May 24, 1966 P. S. GIOVAGNOLI 3,252,453

BASEBALL PITCHING MACHINE

Filed Dec. 26, 1962 3 Sheets-Sheet 1

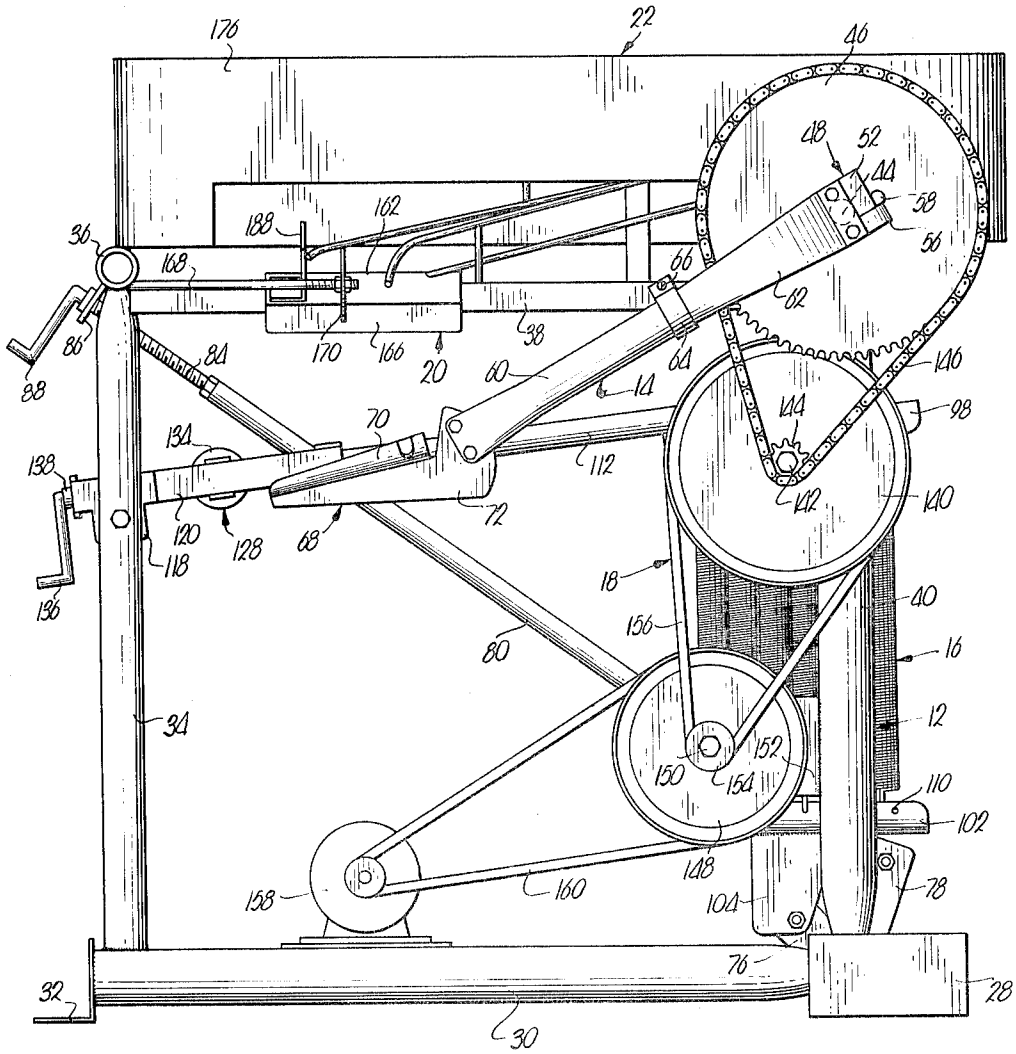


Fig. 1.

INVENTOR.
Paul S. Giovagnoli
BY
Hovey, Schmidt, Johnson & Hovey.
ATTORNEYS.

