Oct. 7, 1969 L. J. PONZA 3,470,859

BALL THROWING MACHINE WITH PIVOTAL RESILIENT MOUNT

Filed Aug. 23, 1966 4 Sheets-Sheet 1

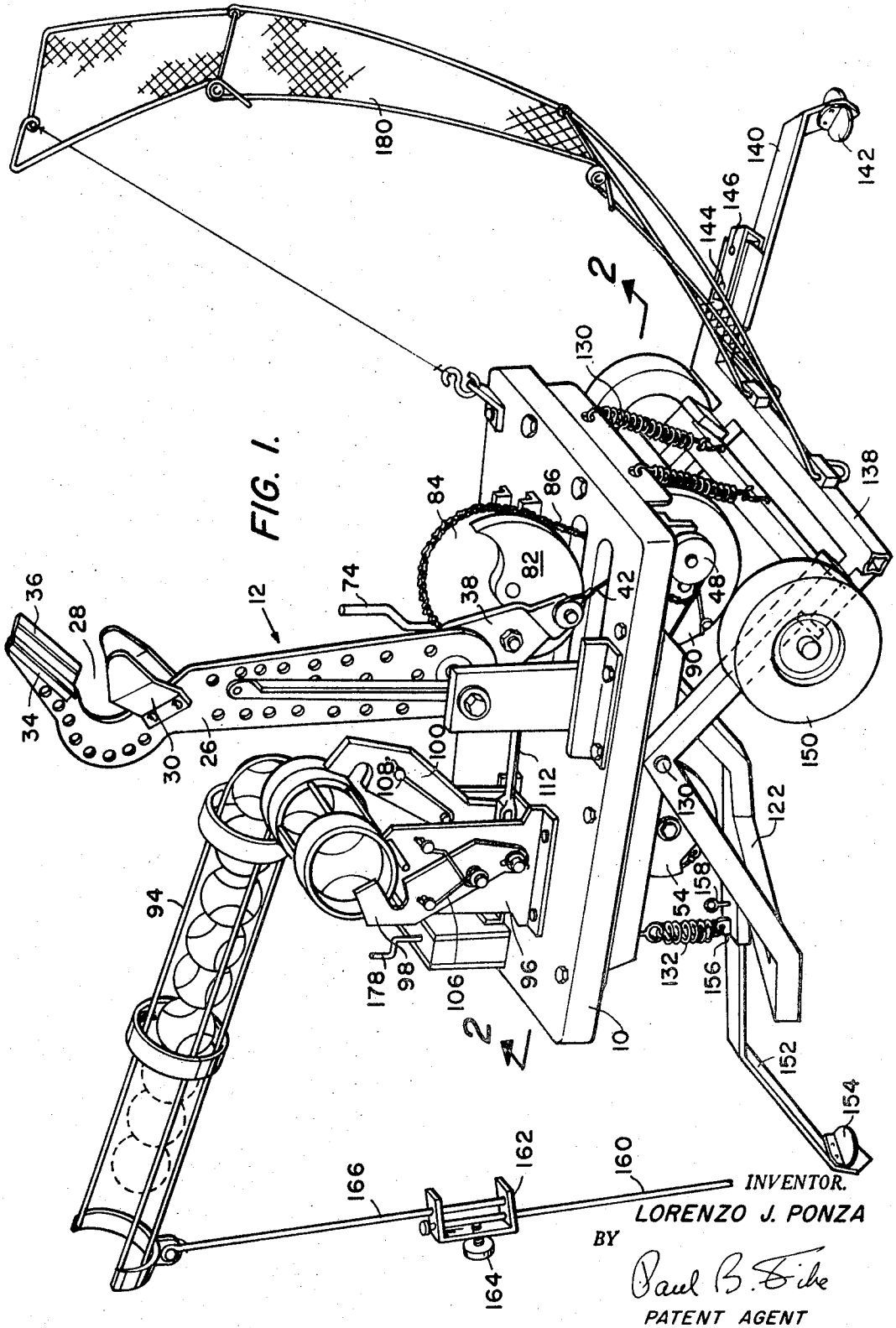


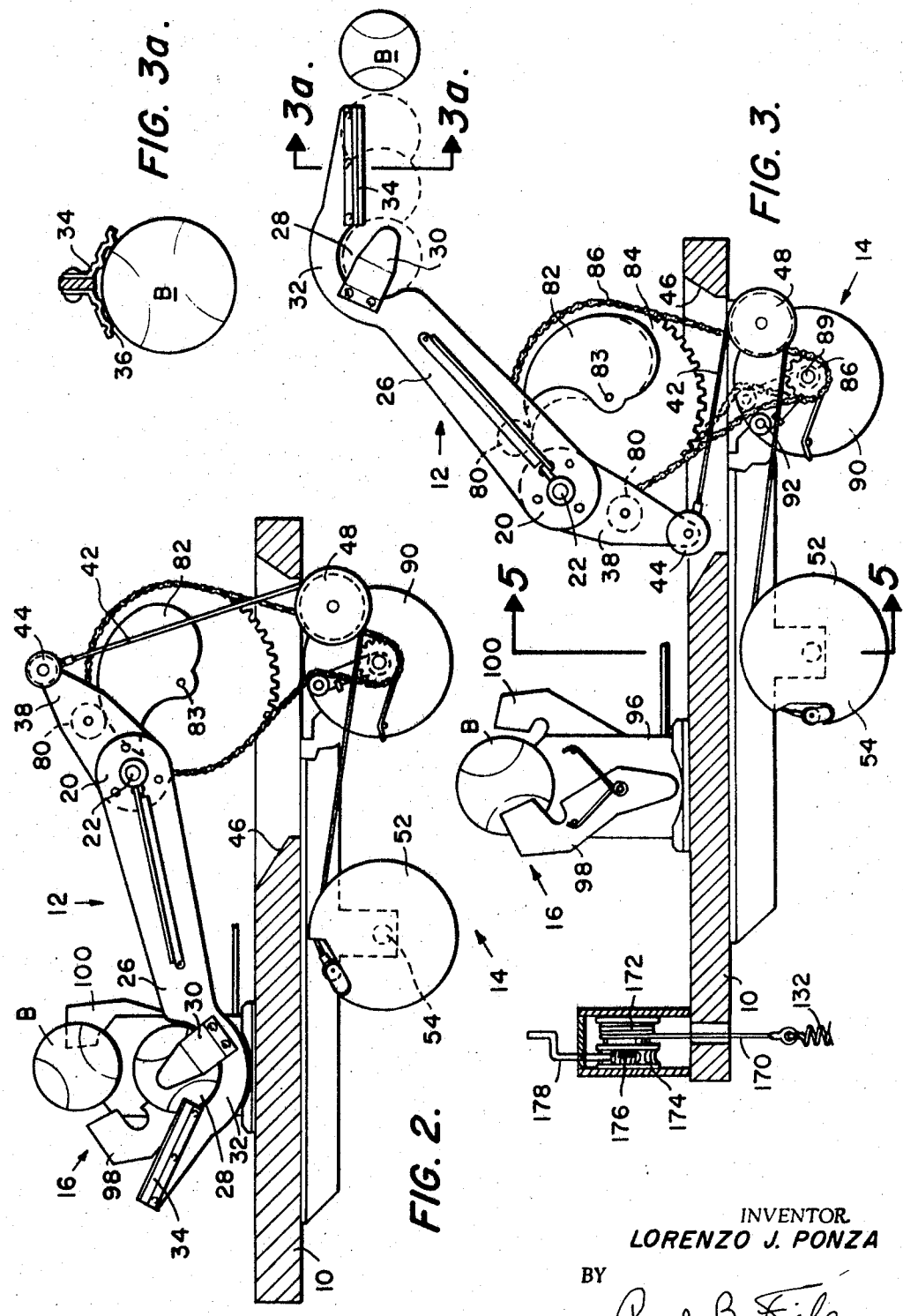
FIG. 1.

