Jan. 25, 1955 A. G. BRIGATI 2,700,379

BALL PITCHING APPARATUS

Filed March 20, 1951 2 Sheets-Sheet 1

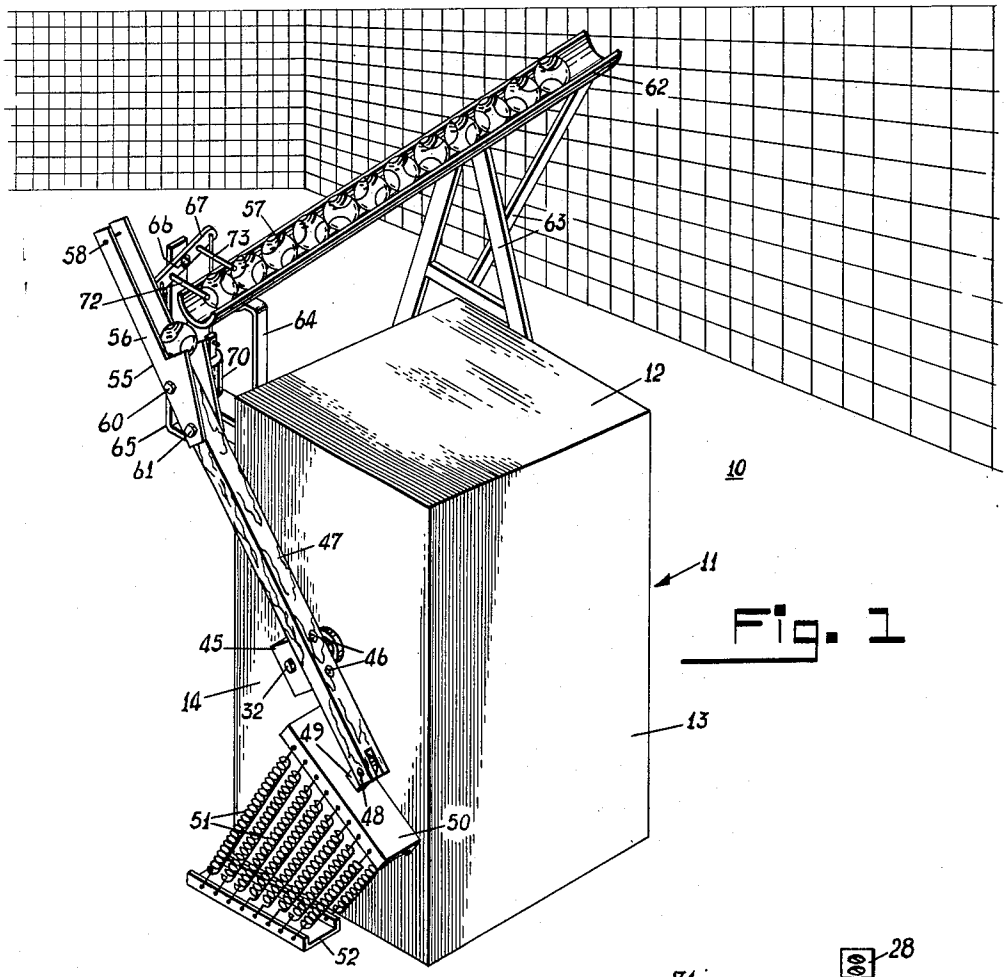


Fig. 1

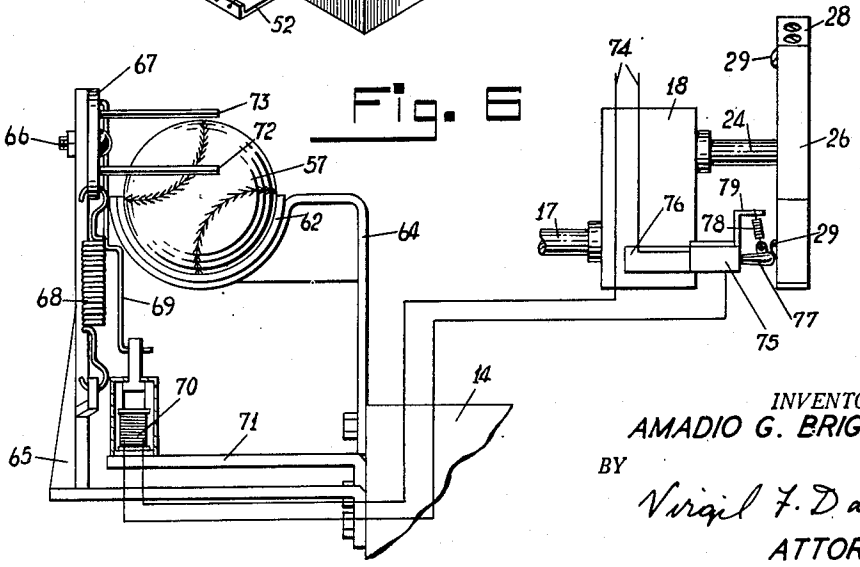