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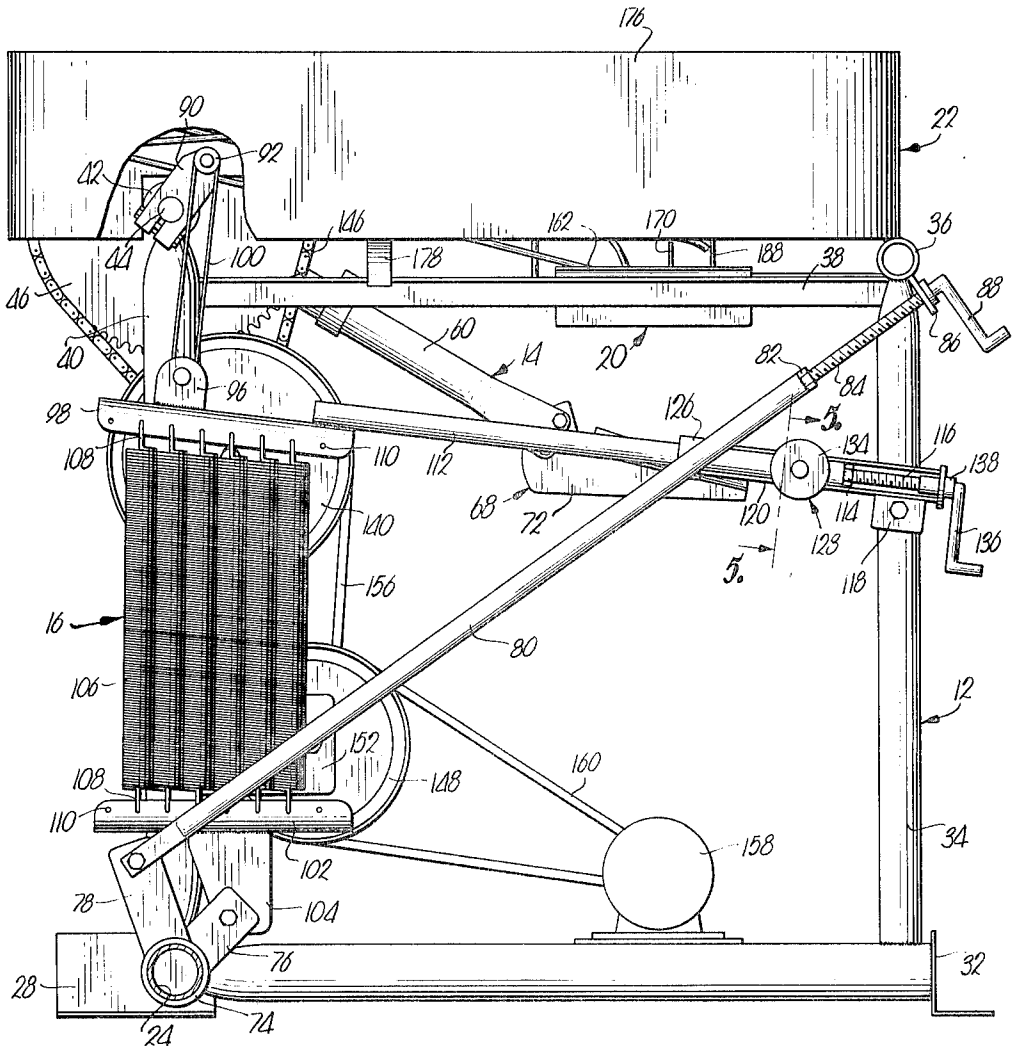


Fig. 2.

INVENTOR.
Paul S. Giovagnoli

BY

Hovey, Schmidt, Johnson & Hovey.
ATTORNEYS.

