March 14, 1967 E. APPLEGATE 3,308,802

POWER DRIVEN BASEBALL PITCHING MACHINE WITH BATTER SIGNALLING MEANS

Filed April 20, 1964 2 Sheets-Sheet 1

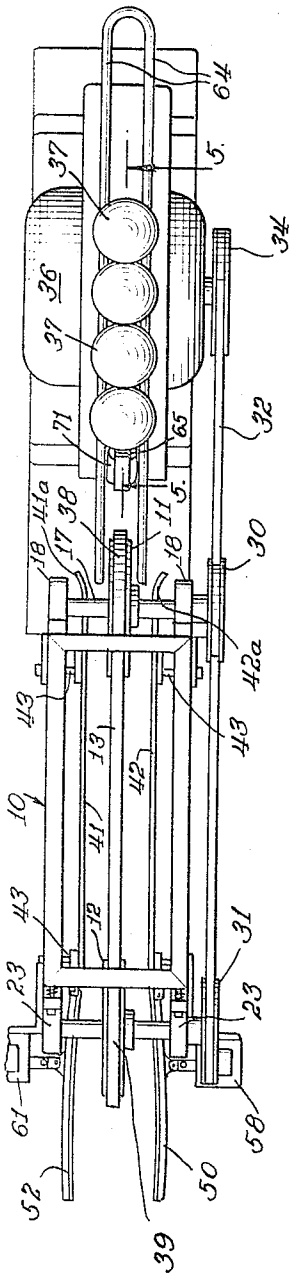

Fig. 2

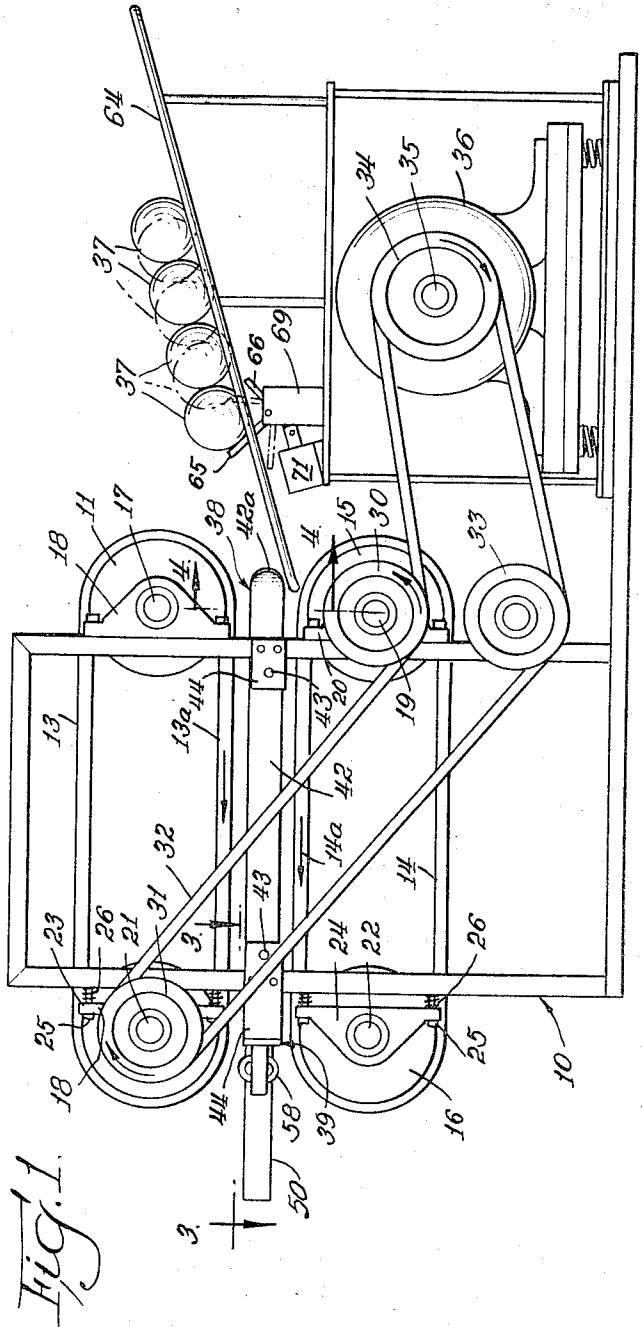

Fig. 1

INVENTOR.

Earl Applegate

BY

Darbo, Robertson & Vandenburgh

Attys.