Fig. 6

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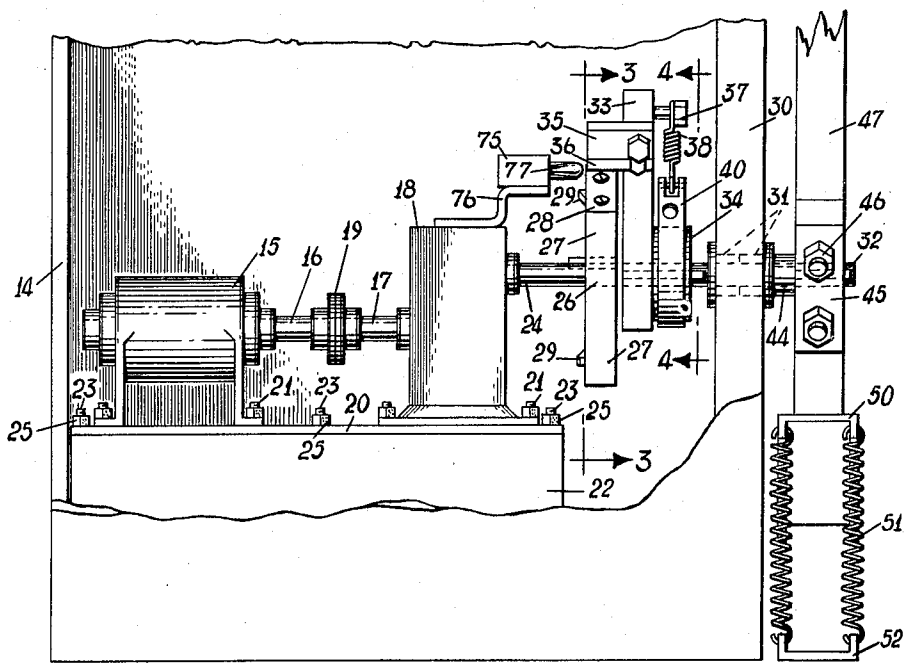


Fig. 2

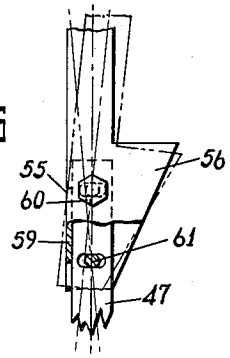
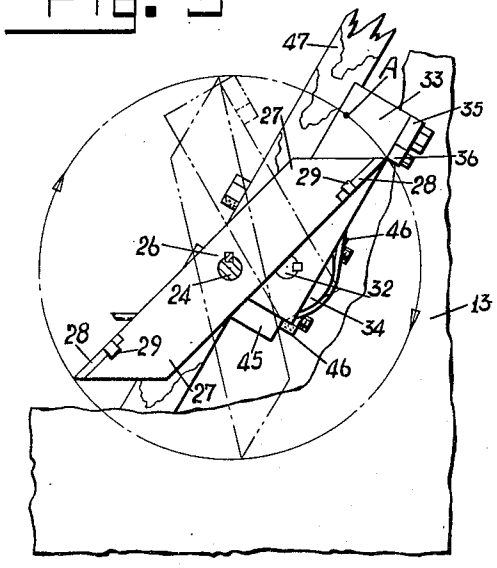