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Filed Dec. 26, 1962 3 Sheets-Sheet 3

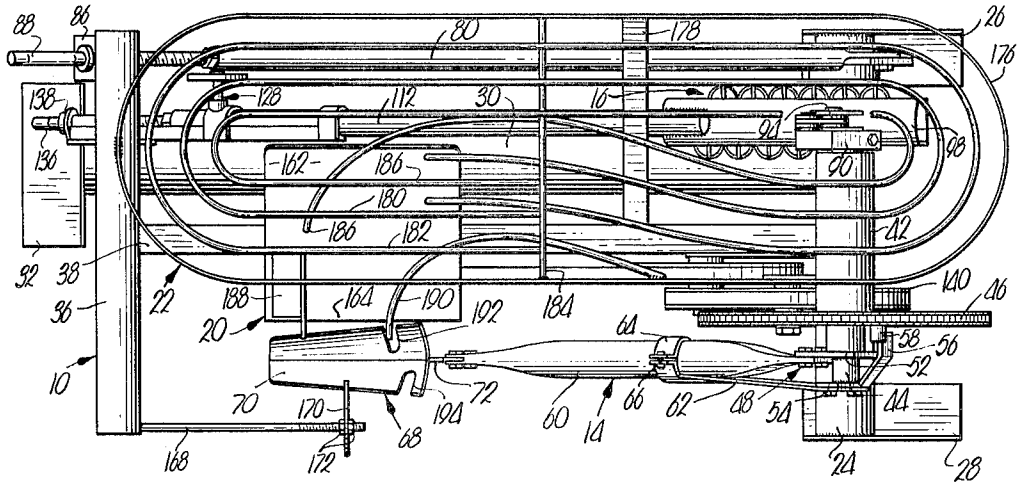


Fig. 4.

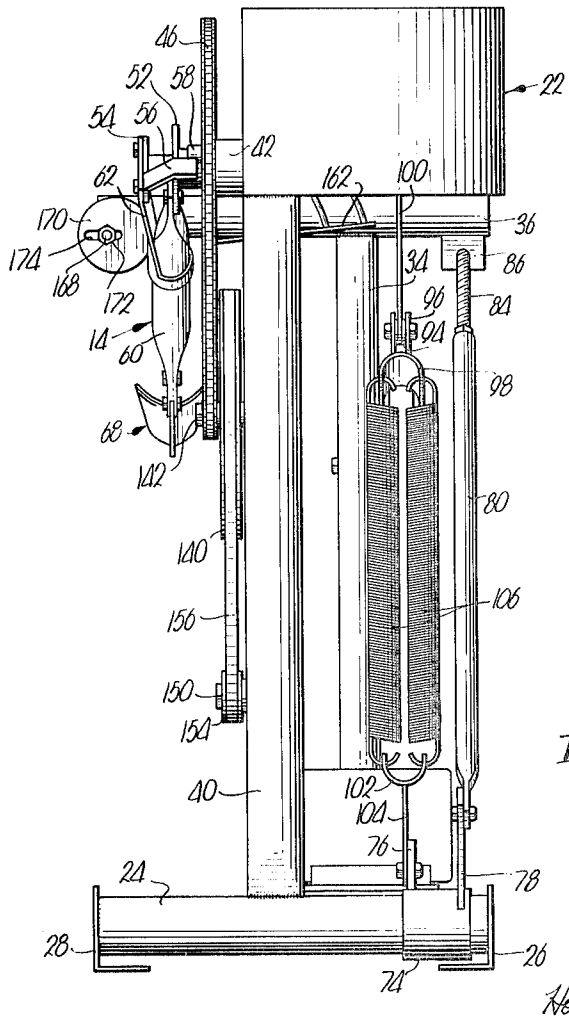


Fig. 3.

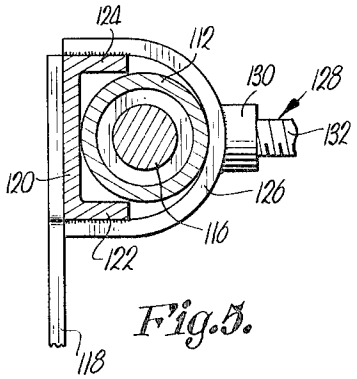


Fig. 5.

