STATES PATENT OFFICE.

ALBERT G. BREWER, OF NATICK, MASSACHUSETTS, ASSIGNOR TO HARRISON HARWOOD AND ROBERT W. HARWOOD, OF NATICK, MASSACHUSETTS, A FIRM.

BALL WINDING AND ROLLING MACHINE.

No. 923,762. Specification of Letters Patent. Patented June 1, 1909.

Application filed July 15, 1908. Serial No. 443,678.

To all whom it may concern:

Be it known that I, ALBERT G. BREWER, 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 filament of yarn or string to form a gradually increasing spherical body, a hemispherical cup being employed in which the ball of yarn is formed by the rotation of the incipient ball by contact therewith of a winding wheel having a roughened periphery opposed to the cavity of 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 has for its object to provide certain improvements in a ball winding machine of this character looking to the more perfect formation of the yarn into a ball, and the variation of the speed of winding as the ball increases in size.

Of the accompanying drawings forming a part of this specification, Figure 1 represents a top plan view of a ball winding machine embodying my invention. Fig. 2 represents a front elevation of the same. Fig. 3 represents an elevation of parts of the machine, and a section of other parts on line 3—3 of Fig. 1. Fig. 4 represents a section on line 4—4 of Fig. 1, and an elevation of parts at the left of said line. Fig. 5 represents a section on line 5—5 of Fig. 1, and an elevation of parts at the right of said line.

The same reference characters indicate the same parts in all the figures.

The supporting frame of the machine, as here shown, comprises a bed or base 12, having bearings 13 in which is journaled the driving shaft 14, to which motion may be applied by a driving belt running on a pulley 15 affixed to said shaft.

16 represents the frictional winding wheel having a roughened periphery which may be provided by striking up spurs on the metallic surface of the wheel, or in any other suitable way, the object being to provide a periphery adapted to engage the surface of a ball of yarn and impart a rotary movement thereto. The ball-forming cup is here shown as a block 17 provided with a hemispherical cavity 18, and detachably secured to a carrier 19, which is movably supported by a horizontal table 20 affixed to the frame of the machine, the carrier being provided with anti-frictional balls 21 movable upon the table. The cup may be secured to the carrier by means of brackets 22 affixed to the carrier, and thumb screws 23 passing through slots in the vertical arms of the brackets, and entering the back of the cup. The carrier and cup are pressed yieldingly toward the winding wheel 16 by means of a spring 24 bearing at one end against a bell crank lever 25, the other end of the spring bearing upon a washer 26, which is adjustably supported on a screw-threaded rod 27 by a thumb nut 28, which permits an adjustment of the washer 26 to vary the tension of the spring 24. The bell crank lever 25 is pivoted at 29 to a fixed ear on the base 12, and one of its arms is connected by a rod 30 with a treadle, not shown. The lever 25 is normally held by a spring 31 in the position shown in Figs. 1 and 4 with the cup retracted from the winding wheel. The spring 31 is here shown as interposed between the lower arm of the lever 25 and the bed 12, although in practice the spring would be applied to the treadle at a point below the bed. When the rod 30 is depressed by the treadle, the lever 25 projects the cup toward the winding wheel, the lever being movable independently of the rod 27, so that its pressure on the cup is exerted yieldingly through the spring 24.

Means are employed for reciprocating the carrier 19 in a path substantially parallel with the axis of the driving shaft to cause the ball interposed between the cup and the winding wheel to move cross-wise of the winding wheel during the winding operation. The mechanism which reciprocates the carrier cup has provisions for varying the speed of the movements, so that the reciprocating movement may be relatively slow at the commencement of the winding operation, and may increase in rapidity as the size of the ball increases. Said mechanism includes a frictional driving wheel 32 affixed to the driving shaft 14, and a frictional driven member 33 adapted to engage one side of the disk 32, and movable laterally of said disk, so that it may engage the disk at any desired distance from the axis of the driving shaft. The driven member 33 is here shown as a leather belt which loosely encircles a horizontal drum 34, which is journaled in bearings in the upright arms 35, 35 of bell crank levers, which are mounted to oscillate on a stud 36 supported by ears 37 affixed to the base 12. The upper ends of the lever arms 35 are connected by a cross bar 38. The said bell crank levers have horizontal arms 39 which are connected by a cross bar 40. A spring 41 connected with the cross bar 40, and with an arm 42 affixed to the supporting base, yieldingly holds the lever arms 35 in the position shown in Figs. 1, 2 and 3, with the driven member 33 out of contact with the friction disk 32.