INVENTOR.
LORENZO J. PONZA
BY
Paul B. Fike
PATENT AGENT

Oct. 7, 1969 L. J. PONZA 3,470,859

BALL THROWING MACHINE WITH PIVOTAL RESILIENT MOUNT

Filed Aug. 23, 1966 4 Sheets-Sheet 2



INVENTOR.
LORENZO J. PONZA

BY

Paul B. Fiche

PATENT AGENT

Oct. 7, 1969 L. J. PONZA 3,470,859

BALL THROWING MACHINE WITH PIVOTAL RESILIENT MOUNT

Filed Aug. 23, 1966 4 Sheets-Sheet 3

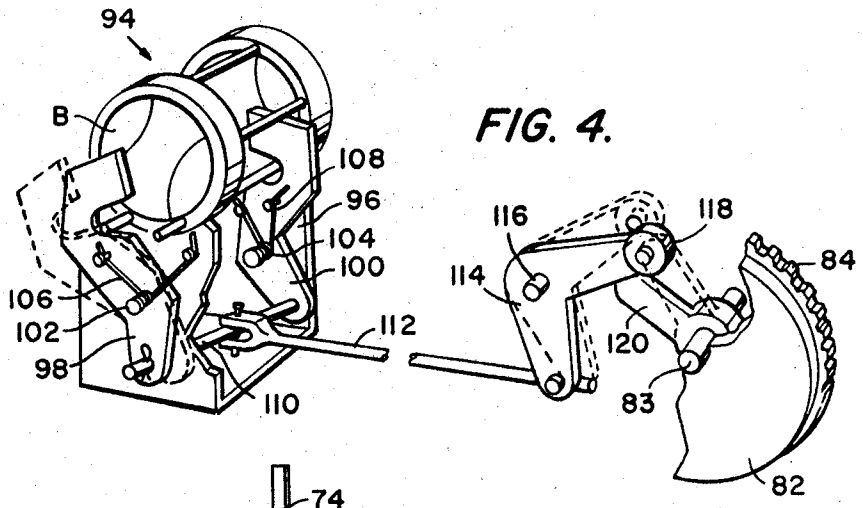


FIG. 4.

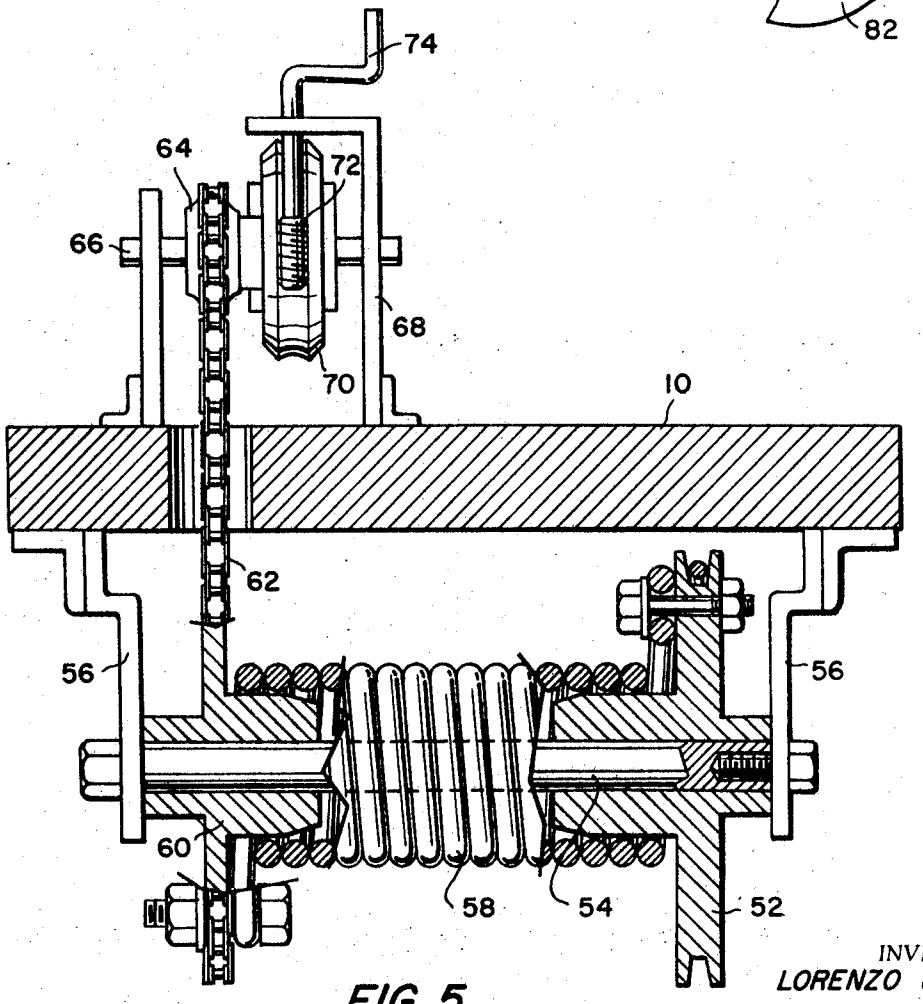


FIG. 5.