INVENTOR.
Paul S. Giovagnoli

BY

Hovey, Schmidt, Johnson & Hovey.
ATTORNEYS.

United States Patent Office

3,252,453

Patented May 24, 1966

3,252,453

BASEBALL PITCHING MACHINE

Paul S. Giovagnoli, 4200 Birmingham Road, Kansas City, Mo.

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2 Claims. (Cl. 124—7)

This invention relates to baseball pitching machines of a type adapted to automatically successively project the balls along a substantially uniform path of travel.

Although machines of this general description have been known for some time and have been uniformly well received, especially for use as amusement devices and for improving the skill of baseball batters, certain inherent limiting difficulties have been encountered with heretofore available machines. Among these difficulties have been the inability to quickly and easily preset the machine to project the balls at any of a variety of velocities and the lack of means for rapidly adjusting the height of pitch to accommodate the various batters who might use the machine. A further limiting feature of machines of the prior art has been the necessity for use of either especially made C-springs or heavy duty automotive springs. Either of these types of springs was costly, subject to a high breakage rate when utilized to impart the amount of kinetic energy required in pitching machines, and not capable of accurate preadjustment to impart a predetermined velocity.

Accordingly, it is the primary object of this invention to provide a baseball pitching machine which may be quickly and easily preadjusted to project the baseballs at any given velocity so that the pitching machine can be made to more nearly duplicate the pitches of a human baseball pitcher.

Another important object of the instant invention is to provide a machine which may be quickly and easily adjusted to vary the height of trajectory of the balls so that the machine can accommodate the strike zones of various sized hitters and may be utilized for improving the skill of certain hitters who may have batting weaknesses for pitches of particular heights.

Still a further very important object of this invention is to provide a machine which utilizes ordinary commercially available and, therefore, relatively inexpensive springs without sacrificing any of the accelerative ability of the machine pitching arm so that a wide range of velocities is available to the user of the machine.

Yet another object of the invention is the provision of a baseball pitching machine which utilizes a plurality of readily removable springs for storing kinetic energy so that the quantity of kinetic energy available during any pitching operation may be accurately controlled through the simple expedient of either adding to or removing springs from the machine.

Still a further object of the invention is to provide a machine having novel means for adjusting the tension of the springs so that relatively minor alterations in pitching velocities may be rapidly effected with a minimum of operator skill being required.

Other objects of the invention will become obvious or will be explained in greater detail as the following specification progresses.

In the drawings:

FIGURE 1 is a side elevational view of a baseball pitching machine embodying the preferred concepts of the present invention:

FIG. 2 is a side elevational view of the opposite side of the machine from the side shown in FIG. 1, certain parts thereof being broken away to reveal details of the components therebehind and one support plate being removed to reveal details of the construction;

FIG. 3 is a front elevational view of the baseball pitching machine;

FIG. 4 is a plan view of the machine; and

FIG. 5 is a cross-sectional view taken along line 5—5 of FIG. 2.

The baseball pitching machine **10** embodying the principles of this invention, includes a generally upright frame **12**, throwing structure **14** rotatably carried on frame **12**, force mechanism **16** connected to structure **14** for acceleratively driving the latter through a portion of its normal path of travel, prime mover means **18**, ball delivery means **20** for delivering balls to the throwing structure **14**, and hopper means **22** carried by frame **12** for retaining a supply of balls to be pitched by machine **10**.