Fig. 5

Fig. 3



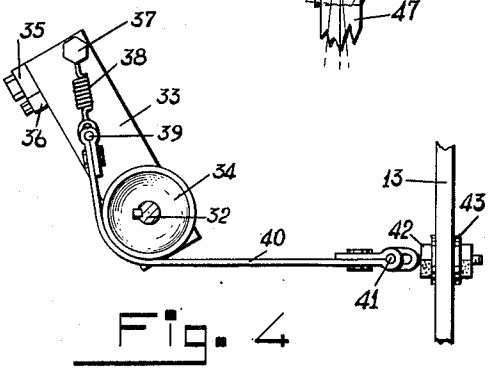


Fig. 4

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BALL PITCHING APPARATUS

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4 Claims. (Cl. 124—7)

This invention relates to ball pitching apparatus employed in delivering balls to a batter for batting practice, whether for perfection of batting skill or for amusement.

In accordance with this invention there is provided a simple, sturdy and practical machine which will hurl a ball, comparable in size and weight to the "Official" base ball, through the standard pitching distance in a manner that favorably approximates the delivery of a skilled baseball pitcher. The machine will automatically hurl a series of balls in spaced sequence with sufficient interval between successive balls to enable the batter to properly prepare himself for each delivery. The machine can successfully be used in batting practice by baseball teams and can likewise successfully be used in many amusement games which involve the batting of a ball and the display of batting skill. In these uses, the machine may be permanently installed in the batting area or it may be mounted on a suitable carriage so that it may easily be moved to and from the batting area.

It is a principal object of this invention to provide ball pitching apparatus, capable of delivering balls to a human batter in a manner closely approximating that of a skilled human pitcher, which requires a minimum of attention and maintenance and which can be easily and simply adjusted to vary the character of the delivery.

It is also a principal object of this invention to provide ball pitching apparatus, capable of delivering balls to a human batter in a manner closely approximating that of a human pitcher, which is of simple and rugged construction and which includes a minimum of operating parts that are subject to wear and require adjustment.

The further objects, advantages and features of the invention will be apparent from the following description of a presently preferred embodiment of the invention, taken with the accompanying drawings, in which:

Fig. 1 is an isometric view of a ball pitching machine, embodying the presently preferred form of the invention, positioned in the batting area;

Fig. 2 is a rear view of the machine, looking in the direction indicated by the arrow 2 in Fig. 1, with portions of the casing broken away to better show the arrangement of the operating elements;

Fig. 3 is a view, taken on line 3—3 of Fig. 2, showing the relation of certain operating elements at the beginning of the ball hurling operation;

Fig. 4 is a view, taken on line 4—4 of Fig. 2, showing the brake arrangement employed.

Fig. 5 is a fragmentary view of the hurling arm illustrating the manner in which ball holder, or hand, may be adjusted, and

Fig. 6 is a schematic view showing the ball feed arrangement and the control therefor.

The ball pitching machine **10** includes a casing **11** comprising the top panel **12**, the front and back panels **13** and the side panels **14**. These panels are suitably mounted on a frame structure, not shown, one or more being removably mounted for ready access to the operating elements, to be described, within the casing **11**. The casing **11** preferably also includes a bottom panel, or bed plate structure, not shown, on which certain elements to be described are supported and through which the machine **10** may be secured to the ground or to a foundation.