INVENTOR.
LORENZO J. PONZA
BY
Paul B. Fike
PATENT AGENT

Oct. 7, 1969 L. J. PONZA 3,470,859

BALL THROWING MACHINE WITH PIVOTAL RESILIENT MOUNT

Filed Aug. 23, 1966 4 Sheets-Sheet 4

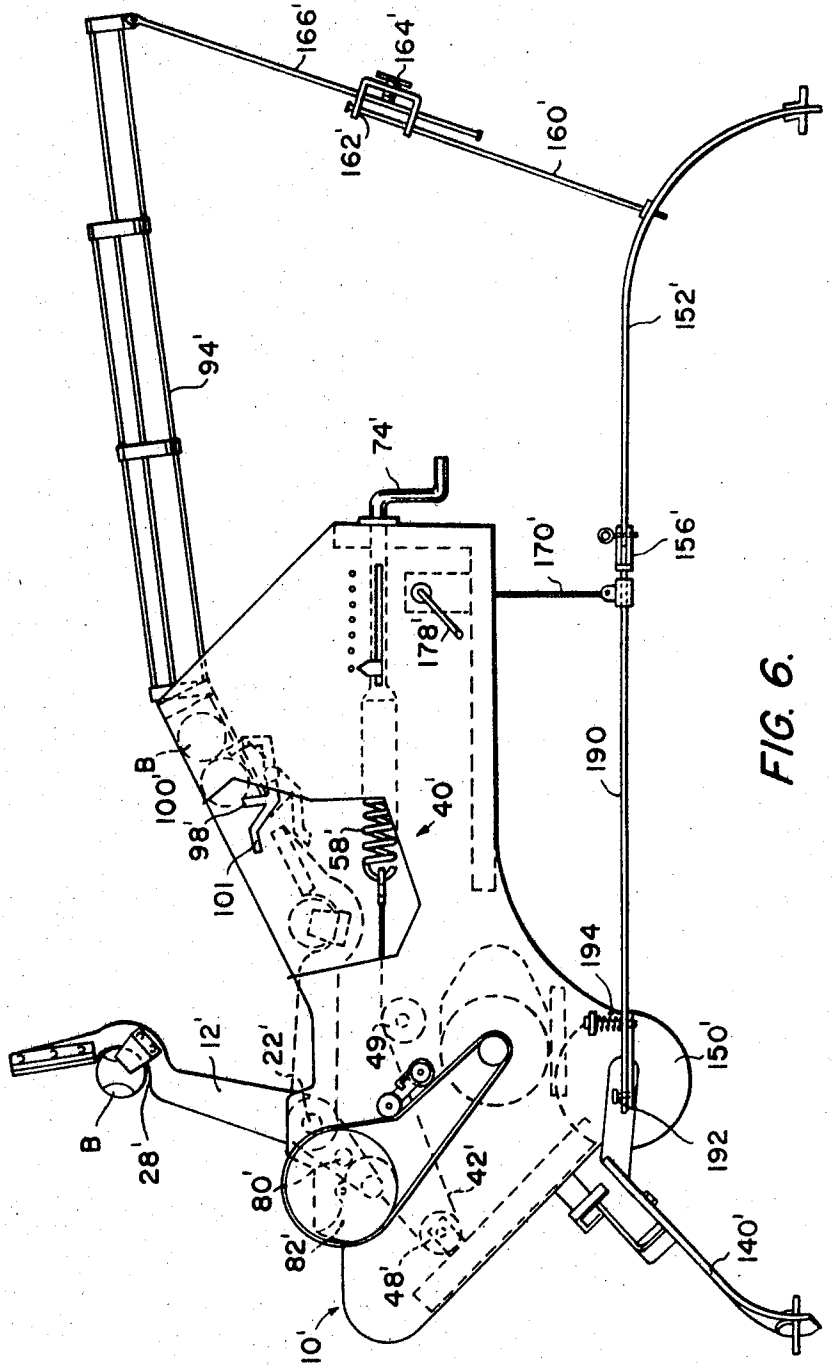


FIG. 6.

INVENTOR.
LORENZO J. PONZA

BY

Paul B. Fiche

PATENT AGENT

United States Patent Office

3,470,859
Patented Oct. 7, 1969

3,470,859

BALL THROWING MACHINE WITH PIVOTAL RESILIENT MOUNT

Lorenzo J. Ponza, Santa Cruz, Calif. 95060

Filed Aug. 23, 1966, Ser. No. 574,460
Int. Cl. F41b 3/04; F41f 7/00
U.S. Cl. 124—7 12 Claims

ABSTRACT OF THE DISCLOSURE

A ball throwing machine having a throwing arm and mounted on a pivotal platform such that the machine pivots and returns to its original position after the throwing arm operates. Tripod legs made of leaf springs may be used to support the pivotal mounting for the platform. The machine is light weight in construction with a thin throwing arm.

The present invention relates generally to ball-throwing machines and more particularly to a machine for throwing baseballs, tennis balls, or the like in a controlled trajectory to provide practice for players.

A rather large number of ball-throwing machines have been proposed and constructed but all have been subject to certain deficiencies in their practical utilization. Most notably in the case of baseball pitching machines, substantial instability in operation has appeared. When baseballs are pitched at relatively high rates of speed to a batter, considerable reactive force against the machine itself is repeatedly experienced so as to shift the position of the machine gradually, which in turn, renders the machine not only of limited usefulness, but also dangerous. In an effort to overcome such instability, baseball pitching machines have been made rather large and heavy but this expedient, in turn, interfered with the portability of the machine, thus further limiting its utility.