Frame **12** includes a normally horizontally disposed, tubular member **24** terminating at opposed ends in L-shaped frame plates **26** and **28** which are adapted to be disposed on the ground as best seen in FIGS. 1, 2 and 3. A normally horizontally disposed, elongated, tubular member **30** is welded to member **24** and extends rearwardly therefrom, terminating in a frame plate **32** which, together with plates **26** and **28**, provide the ground-engaging supports for machine **10**. Frame **12** also includes an upright, tubular member **34** welded to member **30** proximal the rearmost end thereof. A normally horizontally disposed, tubular crossbeam **36** is secured to the uppermost end of member **34**, and a generally horizontally disposed fore and aft extending angle iron **38** is also secured to the upper end of member **34** and is interconnected proximal the upper end of a forward, tubular upright member **40** which is welded to member **24** preferably equidistant from the ends thereof. A normally horizontally disposed, tubular member **42** is welded at the uppermost end of upright member **40** and rotatably receives therein an elongated shaft **44** which protrudes beyond either end of member **42**.

A relatively large sprocket wheel **46** is rotatably carried on shaft **44** and proximal one end of member **42** as best seen in FIG. 4. A connector broadly designated **48**, includes a first flange rigid to shaft **44** lying in a plane perpendicular to the longitudinal axis of shaft **44** and proximal the outer hub of sprocket wheel **46**. A second flange **54** parallel to flange **52** and spaced axially along shaft **44** therefrom, is also secured to sleeve **50** proximal the outermost margin thereof and includes an elongated lug **56** which is bent inwardly into a position where lug **56** may be engaged by an outwardly protruding pin **58** carried on the outer surface of sprocket wheel **46**, as best seen in FIGS. 1 and 4.

A generally elongated, tubular arm **60** rigidly coupled to first flange **52** for rotation with the latter is further braced by a strap **62** which is secured to the outermost second flange **54** of connector **48** and extends to a point approximately midway between the ends of arm **60** where strap **62** terminates in a clamp **64** disposed in circumscribing relationship around arm **60** and secured by a fastener **66**. The outermost end of arm **60** carries a ball-throwing hand **68** which includes a generally arcuate channel **70** and a brace **72**.

Force mechanism **16** includes a ring **74** rotatably telescoped over member **24** between upright member **40** and plate **26**. A generally flat crank **76** is rigidly secured to ring **74** and extends radially outwardly therefrom, which a lever **78** also extends outwardly from ring **74** but disposed at an angle from crank **76**, as best seen in FIG. 2. An elongated, tubular rod **80** is pivotally coupled proximal the outermost end of lever **78** and terminates at its uppermost end in an internally threaded nut **82** secured to rod **80** and rotatably receiving an externally threaded rod **84** which extends through a bracket **86** carried by horizontal crossbeam **36**. Rod **84** terminates in an operating handle **88** adapted to permit rotation of rod **84** for shifting rod **80** to in turn rotate ring **74** on member **24**.

A crank **90** rigidly secured to the end of shaft **44** which protrudes from tubular member **42** opposite sprocket wheel **46**, is provided with a pulley wheel **92** proximal the outermost end thereof and spaced radially from shaft **44**. A second pulley **94** carried by a bracket **96** extending upwardly from a transversely arcuate, generally elongated, rigid carrier **98**, is coupled with wheel **92** by a flexible band **100** which may be a braided wire rope, cable or the like. A second elongated, transversely arcuate, rigid carrier **102** spaced vertically beneath carrier **98** and having the concave surface thereof facing upwardly toward the downwardly facing concave surface of carrier **98**, is secured to crank **76** by a depending, generally flat bracket **104**. A plurality of elongated torsion springs **106**, having opposed ends thereof secured to the respective carriers **98** and **102**, interconnect the latter and are releasably secured to carriers **98** and **102** as by hooks **108** integral with springs **106** and disposed through holes **110** conveniently positioned longitudinally along the carriers **98** and **102**.