43 represents a lever fulcrumed on the stud 36, and having a longer arm engaged with the treadle rod 30, and with the lower arm of the lever 25, and a shorter arm having a slot 44 which engages a stud 45 on one of the horizontal lever arms 39. When the treadle rod 30 is depressed, the longer arm of the lever 43 is also depressed, and its shorter arm is raised, forcing the lower end of the slot 44 against the stud 45, thus causing the lever arms 35 to swing inwardly toward the friction disk 32, and bringing the driven member 33 in contact with said disk, so that the driven member is rotated and imparts rotation to the drum 34 by its frictional contact with the latter.

46 represents a cam which is affixed to one end of the drum 34, and when said drum 34, and when said drum is rotated, acts on is rotated, acts on a lever 47 which is mounted to oscillate on the stud 36.

48 represents a bent rod having a horizontal arm or portion mounted to slide longitudinally in fixed guides 49, and provided with bent arms 50, the upper ends of which are arranged in close proximity to the opposite ends of the carrier 19.

51 represents a spring interposed between a fixed support and a nut 52 secured to the rod 48, said spring having a tendency to move the rod in the direction indicated by the arrow in Fig. 2. The vertical arm of the bent rod is pivoted at 53 to one of the lever arms 47; consequently, the spring 51 acts through the rod 48 to hold the lever arms 47 against the cam 46, the cam and spring acting conjointly to oscillate the lever arms 47 and reciprocate the rod 48, thus causing the arms 50 to engage the carrier 19 and reciprocate the latter in the same direction, the carrier being thus moved cross-wise of the periphery of the winding wheel. The movement thus imparted to the carrier and the cup thereon is not exactly rectilinear, but is made somewhat irregular by studs 54 affixed to the carrier, and projecting rearwardly therefrom into slots 55 in fixed ears 56 on the supporting frame. The ends of the slots form stops for the studs 54, the slots being of such length that they arrest the studs before the end of the movement imparted to the carrier by the means above described, so that the carrier has a slight swinging movement as it approaches the end of its travel in each direction. The compound movement thus imparted to the carrier is found desirable in causing the proper distribution of the yarn on the periphery of the ball, and preventing the yarn from accumulating in ridges on any particular part of the ball.

The driven member 33 is movable lengthwise of the pulley 34, which is elongated, as shown in Figs. 1 and 5, means being employed to shift the position of the driven member 33 relatively to the axis of the disk 32, provision being thus made for varying the speed of the reciprocating movements imparted, as above described, to the carrier and cup, it being desirable to make said movements relatively slow at the commencement of the winding operation, when the ball is relatively small, and to increase the speed of said movements as the size of the ball increases. The means here shown for shifting the position of the driven member comprise, first, a slidable rod 57 which is adapted to slide in suitable guides supported by the lever arms 35; and secondly, a collar 59 affixed to the rod 57 and provided with end flanges 60 which engage the edges of the driven member 33, so that when the rod 57 is moved endwise, the driven member 33 will be correspondingly moved on the pulley 34. The rod 57 is provided with a suitable hand wheel 61.

62 represents a cam which is affixed to a hub 63 (Fig. 5), mounted in a frictional clamp or bearing 64, which is carried by one of the levers 35, and is adapted to be turned therein to vary the position of the cam 62 which is eccentric to said hub, the object of the cam 62 being to furnish a variable stop for the movement of the lever 47 in the direction indicated by the arrow in Fig. 3, provision being thus made for varying the throw of the rod 48, and of the carrier 19, and the cup thereon. The hub 63 is provided with a squared orifice through which the rod 57 passes, and in which it is adapted to slide, the rod being correspondingly formed, so that when it is turned, it will also turn the hub 63 and cam 62, thus adjusting the latter. The cam is in the path in which the lever 47 oscillates, and therefore constitutes a stop limiting the movement of said lever in one direction. Accidental turning of the rod 57, hub 63, and cam 62 is prevented by the friction bearing 64, which, as shown in Fig. 3, is composed of two parts adapted to be compressed on the hub 63 by screws 65. One of the parts or members of the friction bearing 64 is pro-

vided with a shank 66 which is attached by a bolt 67 to the cross bar 38 connecting the levers 35. A set screw 68 engaged with the shank 66 enters a slot 69 in the shank 66, and bears on the bolt 67 to maintain the friction bearing 64 at the desired height.