In view of the foregoing problems, it is a primary object of the present invention to provide a light-weight, portable, ball-throwing machine which is stable and accurate in its ball-throwing function.

It is a feature of the invention to provide a ball-throwing machine including a movable ball-throwing arm designed to provide the requisite strength but to have minimal weight, thus to minimize reactive forces against the machine itself.

Additionally, it is a feature of the invention to provide a ball-throwing arm designed to be non-flexible in the ball-trajectory plane so that a consistent ball trajectory is assured even though variances in ball weight are encountered.

It is a further feature of the invention to provide a ball-throwing machine whose ball-throwing arm is moved to a cocked position by a simple cam mechanism and is thereafter released for throwing motion under the urgency of a simple spring mechanism.

A related feature of the invention is the provision of a simple adjustment of the spring, even during operation of the machine, to vary the speed of the thrown ball.

It is yet another feature of the invention to provide for a novel and simplified ball-feeding arrangement which automatically feeds a single ball to the throwing arm when in its cocked position.

A related feature of the invention concerns the cooperative association of the ball-feeding means with the mechanism which moves the throwing arm to its cocked disposition.

Still another feature of the invention is the provision of a mount for the throwing arm and the ball-feeding means which itself is carried by a resilient support which dampens the reactive forces delivered to such support.

More particularly, it is a feature of the invention to provide for a pivotal mounting of the arm mount on its support together with supplemental resilient interconnecting elements which minimize the transmission of reactive forces between the platform and its support.

It is yet another feature of the invention to provide a support in the form of a tripod whose legs themselves are resilient so as to effect further absorption of reactive forces or shock and thus minimize unwanted shifting of the machine during the throwing operations.

It is still a further feature of the invention to provide a simple means for adjusting the angular disposition of the arm mount on its pivoted support to facilitate control of the precise desired trajectory of the thrown ball.

Yet a further and particularly significant feature of the invention is the provision of a ball-throwing machine which, for example, is capable of throwing baseballs at speeds approaching one hundred miles per hour, yet which is at the same time a relatively light weight unit facilitating portability thereof.

Yet another feature of the invention relating to its portability is the design of the machine which enables ready disassembly of certain portions thereof so that the entire machine can be broken down and carried conveniently, for example, in the trunk of a conventional automobile.

These as well as other objects and features of the invention will become more apparent from a perusal of the following description of the exemplary structures shown in the accompanying drawings wherein:

FIG. 1 is an isometric view of a baseball pitching machine constituting one embodiment of the invention, a portion of the structure being broken away to illustrate certain details thereof,

FIG. 2 is an enlarged fragmentary sectional view taken along line 2—2 of FIG. 1 illustrating one position of the ball-throwing arm,

FIG. 3 is a fragmentary sectional view similar to FIG. 2 but illustrating the ball-throwing arm in a second operational position whereat a ball is being thrown therefrom,

FIG. 3*a* is a fragmentary sectional view taken along line 3*a*—3*a* of FIG. 3 illustrating the disposition of the baseball as it is thrown by the arm,

FIG. 4 is a fragmentary isometric view illustrating the operation of the ball-feeding means,

FIG. 5 is a transverse sectional view taken along line 5—5 of FIG. 3 illustrating details of the construction of the arm-actuating spring mechanism, and

FIG. 6 is a side elevational view of a modified ball-throwing machine, portions thereof again being broken away to illustrate details of the interior construction.

With initial and generalized reference to FIG. 1, the first embodiment of the ball-throwing machine includes a mounting platform **10** which carries thereabove a ball-throwing arm generally indicated at **12**, together with a cyclical actuating mechanism **14** therefor. The platform **10** also mounts a ball-feeding mechanism **16** on its upper

surface which is arranged to deliver a single baseball B to the throwing arm **12** during each cyclical throwing or pitching operation. The machine is illustrated in FIG. 1 as set up for a throwing operation with the mounting platform supported on a tripod support structure **18** as will be described in detail hereinafter.

The ball-throwing arm **12** itself is of relatively simple, light weight but rigid construction including a central hub **20** supported for free rotation on a shaft **22** carried in a substantially horizontal disposition by suitable brackets **24** secured to and extending upwardly from the mounting platform **10**. From this central hub, one portion of the arm projects upwardly and preferably takes the form of a thin, rigid, apertured plate **26** whose large dimension is in a plane which is perpendicular to the mounting shaft **22** and accordingly substantially in the vertical trajectory plane of ball motion, as will become more apparent hereinafter. Since considerable strength of the arm is only required in this direction, the illustrated thin plate design of the throwing arm **12** minimizes its weight and yet provides sufficient strength for throwing baseballs at speeds up to one hundred miles per hour. Furthermore, the rigid, non-flexible nature of the plate **26** provides a consistent trajectory of baseballs whose weight can vary somewhat. If desired, a lateral brace **27** can be secured between one side of the plate **26** and the hub **20** at a laterally displaced position, thus to provide lateral stability to the throwing arm **12** without adding any significant weight to the pivoted structure.

A ball-receiving pocket **28** is formed by two laterally and forwardly projecting ears **30** which are secured respectively to opposite sides of the plate **26** adjacent a curved or hooked portion **32** thereof spaced slightly from the upper extremity of the arm. Additional guide plates **34** are secured to opposite sides of the plate **26** and extend rectilinearly from the ball-receiving pocket **28** to the outermost extremity of the arm **12** and, as shown best in FIG. *3a*, each of these guide plates **34** is formed with a pair of serrated ridges **36**, all of which are designed to engage the surface of a baseball B when it is thrown from the ball-receiving pocket, thus to provide directional control and underspin to the baseball to provide a controlled trajectory thereof.

A downwardly projecting portion of the ball-throwing arm **12** is preferably also in the form of a plate **38** which is also secured to the hub **20** so as to project substantially in an opposite radial direction from the upper portion of the ball-throwing arm, as clearly illustrated in FIG. 1. The entire arm **12** is held in the illustrated disposition resiliently by spring means **40** to be described in detail hereinafter including a cable **42** which is looped at its extremity around a cable sheave **44** at the extremity of the lower arm plate **38**.

With additional reference to FIG. 2, it will be seen that the cable **42** extends downwardly and to the right through a slot **46** in the mounting platform **10** and thence passes around a cable sheave **48** supported for free rotation on a bracket **50** mounted on the under surface of the mounting platform.