The power required for operation is supplied by the motor **15** whose drive shaft **16** is connected to the imput shaft **17** of the speed reducer gear box **18** through the coupling **19**. The motor **15** and the gear box **18** are

secured to the bed plate **20** as by the studs and nuts **21**. The plate **20** is mounted on the support **22** which is preferably secured in a convenient manner to the bottom panel, or bed plate structure, not shown, of the casting **11**. The studs **23** extend from the support **22** and pass through elongated slots in the bed plate **20** to permit adjustive movement of the plate **20** toward and away from the front panel **13** as required to locate the output shaft **24** of the gear box **18** as desired relative to other elements to be described. The plate **20** is locked in adjusted position through the nuts **25**.

A power transmitting bar **26** is keyed through its middle onto the outer end of the shaft **24** and presents two like cam arms **27** spaced 180° apart. The outer ends of the arms **27** are mitered as shown and corresponding end portions thereof are removed to accommodate the hardened metal wear pieces **28** that carry integral therewith the toggle operating abutments **29** and are held in place as by the screws shown.

The left-hand (Fig. 1) side panel **14** includes a heavy section **30** having a hole therethrough into which fit the flanged halves of the sleeve bearing **31**. Said halves are held in position as a unit as for instance by bolts, not shown, passing through the flanges thereof. The bearing **31** journals the shaft **32** whose axis is preferably, as shown, located in the same horizontal plane as and parallel to the axis of the shaft **24**. Within the casing **11**, the shaft **32** carries thereon and keyed thereto the arm **33** and the brake drum **34**. The arm **33** carries bolted thereto, as shown, the contact pieces **35** and **36** which extend from the arm **33** to overlie the arm **26**. The pieces **36** are hardened for improved wear resistance. The arm **33** carries screwed therein the bolt **37** whose shank is encircled by the eyed end of the coil spring **38**. The lower eyed end of the spring **38** encircles the pin **39** carried by the looped and riveted upper end of the friction strap **40** that passes under and contacts the drum **34** and may be of leather. The lower looped and riveted end of the strap **40** carries the pin **41** that is encircled by the headed eye bolt **42**. The shank of the bolt **42** passes through a convenient fixed portion of machine **10**, as for instance the front panel **13**, and is fastened in position as by the washer and nut **43**.

The outer end of the shaft **32** has positioned thereon the spacer sleeve **44**. A block **45** is carried by the shaft **32** and is keyed thereto. The bolts **46** unite the hurling arm **47** to the block **45**. The block **45** and the arm **47** are preferably of wood. The lower end of the arm **47** is bifurcated and carries the pin **48** which in turn pivotally mounts thereon the lug **49** that extends from the channel section **50**. One end of each of the coil springs **51** is connected to the section **50** while the other end of each of said springs **51** is connected to the channel section **52**. The section **52** is anchored against movement in any convenient manner.

At the upper end of the arm **47** is secured, by the bolts **60** and **61**, the hurling hand **55** between whose end pieces **56** the ball **57** is adapted to be positioned for hurling. The pieces **56** are preferably connected as by a pin **58** at their upper ends. At their lower ends the pieces **56** are connected by the web **59**. When loosened, the bolts **60** and **61** permit angular adjustment of the hand **55** relative to the arm **47**. The bolt **60** serves as the pivot, while the arcuate slots in the pieces **56** through which the bolt **61** passes permit the pivotal movement.

Above the casing **11** is an inclined ball supply trough **62** from which the balls **57** pass to the hand **55**. One end of the trough **62** is supported by a structure **63** while the other end is carried on a bracket **64** suitably fastened to the casing **11**. A second bracket **65** also fastened to the casing **11**, carried a bolt **66** which passes through the middle of the arm **67** and mounts said arm for movement thereabout. The end of the arm **67** nearest the hand **55** has connected thereto one end of a coil spring **68** whose other end is anchored to a lug extension of the bracket **65**. The other end of the arm **67** has one end of a link **69** pivotally connected thereto, the other end being pivotally connected to the core bar of the solenoid **70**. The solenoid **70** is supported on the bracket **71** fastened to the casing **11**. The arm **67** carries adjacent the ends thereof

the fingers 72 and 73 that overlie the major portion of the trough 62.