It will be noted from FIG. 3 that a row of holes **110** extends through both of the flanges of carriers **98** and **102** to accommodate a pair of parallel rows of springs **106**. An elongated, tubular member **112** is welded to one end of the upper carrier **98** and terminates in an internally threaded nut **114** secured to the end of member **112** and rotatably receiving therein an elongated, externally threaded rod **116**. Both member **112** and rod **116** are pivotally coupled to upright member **34** by a bracket **118** bolted to member **34**. Bracket **118** is secured to an elongated channel member **120**, and the tubular member **112** is received between the outwardly extending flanges **122** and **124** of member **120** as best shown in FIGS. 2 and 5.

A plurality of straps **126** welded to flanges **122** and **124** of channel **120**, slidably maintain member **112** in position between flanges **122** and **124**. Clamping means broadly designated **128**, includes an outwardly extending, generally cylindrical, tubular, internally threaded projection **130** carried by a strap **126** which rotatably receives an externally threaded stem **132** which may be tightened upon member **112** to prevent longitudinal shifting of member **112** with respect to channel member **120**. A handwheel **134** is provided to facilitate the tight clamping of stem **132** against member **112**. An operating lever **136** is secured to the outermost end of rod **116** to facilitate rotation of the latter. A bearing **138** secured to the outermost end of channel **120** insures the alignment of rod **116** with member **112**.

The prime mover means **18** includes a pulley wheel **140** rotatable on a stub shaft **142** which is carried by upright member **40**. A small sprocket wheel **144** also rotatable on stub shaft **142** and rigidly secured to pulley wheel **140**, is in alignment with sprocket wheel **46** and receive an endless chain **146** which in turn is disposed around wheel **46**.

Another pulley wheel **148** disposed below and of somewhat smaller diameter than wheel **140**, is rotatably carried by a stub shaft **150** extending outwardly from a bracket **152** which is welded to and protrudes rearwardly from upright member **40**. A small pulley **154** rotates with wheel **148** on shaft **150** and drives a V-belt **156** which in turn extends around wheel **140** for driving the latter. An electric motor **158** mounted on tubular member **30**, drives a V-belt **160** which in turn drives wheel **148** and pulley **154**.

The ball-delivering means includes a flat plate **162** carried by horizontal angle iron **38** and disposed generally horizontally. An outer margin **164** of plate **162** terminates in a downwardly extending lip **166** which is disposed proximal hand **68** as the latter is rotated during a portion of its normally circular path of travel by arm **60**. A forwardly extending rod **168**, secured to the outermost end of crossbeam **36**, is threaded at its outer end and mounts a wheel **170** which is held in vertical disposition by a pair of nuts **172** on rod **168**. Wheel **70** is provided with a slot **174** to permit the adjustment of wheel **170** so that the latter is in the most advantageous position to stop a ball which is deposited on plate **162** adjacent the outermost margin **164** thereof.

The ball hopper means of machine **10** includes an essentially oval, open top side wall **176** carried by frame **12** and may be secured by welding or the like to crossbeam **36**. A diagonally extending brace **178** is also welded to the inner surface of side wall **176** and to angle iron **38**. The bottom for hopper means **22** comprises a ball track including a pair of elongated wire guide rods **180** and **182** having ends thereof welded to a cross rod **184** which is carried by side wall **176**.

Rods **180** and **182** are bent into curvilinear configuration as best shown in FIG. 4 to provide a path around the periphery of side wall **176** and to deposit the ball on plate **162**. In this respect, it is to be noted that the rods **180** and **182** are bent to decline gradually so that the ends thereof remote from the ends secured to rod **184**, are disposed at a substantially lower elevation than is rod **184**. A guide rod **186** also secured to rod **184** and disposed slightly above rods **180** and **182**, extends generally alongside and slightly above rods **180** and **182** and is adapted to provide a guide to keep the balls rolling along the track provided by rods **180** and **182**. Guide rod **186** extends further than rods **180** and **182** and terminates in substantial alignment with an L-shaped bracket **188** on plate **162** which, together with a curved rod **190** welded to side wall **176**, provides a chute for delivering the balls to the outer margin **164** of plate **162**. It will be readily understood that the balls are held securely between bracket **188** and rod **190** and will rest against wheel **170** until the ball is picked up by hand **68** when the latter is rotated past plate **162**. It will be noted that arcuate channel **70** of hand **68** is conveniently provided with a notch **192** to permit hand **68** to clear bracket **188**. A second notch **194** in channel **70**, permits hand **68** to clear wheel **170**.