From the sheave **48**, the cable **42** extends rearwardly under the mounting platform **10** for connection at its extremity to a power sheave **52** supported for free rotation on a shaft **54** that extends transversely of the mounting platform **10** and is supported at its extremities by suitable brackets **56** depending from the mounting platform as illustrated in FIG. 5. A torsion spring **58** is mounted in concentric relationship around the shaft **54** and is secured at its one extremity to the power sheave **52** and at its opposite extremity, to a sprocket **60** mounted for free rotation on the same shaft **54** and fixed in an adjusted position by movement of a sprocket chain **62** which is trained about the spring-holding sprocket **60** and another smaller sprocket **64** mounted thereabove on an adjustment shaft **66** suitably supported in brackets **68** projecting upwardly from the mounting platform. A small gear **70** is keyed to the adjustment shaft **66** and is engaged by suitably supported worm gear **72** at the end of a manual control crank **74**. If this crank **74** is turned in one direction or the other, greater or lesser torsion is imparted to the torsion spring **58** and, in turn, greater or lesser tension is imparted through the connecting cable **42** to the ball-throwing arm **12**. Thus, if the arm **12** is displaced either forwardly or rearwardly from its neutral disposition shown in FIG. 1, a variable resilient force, depending upon the position of the speed-control crank **74**, is imparted through the cable **42** to urge the arm to such neutral disposition.

To instigate ball-throwing motion of the arm **12**, it is moved from the neutral position shown in FIG. 1 to a cocked position as illustrated in FIG. 2 by a simple, periodically operative means which includes a cam follower **80** in the form of a roller mounted on one side of the lower portion **38** of the ball-throwing arm in the path of a contoured cam **82** arranged to engage the follower and gradually bring the ball-throwing arm **12** from the neutral to the cocked disposition. The cam **82** is mounted on one side of a sprocket **84** about which a conventional sprocket chain **86** is trained, the chain passing downwardly and around a drive sprocket **88** secured to the shaft **89** of a small electric motor **90** so as to effect continuous rotation of the cam **82** in a clockwise direction as viewed in FIGS. 1 and 2. An intermediate idler sprocket **92** also engages the sprocket chain **86** to maintain the desired degree of tension thereon.

When the motor **90** is energized to drive the cam **82** in the mentioned clockwise direction, a gradually rising cam surface is presented to the follower **80** to cause the entire throwing arm **12** to pivot in a counterclockwise direction, the arm **12** being pivoted into the rearwardly projecting disposition shown in FIG. 2 when the high point of the cam **82** is reached. At this point, the cam surface suddenly drops away and when the follower **80** loses contact therewith, the previously described spring means **40** acts to return the ball-throwing arm **12** in a clockwise direction toward its neutral position. When the arm **12** arrives at such neutral position, it will continue therebeyond into the position illustrated in FIG. 3 since a certain amount of momentum has developed and as the arm passes its neutral position, the torsion spring means **40** now provides a restraining force acting to urge the throwing arm **12** in a counter-clockwise direction from the position shown in FIG. 3 back into the neutral position illustrated in FIG. 1. Thus, the same spring means **40** functions to provide the requisite ball-throwing force and also to subsequently provide a restoring force which returns the arm to its initial neutral disposition preparatory to another rotative cycle of the cam **82**.

It is to be expressly observed that the ball-throwing arm **12** never is stopped suddenly so that reactive forces either forwardly or rearwardly relative to its general direction of motion are minimized. Furthermore, it will be noted that only the throwing arm **12** and the small cable sheave **44** and cam follower **80** thereon constitute the moving parts of the throwing mechanism. Since these parts are designed to be relatively lightweight, the total reactive forces resultant from arm acceleration or deceleration are kept to an absolute minimum.

When the ball-throwing arm **12** is moved to its cocked disposition, as illustrated in FIG. 2, the ball-feeding mechanism **16** is arranged to deliver a single baseball B into the ball-receiving pocket **28** of the throwing arm **12**. Preferably, such ball-feeding mechanism **16** includes a removable, inclined supply chute **94** preferably in the form of a plurality of chute-defining wires held in parallel spaced relationship by a number of cylindrical braces connected thereto at spaced longitudinal positions. The lowermost brace of the inclined chute **94** forms a collar which is telescopically received over a cylindrical neck on a fixed extension of the chute mounted on brackets **96** extending upwardly from the mounting platform at one side of the

cocked throwing arm 12, so that a ball released from the end of the delivery chute 94 can drop immediately into the ball-receiving pocket 28.

In order to control release of a single ball B at the terminal end of the chute 94, a pair of pivoted stops 98, 100 are provided, one stop 98 being pivotally supported centrally on a pivot pin 102 extending from one of the chute support brackets 96 for movement between a ball-stopping position as illustrated in FIG. 1 and in full lines in FIG. 4 where the upper end of the stop is aligned with the terminal end of the chute 94 and a ball-releasing position shown in FIG. 2 and in phantom lines in FIG. 4 where this same stop has been pivoted out of ball-stopping position. The second stop 100 is supported pivotally in a similar fashion by a pivot pin 104 projecting from the other chute-supporting bracket 96 so that its upper extremity is movable between a ball-releasing position as shown in FIG. 1 and a ball-stopping position as shown in FIGS. 2 and 4 whereat the upper end of the stop is positioned between the first and second balls B at the delivery end of the chute 94.

Each of the two stops 98, 100 is connected to the adjacent mounting bracket by a small spring 106, 108 so as to resiliently hold the respective stop in a predetermined position. More particularly, the spring 106 on the first stop 98 resiliently retains such stop in the ball-stopping position as illustrated in FIG. 1 and in full lines in FIG. 4. On the other hand, the spring 108 on the second stop 100 normally retains this stop in its opened, ball-releasing position as illustrated in FIG. 1.