In the normal open circuit position of the solenoid 70, shown in Fig. 6, the spring 68 holds its end of the arm 67 down so that the finger 72 is in position to hold the lowermost ball 57 from further downward movement, and the finger 73 is raised above the balls 57.

The solenoid 70 is connected to a current source by the line 74 in one side of which is the normally open toggle switch 75. The switch 75 is mounted on the bracket 76 which is fastened to the gear box 18. The toggle lever 77 of the switch 75 is moved from the closed position to the open position by the coil spring 78, one end of which is fastened to said lever 77 and the other end of which is fastened to the bracket 79 carried by the switch 75. The switch 75 is so positioned that its lever 77 will be moved to closed position by one or the other of the pieces 29 when during the energy absorbing stroke of the arm 47, the hand 55 is in the required position relative to the trough 62 to properly receive a ball 57. When this occurs the solenoid 70 is energized and the link 69 is moved downwardly to interpose the finger 73 as a barrier to the movement of all of the balls 57 above it. Simultaneously the finger 72 is raised to permit the lowermost ball 57 to feed to the hand 55. As soon as the piece 29 passes the lever 77 the solenoid will be deenergized and the spring 68 will return the fingers 72 and 73 to the position of Fig. 6 and the balls 57 will move down the trough 62 until the lowermost contacts the finger 72. By this arrangement only one ball 57 can pass to the hand 55 during any complete energy absorbing stroke of the arm 47.

The rate of ball delivery is determined by the R. P. M. of the motor 15 and the speed reduction ratio of the gear box 18 chosen. Thus, by way of example, with a motor 15 rated at 1740 R. P. M. a reduction of 550 to 1 by the gear box 18 results in three complete revolutions of the bar 26 and the delivery of six balls in approximately one minute. The speed of the ball delivery depends on the power delivered by the motor 15 and the length of the energy absorbing stroke of the arm 47. The height of the delivery while it is dependent on the length of said stroke, is mainly determined by the position of the hand 55 at and just before the ball 57 leaves it during the delivery stroke of the arm 47. The length of the energy absorbing stroke of the arm 47 may, within limits, be shortened by moving the shaft 24 closer to the shaft 32 and lengthened, also within limits, by moving the shaft 24 away from the shaft 32. The position of the hand 55 at and just before the ball 57 leaves it may be adjusted by changing the angular disposition of the hand 55 relative to the arm 47 as described heretofore.

Assuming all necessary adjustments have been made, the machine 10 is set in operation by closing the switch, not shown, in the power circuit of the motor 15. The rotation of the motor 15 is transmitted to the shaft 24, at reduced speed but at increased torque, to rotate the arm 26 and to carry the pieces 28 through a circle and in a direction to pick up the piece 35 on the arm 33 (the broken line circle of Fig. 3 and in the direction indicated by the arrows thereon). At this time the arm 33 is in the at rest or neutral position (broken line position of Fig. 3) being the position attained by the arm 33, and the parts that move with it, when the effect of the springs 51 is balanced by the effect of the band 40 on the drum 34. In the neutral position the band 40 encircles approximately one-half the circumference of the drum 34 and the spring 38 is correspondingly distended. When the arm 26 attains the broken line position of Fig. 3 the energy absorbing stroke of the arm 47 is begun. As the rotation of the arm 26 progresses the torque applied to piece 35 through the piece 28 results in the rotation of the arm 33 toward the solid line position of Fig. 3. As the mentioned rotation goes forward, the band 40 is unwound from the drum 34 thus reducing the brake effect of the band 40. Since the arm 33 and the arm 47 are keyed to the same shaft 32, the arm 47 and the hand 55 move through the same angular distance as the arm 33. The angular movement of the arm 47 is resisted by the springs 51 and as they are distended by said movement energy is stored therein.