70 represents a tension spring between one end of which and a fixed bearing 71 the yarn passes from a suitable source of supply through a guide orifice 72 in the cup 17. The tension spring is provided with a notch 73 which guides the yarn to the point where tension is applied to it. The tension is regulated by an adjusting screw 74.

75 represents a pulley which guides the yarn to the cup.

The operation of the machine is as follows:—The core or nucleus of the ball is inserted in the cup and the carrier 19 is moved forward toward the winding wheel until the latter suitably engages the side of the core which projects from the cup, this operation being caused by the depression of the treadle rod 30 which moves the lever 43 in the direction required to swing the levers 35 toward the friction wheel 32, thus causing the driven member 33 to engage said friction wheel. A reciprocating motion is thus imparted to the rod 48 and through the arms 50 to the cup 18 and its carrier, the speed of the reciprocating movement of the cup being determined by the distance of the driven member 33 from the axis of the disk 32. At the commencement of the operation the friction member 33 is relatively near the center of the disk, said member being drawn outwardly toward the periphery of the disk from time to time, as the size of the ball increases. The ball is continuously rotated by the winding wheel so long as it is maintained in contact with the latter, the position of the ball being changed by the described irregular movement imparted to the cup, so that the size of the ball increases uniformly over its entire surface. When the ball has attained the desired size, the operator releases the treadle, whereupon the spring 31 swings the vertical arm of the lever 35 outwardly and retracts the carrier and cup from the winding wheel.

The levers 35 and 39 constitute an oscillatory carrier for the driven member 33 and the pulley 34, said carrier and the cup 17 being movable simultaneously by the lever 25, which acts to move the cup toward the winding wheel 16, and the driven member 33 toward the driving wheel 32.

I claim:

1. In a ball-winding machine, the combination of a winding wheel, a cup movable relatively to the wheel, means for reciprocating the cup crosswise of the periphery of the wheel, and means for imparting swinging movements to the cup while it is being reciprocated.

2. In a ball-winding machine, the combination of a winding wheel, a substantially horizontal table adjacent thereto, a carrier mounted loosely on the table, a cup attached to the carrier, means for reciprocating the carrier crosswise of the periphery of the wheel, and fixed stops adapted to engage projections on the carrier and impart swinging movements to the carrier while it is being reciprocated.

3. In a ball-winding machine, the combination of a winding wheel, a cup movable relatively thereto, and mechanism for reciprocating the cup, said mechanism having means for varying the speed of the movements of the cup.

4. In a ball-winding machine, the combination of a winding wheel, a cup movable relatively thereto, a frictional driving wheel which rotates with the winding wheel, an elongated pulley located beside the frictional wheel, a frictional driven member adapted to impart motion from the wheel to the pulley, and adjustable lengthwise of the pulley to vary the speed of rotation of the latter, means for adjusting the driven member, and means for imparting motion from the pulley to the cup.

5. In a ball-winding machine, the combination of a winding wheel, a cup movable relatively thereto, a frictional driving wheel which rotates with the winding wheel, an elongated pulley located beside the frictional wheel, a frictional driven member adapted to impart motion from the wheel to the pulley, and formed as a band loosely surrounding the pulley, a slidable rod adjacent to the pulley and provided with a device for engaging the said belt to adjust the latter, and means for imparting a reciprocating motion from the pulley to the cup.

6. In a ball-winding machine, the combination of a winding wheel, a cup and a carrier therefor movable crosswise of the periphery of the wheel, a friction wheel which rotates with the winding wheel, a pulley driven by the friction wheel, a cam which rotates with the pulley, a lever adapted to be moved by a rod pivoted to the lever and having means for engaging the cup carrier, and a spring which coöperates with the cam in reciprocating the carrier and cup.

7. In a ball-winding machine, the combination of a winding wheel, a cup movable crosswise of the periphery of the wheel, a friction wheel which rotates with the winding wheel, a pulley driven by the friction wheel, a movable carrier supporting the pulley and adapted to move it toward and from the friction wheel, and means for imparting a reciprocating motion from the pulley to the cup.

8. In a ball-winding machine, the combination of a winding wheel, a cup movable crosswise of the periphery of the wheel, a

friction wheel which rotates with the winding wheel, a pulley driven by the friction wheel, a movable carrier supporting the pulley and adapted to move it toward and from the friction wheel, means for moving said carrier to make the pulley alternately operative and inoperative, and mearns for imparting a reciprocating motion from the pulley to the cup.