Generally, the operation is such that when the ball-throwing arm 12 is moved from its neutral to its cocked disposition, the second stop 100 is first moved from its inoperative position as shown in FIG. 1, to its operative ball-stopping position shown in FIGS. 2 and 4, and thereafter, the first stop 98 at the terminal end of the chute 94 is moved from its ball-stopping disposition shown in FIG. 1 and in full lines in FIG. 4, to the ball-releasing position, shown in FIG. 2 and in phantom lines in FIG. 4, wherefore the baseball B at the terminal end of the chute 94 can drop by gravity into the adjacent ball-receiving pocket 28, but the remainder of the baseballs B are retained in the delivery chute 94 by the second stop 100 preparatory to a subsequent ball-feeding operation.

Preferably, the stop actuating means are arranged for energization from the same drive mechanism which moves the ball-throwing arm 12 from its neutral to its cocked disposition, the specific arrangement being best illustrated in FIG. 4. As there shown, a rod 110 is connected at its opposite extremities to the lower ends of the two stops 98, 100 passing through generally horizontal slots in the mounting brackets 96 therefor. At an intermediate position, and more particularly, at a position somewhat closer to the second stop 100, an actuating rod 112 is pivotally joined to the described stop rod 110 at its one extremity and extends forwardly over the mounting platform 10 for connection at its remote end to one end of a crank arm 114 which is centrally supported for rotative motion about a fixed pivot pin 116 connected to the mounting bracket 24 for the ball-throwing arm 12. The opposite extremity of the crank arm 114, which projects substantially horizontally in its inoperative disposition carries a cam follower 118 in the form a roller at its extremity for actuating engagement by a lobular cam 120 which is mounted on the same drive shaft 83 which mounts the actuating cam 82 for the ball-throwing arm 12, thus assuring a correlated action of the ball-throwing arm 12 and the ball-feeding mechanism 16.

The correlation is such that as the arm-actuating cam 82 instigates movement of the ball-thowing arm 12 towards its cocked disposition, the feed cam 120 engages the associated cam roller 118 in the fashion shown in FIG. 4 in full lines to effect a counter-clockwise motion of the crank arm and a consequent pull on the actuating rod 112 which, in turn, pulls the rod 110 connecting the lower ends of the two stops 98, 100 to the right as viewed in FIG. 4. Since the actuating rod 112 is connected to the stop-connecting rod 110, closer to the second stop 100, this stop is moved first from the ball-releasing position shown in FIG. 1 to the ball-stopping position as shown in FIG. 4. Continued pull brings that end of the stop-connecting rod 110 to the end of the associated slot in the mounting bracket 96 and further motion of the actuating rod 112 in response to continued motion of the cam 120, as shown in phantom lines in FIG. 4, will then exert a pull on the lower end of the stop 98 so as to move the same from the ball-stopping position shown in full lines in FIG. 4 to the ball-releasing position illustrated in phantom lines. Thus, a single actuating rod 112, through its off-center connection, automatically performs a sequential operation wherein the second stop 100 is moved into ball-stopping position before the first stop 98 is moved into ball-releasing position and only a single ball B will be dispensed from the chute 94 to fall into the ball-receiving pocket 28 of the throwing arm 12 in its cocked disposition as shown in FIG. 2.

During the ball-throwing operation, the movement of the ball-throwing arm 12 and the ball B thrown thereby does exert some reactive force on the mounting platform 10 although, as previously explained, the lightweight construction of the throwing arm 12 and its particular mounting arrangement minimizes such reactive force. However, in accordance with an additional aspect of the present invention, the mounting platform 10 itself is supported in a fashion which minimizes the transfer of such reactive forces to its own support that is in turn, ultimately in engagement with the underlying ground or other surface.

As previously mentioned, such supporting structure 18 is preferably generally in the form of a tripod and, more particularly, includes a rectangular tubular frame 122 whose sides are centrally bent downwardly to the front and rear. The front cross member of the frame 122 removably supports two legs 140, which extend downwardly and forwardly therefrom and a third leg 152 projects rearwardly and downwardly from the central portion of the rear cross member of the frame 122, as clearly shown in FIG. 1. At the apex portions of the bent tubular frame 122, pins 130 project inwardly to carry the mounting platform 10 for pivotal motion about an axis which is substantially horizontal and extends transversely to the direction of motion of the ball-throwing arm 12 and a ball B thrown therefrom.

From the forward portion of the mounting platform 10, a pair of springs 130 extends downwardly for connection at their lowermost ends to the cross member of the support frame 122 and a third spring 132 similarly extends downwardly from the rear of the mounting platform to the support frame thereunder, thus to resiliently restrict pivotal motion of the mounting platform 10 on the support frame. The sides of the support frame 122 which slope downwardly and forwardly from the pivotal support of the mounting platform 10, are each formed with brackets 134 which receive telescopically parallel stubs 136 rigidly projecting from a cross member 138 which carries at its extremities the two forward tripod legs 140, each of which preferably takes the form of an elongated leaf-spring which is pointed at its lower extremity for slight entry into the earth and carries adjacent such lower extremity lateral flanges 142 which preclude excessive entry of the pointed end of the leg into the earth. Preferably, at its upper extremity, each leg 140 is pivotally secured to the cross-member 138 by a bolt 144 and another spring-urged bolt 146 is mounted on the cross-member 138 to normally project into an opening in the leg when in its operative, extended disposition as shown in FIG. 1. If this retaining bolt 146 is pulled resiliently from the opening in the leg 140, the leg can, in turn, be pivoted into substantial parallelism with the cross member 138, thus to provide a collapsed disposition facilitating storage and portability of this leg

portion of the frame. When the two forward legs **140**, with their common mounting cross member **138** are withdrawn from the telescopic connection to the support frame **122**, a pair of wheels **150** mounted on the sides of the main support frame **122** are disposed so as to extend beyond the lower extremities of such support frame and thus provide rolling support for the entire structure to any desired location. Normally, the third and rearwardly extending leg **152** of the tripod support **18** is then used as a handle for lifting the structure in the fashion of a two-wheeled cart to facilitate such rolling movement of the entire structure to a desired place.

Such third and rearwardly and downwardly extending leg **152** is also in the form of a leaf-spring which is pointed at its lower end for penetration in to the ground and lateral flanges **154** are secured to the leg adjacent such pointed end to preclude excessive penetration into the earth. At its upper end, the leaf-spring is received within a socket **156** suitably formed at the central, rear portion of the main support frame **122** and is held removable by a retaining pin **158**, thus enabling withdrawal of the third leg from its operative disposition.