When the outer edge of the piece 28 reaches the point A of Fig. 3 the contact piece 29 acts upon the toggle lever 77 to close the circuit of the solenoid 70 and a ball 57 is passed from the trough 60 to the hand 55, in the manner above described, at this time the arm 47 and the springs 51 attain the position shown in Fig. 1. When the parts reach the solid line position of Fig. 3, the energy absorbing stroke of the arm 47 is at an end and the delivery stroke is about to begin. At this time the band 40 and the spring 38 are positioned as in Fig. 4 and the brake effect produced thereby is a minimum. The next incremental movement of the arm 26 carries the outer edge of the piece 28 below the edge of the piece 36 and the arm 26 no longer controls the movement of the arm 33. When this occurs the springs 51 move toward their unstressed position. This movement of the springs 51 rotates the system comprising the arm 47, the shaft 32 and the arm 33 rapidly about the axis of the shaft 32 and carries the hand 55 and the ball 57 through an arc and in a direction toward the batsman. Since the energy release is sudden the hand 55 and the ball 57 are rapidly accelerated to their ultimate speed. As the delivery stroke progresses, the band 40 increases its surface on the drum 44. Due to this cause, as well as to frictional effects, the hand 55 begins to deaccelerate from its ultimate speed. When this occurs the ball 57, being uninfluenced by the retarding effects mentioned, will deaccelerate at a slower rate and will move forwardly along the side pieces 56 until it leaves the hand. This will occur when the arm 47 is approximately upright, either before, during or after the upright position.

The arm 47 will continue its forward movement until stopped by retarding effects, above mentioned, and the springs 51. It is to be noted that after the arm 47 in its forward movement passes the neutral position heretofore referred to, further movement thereof will distend the springs 51. At the end of the forward movement of the arm 47 the springs 51 will again move toward their unstressed position and thus will reverse the movement of the arm 47. This reversal will occur several times and will end with the arm 47 in the at rest or neutral position when the brake effect of the band 40 on the drum 34 is sufficient to overcome the effects of the springs 51. In this manner the overthrow of the arm 47 is effectively stopped without imposing severe shock effects on any of the operating parts of the machine 10.

As the rotation of the arm 26 continues the other cam arm 27 will reach the neutral position of the arm 33 and another ball hurling cycle will begin. Thus, as long as the motor 15 is energized and balls 57 are supplied to the trough 62, the machine 10 will continue its periodic ball delivery.

I claim:

1. In a ball pitching machine, a lever adapted to support a ball at its top end, a shaft carrying said lever on one end thereof for unisonal movement about the shaft axis, means mounting said shaft for rotation about said axis, said axis passing through said lever intermediate its ends dividing said lever into a major and a minor portion, brake means imposing restraint on said shaft variable in accordance with the position of said major portion, resilient means having one end connected to a fixed member and the other end connected to said minor portion resisting said unisonal movement and with said brake means maintaining said lever in the at rest position with said major portion inclined forwardly in the direction of ball delivery, and power means periodically applying power on said shaft to rotate said lever through a power absorbing stroke, thereby rotating said major portion from the at rest position backwardly, said resilient means, released as said power applying period ends, rotates said lever through a ball delivery stroke, thereby rotating said major portion forwardly, said brake means including an element fixed on said shaft exposing an arcuate engageable surface and a second element engaging said surface and movable with said major portion to progressively uncover said engageable surface when said major portion rotates in the direction of the power stroke, thereby progressively decreasing said imposed restraint, and to progressively increase the area of said arcuate surface engaged thereby when said major portion rotates in the direction of the ball delivery stroke, thereby progressively increasing said imposed restraint.