9. In a ball-winding machine, the combination of a winding wheel, a cup movable relatively thereto, and mechanism for reciprocating the cup, said mechanism having means for varying the length of the reciprocating movements of the cup.

10. In a ball-winding machine, the combination of a winding wheel, a cup movable relatively thereto, a friction wheel which rotates with the winding wheel, a pulley driven by the friction wheel, a cam which rotates with the pulley, a spring-pressed lever adapted to be moved in one direction by the cam, connections between the lever and the cup to impart a reciprocating motion to the latter, and an adjustable stop adapted to vary the length of movement imparted to the cup by the spring.

11. In a ball-winding machine, the combination of a winding wheel, a cup movable relatively thereto, a friction wheel which rotates with the winding wheel, an elongated pulley located beside the friction wheel, an adjustable frictional driven member adapted to impart motion from the friction wheel to the pulley, an adjusting rod provided with a device for engaging the said driven member, a cam which rotates with the pulley, a spring-pressed lever adapted to be moved in one direction by the cam, a stop cam adapted to limit the movement of the lever by its spring, said cam having a hub with which the adjusting rod has a sliding and a rotative engagement, whereby said rod is adapted to adjust both the driven member and the stop cam, and reciprocating connections between the lever and the cup.

12. In a ball-winding machine, a friction bearing, a hub rotatable therein, a stop cam on said hub, and means for turning the hub to adjust the cam.

13. In a ball-winding machine, a friction bearing, a hub rotatable therein, and having a squared orifice, a stop cam on said hub, and a squared rod movable lengthwise in the hub, and adapted to turn the latter.

14. In a ball-winding machine, a friction bearing, a hub rotatable therein, a stop cam on said hub, means for turning the hub to adjust the cam, and means for compressing the friction bearing on the hub.

15. In a ball-winding machine, the combination of a winding wheel, a cup movable relatively thereto, a driving member which rotates with the winding wheel, a driven member normally separated from the driving member, means for imparting a reciprocating motion from the driven member to the cup, and means controlled by the operator for simultaneously forcing the cup toward the winding wheel, and engaging the driven member with the driving member.

16. In a ball-winding machine, the combination of a winding wheel, a cup movable relatively thereto, a frictional driving wheel which rotates with the winding wheel, a frictional driven member normally separated from the driving wheel and adjustable toward and from the axis thereof, means for imparting a reciprocating motion from the driven member to the cup, means controlled by the operator for simultaneously forcing the cup toward the winding wheel and engaging the driven member with the friction wheel, and means for adjusting the driven member to vary the speed of the movements of the cup.

17. In a ball-winding machine, the combination of a winding wheel, a cup movable relatively thereto, a frictional driving wheel which rotates with the winding wheel, a frictional driven member normally separated from the driving wheel and adjustable toward and from the axis thereof, means for imparting a reciprocating motion from the driven member to the cup, means controlled by the operator for simultaneously forcing the cup toward the winding wheel and engaging the driven member with the friction wheel, means for adjusting the driven member to vary the speed of the movements of the cup, and means for varying the length of said movements.

18. In a ball-winding machine, the combination of a winding wheel, a cup movable toward and from the wheel, a lever controlled by the operator, and a yielding connection between the lever and the cup, said lever being adapted to force the cup through said yielding connection toward the winding wheel.

19. In a ball-winding machine, the combination of a winding wheel, a cup movable toward and from the wheel and crosswise of its periphery, normally inoperative mechanism for reciprocating the cup crosswise of the periphery of the wheel, a lever controlled by the operator, a yielding connection between the lever and the cup, the lever being adapted to force the cup, through said connection, toward the wheel, and means operated by the said lever for making the cup-reciprocating mechanism operative.

20. In a ball-winding machine, the combination of a winding wheel, a cup movable toward and from the wheel and crosswise of its periphery, a frictional driving wheel which rotates with the winding wheel, an oscillatory carrier movable toward and from said driving wheel, a driven member supported by said carrier and adapted to be

moved thereby into engagement with the driving wheel, means of which said driven member forms a part, for reciprocating the cup crosswise of the periphery of the winding wheel, a lever controlled by the operator, and adapted to force the cup toward the winding wheel, and connections between said lever and the oscillatory carrier, whereby the latter is moved toward the driving wheel when the lever is operated to force the cup toward the driving wheel.

In testimony whereof I have affixed my signature, in presence of two witnesses.

ALBERT G. BREWER.

Witnesses:

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C. A. DOWSE.