It is notable that the support frame **122**, after the legs **140**, **152** have been removed, has no greater lateral dimensions than the mounting platform **10** which it carries. Furthermore, since the supply chute **94** can be detached from the brackets **96**, the entire machine can be placed in a relatively small compartment such as the trunk of a standard automobile.

From one of the flanges **154** on the rear tripod leg **152**, a rod **160** projects upwardly into a bracket **162** which is slidably adjustable on such rod through the expedient of loosening or tightening a knurled set screw **164** and a second rod **166** which is fixed at its lower end to such bracket extends upwardly therefrom for connection at its upper extremity to the rear and highest end of the inclined ball-feeding chute **94**. Thus, adjustment of this linkage enables the inclination of the chute **94** to be varied as requisite to assure a gravity flow of a plurality of baseballs into feeding position at its lower discharge end.

Since the mounting platform **10** is pivotally mounted on the tripod support **18**, it is an additional feature of the invention to provide for pivotal adjustment of the mounting platform to, in turn, control the elevational trajectory of a ball B thrown thereby. Structurally, as best shown in FIG. 3, such elevation control means preferably is integrated with the restraining spring **132** connected between the support frame **122** and the mounting platform **10** and includes a cable **170** which is connected to the upper extremity of the described spring **132** at its lower end and is wound around a small reel **172** secured on the mounting platform for rotational adjustment in response to the turning of a gear **174** secured adjacent the reel and operatively engaged by a worm gear **176** connected at the end of a small crank **178**. It is to be particularly observed that this manual adjustment of the ball trajectory can be made during operation of the machine so that quick adjustment from horizontal pitches to elevated fly balls or grounders can be readily achieved at the will of the operator.

In order to protect the operator, a three-section foldable net **180** is releasably mounted between the forward portion of the tripod support **18** and the mounting platform **10** as shown in FIG. 1 and can be removed for storage purposes.

If it is assumed that this elevation control crank **178** has been present at a desired position and the speed control crank **74** has also been turned to a desired setting, the supply chute **94** can be loaded with a relatively large number of baseballs B, and the motor **90** then energized to instigate operation of the ball-throwing machines. Rotation of the motor shaft in a clockwise direction as viewed in FIGS. 1 and 2 will instigate motion of the arm actuating cam **82** and the ball-feed actuating cam **120** mounted on the common shaft **89** and the arm **12** will initially move in a counter-clockwise direction from its neutral position shown in FIG. 1 to the cocked position shown in FIG. 2, such motion being relatively slow so that the requisite size of the motor **90** can be relatively small (e.g. ¼ horsepower). As the ball-throwing arm **12** reaches its cocked disposition, the second stop **100** has arrived at ball-stopping position and the first stop **98** moves to ball-releasing position so that a baseball B can drop into the ball-receiving pocket **28** as illustrated in FIG. 2. Immediately thereafter, the arm-actuating cam **82** is removed from engagement with the cam follower **80** and the torsion spring means **40** can act to move the ball-throwing arm **12** in a rapid clockwise motion towards the extreme position illustrated in FIG. 3 whereat the ball B is released from the pocket **28** and moves along the ball-directing ridges **36** formed on the rectilinear guide plates **34** which, as illustrated in FIG. 3*a*, impart an underspin thereto which serves to maintain the ball in a substantially horizontal trajectory as it approaches a batter. The torsion spring **58** now acts to return the throwing arm **12** in a counter-clockwise direction towards its neutral disposition and a slight to and fro motion of the arm occurs before it finally settles to the neutral disposition illustrated in FIG. 1. As will be obvious, in the meantime, the ball-feed cam **120** has released its engagement with the associated crank arm **114** so as to return the ball stops **98**, **100** to their initial dispostions as shown in FIG. 1.

Since the weight of the ball-throwing arm **12** has been minimized in the manner described heretofore, minimal reactive forces are transmitted to the mounting platform **10**. In turn, these minimal reactive forces tend to effect a slight pivotal motion of the mounting platform **10** itself on its tripod support **18** and this motion of the mounting platform is, in turn, dampened by the spring connections to the tripod support structure. Finally, since the tripod support **18** includes legs **140**, **152** formed by leaf springs which further absorb any transmitted reactive forces, the ultimate forces experienced between the legs and the supporting earth are substantially negligible and no shifting of the machine from its original placement occurs, even over extended periods of operation and even though the baseballs B may be thrown at relatively high speeds approaching one hundred miles per hour.

If the ball-throwing machine is to be moved to a different position, it is merely necessary for the two forward tripod legs **140** to be withdrawn from their telescopic mounting on the support frame **122** which, in turn, brings the wheels **150** into engagement with the ground and the rear tripod leg **152** may be grasped to wheel the entire structure to the new location whereupon the forward tripod legs **140** can be reinserted and the machine is once again ready for use.

If the entire machine is to be moved in a vehicle or stored, the forward tripod legs **140** can be removed from the support frame **122** in the manner described and the rear tripod leg **152** can, in turn, be withdrawn from its socket and subsequently, the ball supply chute **94** can be withdrawn from its telescopic reception in the brackets **96**, thus to provide a plurality of elements whose overall dimensions are relatively small and can readily be stored in the trunk of an automobile or in a relatively small closet. When desired, reassembly of the entire structure can be achieved by reversing this operation and, in practice it has been found that the entire machine can be set up from its knocked-down position in less than two minutes.

It will be apparent that many details of the structure described hereinabove with reference to FIGS. 1 through 5 can be changed without departing from the spirit of the invention and as one example, reference is made to FIG. 6 wherein there is shown a slightly modified embodiment of the invention which, however, not only retains the same inventive principles, but also includes

many structural elements which are substantially identical with those in the first embodiment of the invention and will therefore be indicated in the following description by like reference numerals with an added prime notation to provide differentiation.