2. In a ball pitching machine, a lever, an arm, a shaft carrying said lever and said arm for unisonal movement about its axis, means mounting said shaft for rotation about said axis, said axis passing through said lever intermediate its ends dividing said lever into a major and a

minor portion, brake means adapted to impose a variable restraint on said shaft, resilient means having one end connected to a fixed member and the other end connected to said minor portion restraining said lever and with said brake means holding said lever in the at rest position with said major portion inclined forwardly in the ball delivery direction, means periodically applying power to said arm to rotate said arm and said lever through a power absorbing stroke during which said major portion leaves the at rest position and rotates away from said ball delivery direction, at the end of said power stroke said power applying means releasing said arm, whereby said resilient means rotates said lever and said arm through the ball delivery stroke during which said major portion rotates forwardly in said ball delivery direction, said brake means including a member fixed to said shaft exposing a cylindrical surface and an elongated member engaging said surface and having one end fixed against movement forwardly of said shaft and the other end movable with said arm whereby as said major portion rotates in the direction of said power stroke said elongated member is progressively unwound from said surface to progressively reduce said imposed restraint and as said major portion rotates in the direction of the ball delivery stroke said elongated member is progressively wound on said surface to progressively increase said imposed restraint.

3. In a ball pitching machine, a lever, an arm, a shaft carrying said lever and said arm for unisonal movement about its axis, means mounting said shaft for rotation about said axis, said axis passing through said lever intermediate its ends dividing said lever into a major and a minor portion, brake means adapted to impose a variable restraint on said shaft, resilient means having one end connected to a fixed member and the other end connected to said minor portion restraining said lever and with said brake means holding said lever in the at rest position with said major portion inclined forwardly in the ball delivery direction, means periodically applying power to said arm to rotate said arm and said lever through a power absorbing stroke during which said major portion leaves the at rest position and rotates away from said ball delivery direction, at the end of said power stroke said power applying means releasing said arm, whereby said resilient means rotates said lever and said arm through the ball delivery stroke during which said major portion rotates forwardly in said ball delivery direction, said brake means including a drum member fixed to said shaft and an elongated band member having one end fixed against movement forwardly of said shaft and the other end fixed to said arm, said band passing beneath said drum and engaging said drum, whereby as said major portion rotates in the direction of said power stroke said arm carries said other band end away from said drum to progressively unwind said band thereby progressively reducing said imposed restraint and as said major portion rotates in the direction of said ball delivery stroke said arm carries said other band end towards said drum to progressively wind said band on said drum thereby progressively increasing said imposed restraint.

4. In a ball pitching machine, a lever, an arm, a shaft carrying said lever and said arm for unisonal movement about its axis, means mounting said shaft for rotation about said axis, said axis passing through said lever intermediate its ends dividing said lever into a major and a minor portion, brake means adapted to impose a variable restraint on said shaft, resilient means having one end connected to a fixed member and the other end connected to said minor portion restraining said lever and with said brake means holding said lever in the at rest position with said major portion inclined forwardly in the ball delivery direction, means periodically applying power to said arm to rotate said arm and said lever through a power absorbing stroke during which said major portion leaves the at rest position and rotates away from said ball delivery direction, at the end of said power stroke said power applying means releasing said arm, whereby said resilient means rotates said lever and said arm through the ball delivery stroke during which said major portion rotates forwardly in said ball delivery direction, said brake means comprising a brake drum fixed to said shaft and exposing a cylindrical brake surface, an elongated brake band having one end anchored against movement forwardly of said shaft and at approximately the level of said drum, a spring member having one end connected to the other end of said brake band, and means securing the other end of said spring member to the outer end of said arm, the intermediate portion of said brake band passing beneath and engaging said brake surface, whereby said arm during movement in the direction of the power absorbing stroke progressively unwinds said brake band from said brake surface to progressively reduce said imposed restraint and during movement in the direction of the ball delivery stroke progressively winds said brake band on said brake surface to progressively increase said imposed restraint.

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