Operation

A quantity of baseballs is deposited in hopper means **22**, and the balls are conducted to the delivery station on plate **162** by the elongated rods **180** and **182**. The downward inclination of rods **180** and **182** insures the gravitation of the baseballs toward plate **162** where they are held in position to be picked up by hand **68**. Motor **158** is energized to cause the rotation of sprocket wheel **46** through the various belt and chain drives. As sprocket **46** rotates, it carries along pin **58** which picks up lug **56** to cause rotation of arm **60** and of shaft **44** through a portion of travel of arm **60**. Arm **60** is thus rotated through its path of travel to move hand **68** past plate **162** where a baseball is picked up by channel **70**. The baseball is retained in channel **70** as arm **60** continues through its circular path of travel, and crank **90** rotates with arm **60** to cause carrier **98** to be shifted upwardly by the connection of crank **90** and carrier **98** through the flexible band **100**. As carrier **98** is shifted upwardly, the springs **106** are stretched to store a considerable amount of kinetic energy therein. When the rotation of

arm **60** and shaft **44** has proceeded to a point where crank **90** passes beyond top center of its path of rotation, arm **60** is acceleratively swung through the remaining portion of its path of travel under the bias of springs **106** as they cause shaft **44** to rotate faster than sprocket wheel **46**.

The baseball held by hand **68** is thrown by arm **60** during this accelerative portion of its path of travel along a trajectory simulating the throwing of the baseball by a human pitcher. As wheel **46** continues to rotate, it again reaches a position where pin **58** comes into engagement with lug **56** to cause the arm **60** to be rotated by prime mover means **18**. After another ball has been picked up by hand **68**, crank **90** reaches a position where spring means **16** may again acceleratively drive shaft **44** to cause the baseball to be projected from hand **68**. This operation may be continued so long as there is a supply of baseballs in hopper means **22**.

The accelerative force imparted to arm **60**, and therefore, the velocity at which the baseball is pitched from machine **10**, is determined by the force exerted by mechanism **16** during the accelerative portion of the path of travel of arm **60**. This force may be calculated by the number of springs which are connected between the respective carriers **98** and **102**. If it is desired to lessen the amount of such force in order to reduce the velocity of the pitched baseball, it is but necessary to remove one or more of the springs from the carriers to achieve the desired velocity. It is preferred that the springs be either added to or removed from the carriers in pairs so that spring means **16** will be kept balanced for smooth operation of the component parts. A distinct advantage obtained by the use of a plurality of springs which may be either added to or removed from the machine, lies in the fact that each spring may be calculated to impart a certain amount of kinetic energy for use in operating machine **10**. Close control on the kinetic energy available and thus, the velocity of the pitch, may be obtained through the simple expedient of adding to or removing the springs from the machine.

With heretofore available pitching devices wherein a single spring was utilized, the velocity of the pitch could not be accurately adjusted inasmuch as compressing or tensioning of the spring prior to its operation would alter the modulus of elasticity of the spring so that the velocity could not be accurately predicted. For example, with an elongated compression spring the precompressing of the spring one linear inch might alter the pitching velocity a given amount from that which would be available had the spring not been precompressed. However, the precompressing of the spring an additional inch might alter the pitching velocity many times the given amount. With a plurality of springs, however, each spring adds its amount of force to the total unit. Thus, the addition of a pair of springs to the unit can be expected to increase the velocity in predetermined predictable increments. Thus, the machine may be quickly and easily adjusted to provide whatever velocity is desired of the pitched baseballs.