The ball-throwing arm **12'** is substantially identical with that shown in the first embodiment of the invention and is mounted for its pivotal motion on a short transverse shaft **22'** which extends between two substantially vertically disposed parallel side plates which provide a housing **10'** for the entire unit corresponding to the mounting platform **10** of the first embodiment of the invention. Generally, the ball-throwing arm **12'** is similarly actuated by the engagement of a rotary cam **82'** with a cam follower **80'** on the throwing arm **12'** and spring means **40'** are utilized to provide the throwing force after the arm has been moved from its full-line neutral disposition to its cocked disposition shown in phantom lines in FIG. 6. More particularly, a cable **42'** is connected to the lowermost extremity of the arm to pass downwardly and around a sheave **48'** and thence rearwardly over another idler sheave **49** to one end of a coil spring **58'** held in tension between the end of the cable **42'** and an adjustment member whose disposition in a direction co-axially of a spring can be adjusted by turning of a hand crank **74'** suitably mounted at the rear of the housing **10'**.

An elongated ball-feeding chute **94'** structurally similar to that appearing in the first embodiment of the invention is arranged to deliver a series of baseballs B to a position immediately behind the ball-receiving pocket **28'** of the throwing arm **12'** when the latter is in its phantom-line cocked disposition. Delivery of a single baseball B to the throwing arm **12'** in such disposition is controlled by a pair of stops **98'**, **100'** which constitute the upstanding projections from opposite ends of a base member that is pivotally mounted, one of the stops **98'** being arranged for movement between ball-stopping and ball-releasing position at the terminal end of the feed chute **94'** and the second stop **100'** being arranged for correlated motion between ball releasing and ball-stopping positions between the first and second balls in the chute. Suitable spring means (not shown) normally holds the stops **98'**, **100'** in the disposition indicated in full lines in FIG. 6, but an additional tongue **101** projects forwardly from the stops for engagement by the extremity of the ball throwing arm **12'** as it reaches its cocked disposition. When such contact is made, the second stop **100'** is first raised into ball-stopping position between the first and second balls B and the first stop **98'** is thereafter removed from its ball-stopping position at the terminal end of the chute **94'** wherefore the first baseball B can roll down into the ball-receiving pocket **28'** preparatory to the throwing action which follows immediately thereafter. Such action is substantially the same as in the first embodiment of the invention and therefore will not be repeated.

At the forward and lower end of the side plates forming the housing **10'**, a cross member is releasably secured thereto by suitable brackets and carries a pair of leaf-spring legs **140'** at its outer extremities which form the forward portion of a tripod support **18'** generally similar in nature to those described in the first embodiment of the invention. Such legs **140'** are pivoted and are extended beyond such pivotal support to mount wheels **150'** which can therefore be swung downwardly into ground-engaging positions when the machine is to be moved. To facilitate such motion the third rear leg **152'** of the tripod is in the form of a leaf-spring which curves downwardly from a socket **156'** to form a pointed end which engages the earth when the machine is to be operated. The socket **156'** is mounted at the rear extremity of a mounting leaf spring **190** which is substantially horizontal and is pivotally joined at its forward extremity by a bolt **192** to the housing **10'**. A coil spring **194** is compressed between the housing **10'** and the upper surface of the leaf spring **190** to normally maintain the illustrated disposition but to permit pivotal adjustment.

To provide for such adjustment of the ball trajectory, a cable **170'** is connected at its lower end to this leaf-spring **190** and extends vertically to pass around a reel which, in turn, can be rotated by a small hand crank **178** projecting from the side of the housing **10'**. Although the coil springs **130**, **132** connecting the mounting platform **10** of the first embodiment of the invention to the support frame **18** do not exist in this second embodiment, the particular disposition of the leaf-spring legs provide for such resilient connection between the housing **10'** and the support **18'** therefore to again function as an effective shock absorber wherefore the entire machine, although of relatively light weight, will not shift during operation.

Various further modifications and/or alterations can obviously be made without departing from the spirit of the invention and the foregoing description of two embodiments is accordingly to be considered as purely exemplary and not in a limiting sense and the actual scope of the invention is to be indicated only by reference to the appended claims.

What is claimed is:

1. A ball-throwing machine which comprises,
a ball-throwing arm,
means mounting said arm for ball-throwing motion,
a ground engageable support means carrying said mounting means above the ground,
a pivotal connection between said support means and said mounting means, and
resilient means resiliently resisting movement of said mounting means in either pivotal direction from a predetermined initial position and operative upon pivotal displacement of said mounting means from its predetermined initial position to return said mounting means to such predetermined position.

2. A ball-throwing machine according to claim **1** wherein
said ball-throwing arm consists of a rigid plate which is thin in a direction perpendicular to its direction of motion.

3. A ball-throwing machine according to claim **1** wherein said pivotal motion is about an axis extending perpendicularly to the direction of throwing motion.

4. A ball-throwing machine according to claim **3** which comprises means for adjusting the pivotal disposition of said mounting means on said support.

5. A ball-throwing machine according to claim **3** wherein said arm-mounting means supports said arm for pivotal motion about an axis parallel to the pivotal axis for support of said mounting means.

6. A ball-throwing machine according to claim **5** which comprises spring means connected to said arm to hold the same resiliently in a neutral position.

7. A ball-throwing machine according to claim **6** which comprises means periodically contacting said arm to move same from its neutral position to a cocked position.

8. A ball-throwing machine according to claim **7** which comprises means automatically operative in response to movement of said arm to cocked position to feed a single ball to said throwing arm.

9. A ball-throwing machine according to claim **3** wherein said resilient support includes a tripod leg structure, each leg being composed of a leaf spring.

10. A ball-throwing machine according to claim **9** wherein said tripod legs are removably connected to the remainder of said resilient support.

11. A ball-throwing machine according to claim **10** wherein said resilient support includes a pair of wheels adjacent two of said removable legs and adapted to provide a mobile support when said two legs are removed.

12. A ball-throwing machine according to claim 9 which comprises trajectory adjustment means connected between said mounting means and one of said tripod legs at a position intermediate of its overall length.

References Cited

UNITED STATES PATENTS

1,051,470	1/1913	Waldmann	124—7
2,170,221	8/1939	Stanley	124—29
2,696,204	12/1954	Gilgoff	124—7
2,815,743	12/1957	Brunderman	124—7
2,877,757	3/1959	Giovagnoli	124—7
3,213,843	10/1965	Laney	124—7
3,328,028	6/1967	Williams	272—57

ANTON O. OECHSLE, Primary Examiner

T. ZACK, Assistant Examiner

U.S. Cl. X.R.

124—30, 36, 41, 50