Means is provided with machine **10** for pre-tensioning the springs a slight amount to provide a fine adjustment to the velocity of the pitches without the necessity for removal or addition of springs to force mechanism **16**. When it is desired to increase the velocity of the pitches, it is but necessary to rotate handle **88** to shift rod **80** in a direction to cause rotation of crank **76** downwardly. This pulls carrier **102** downwardly to provide the required pre-tensioning to springs **106**.

It has heretofore been necessary to control the height of the trajectory of the pitched baseballs by either adjusting the frame or by altering the angle made between the channel **70** of hand **68** with the pitching arm **60**. Either of these adjustments were not easily made and

prevented the flexibility which was desired with baseball pitching machines.

The trajectory of the balls pitched by machine **10** may be quickly and easily adjusted however, by the expedient of rotating lever **136** to shift carrier **98** either forwardly or backwardly. If it is desired to lower the trajectory, the operator merely shifts carrier **98** rearwardly toward upright member **34** so that crank **90** must rotate further in a counterclockwise direction as viewed in FIG. 2, before pulley **92** reaches the over-center position with respect to a line drawn between pulley **94** and shaft **44**. Such over-center position must be reached before force mechanism **16** may acceleratively drive arm **60** through its path of travel. By the same token, the shifting of carrier **98** forwardly and away from member **34**, moves the location at which pulley **92** passes top dead-center with respect to a line drawn between pulley **94** and shaft **44** so that force mechanism **16** will start the accelerative driving of arm **60** at an earlier point in the circular path of travel of arm **60**. This raises the trajectory of the pitched baseballs.

It can be seen that machine **10** is much more readily adjustable and, therefore, more desirable than baseball pitching machines which have heretofore been available.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In a machine for automatically successively throwing baseballs:

support structure;

a shaft pivotally mounted on the structure;

a throwing arm rigidly mounted on the shaft;

a crank rigidly secured to the shaft and extending radially therefrom, said arm and the crank being disposed for travel through parallel, circular paths about the shaft;

first driving means mounted on the structure for driving the arm and the crank through a first arcuate portion of their respective paths of travel in one direction;

means on the structure for supplying a baseball to said arm during travel of the latter through said first portion of the circular path;

second driving means for acceleratively driving the arm through a second arcuate portion of said circular path of travel in said one direction, said second driving means including tension spring means, means operably coupling one end of the spring means to the crank, the other end of the spring means being operably coupled with the structure;

means for simultaneously driving the crank through a first arcuate portion of its path and the second driving means through a kinetic energy acquiring path of travel, said simultaneous driving means being operable to release said second driving means and the crank from driving connection with the first driving means when the crank reaches an overcenter position on its path of travel with respect to an imaginary line drawn between said one end of the spring means and the shaft whereby the second driving means expends said kinetic energy and acceleratively drives the arm under substantially uniform force through the second arcuate portion of its respective path to throw the baseball;

shiftable means operably coupled with said one end of the spring means and with the support structure for shifting said one end of the spring means with respect to the shaft to any selected one of several locations relative thereto and for holding said one end in the selected position thereof whereby the point on said circular path at which the crank reaches said overcenter position may be accurately controlled; and

tension adjusting means coupled with the structure and said other end of the spring means for independently controlling the tension on the spring means whereby

the accelerative force imparted by the second driving means to the crank for rotating said shaft may be varied.

2. Apparatus as set forth in claim 1 wherein said shiftable means includes an elongated, tubular member operably coupled with said one end of the spring means, a rod rotatably mounted on the structure and threadably received in the member, means coupled with the rod for rotating the latter with respect to the member for shifting the rod longitudinally with respect to the member and clamp means for releasably securing the rod in any selected one of several positions with respect to the member.

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RICHARD C. PINKHAM, *Primary Examiner.*