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Fig. 3

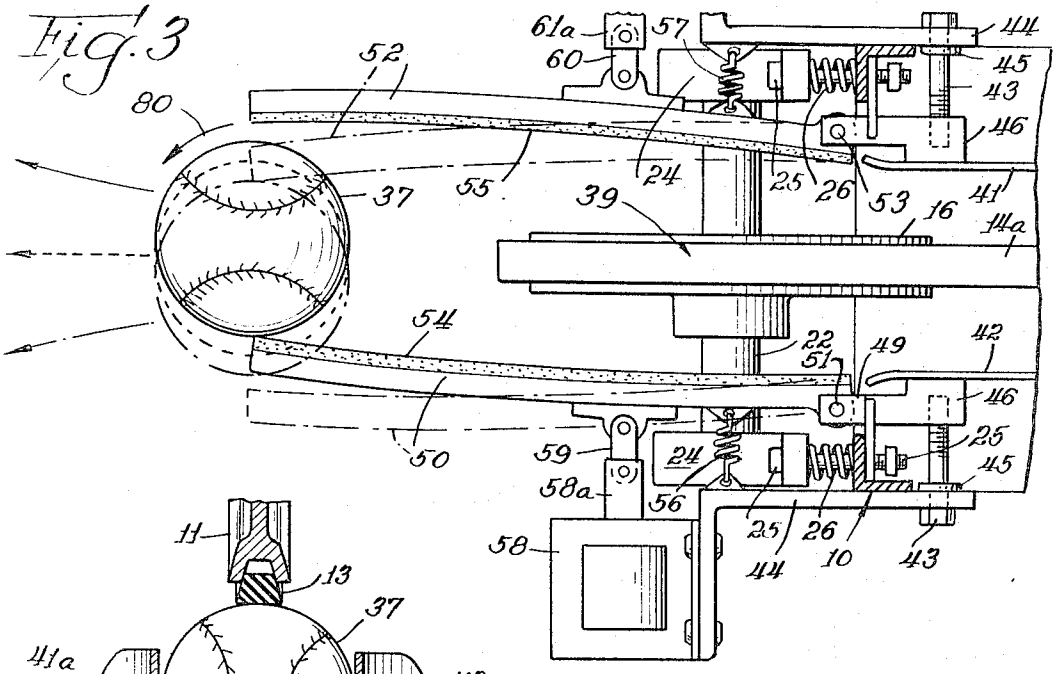


Fig. 4

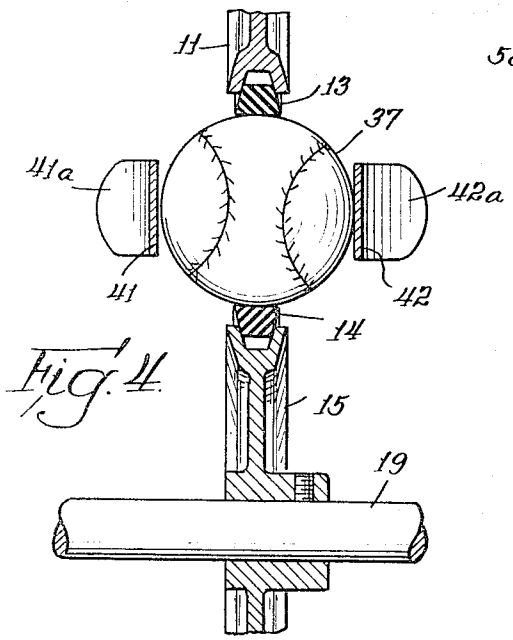


Fig. 6

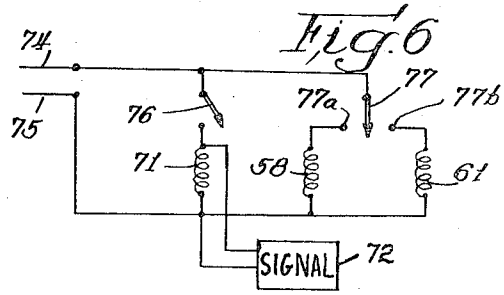
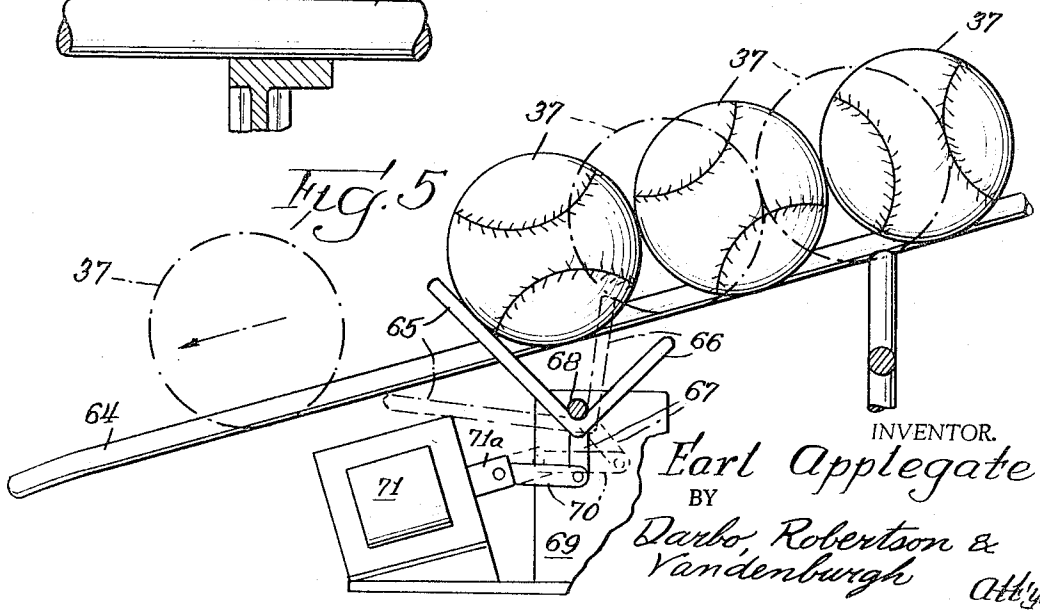


Fig. 5



INVENTOR.
Earl Applegate
BY
Darbo, Robertson & Vandenburgh
Attys.

United States Patent Office 3,308,802
Patented Mar. 14, 1967

3,308,802

POWER DRIVEN BASEBALL PITCHING MACHINE WITH BATTER SIGNALLING MEANS

Earl Applegate, 750 Harvard Terrace,
Frankfort, Ind. 60423

Filed Apr. 20, 1964, Ser. No. 360,932
3 Claims. (Cl. 124—1)

The present invention relates to improvements in a baseball pitching machine, and the following disclosure thereof is offered for public dissemination upon the grant of a patent therefor.

The present invention is intended to provide a sturdy, reliable baseball pitching machine that can be manufactured and sold in a moderate price range. The parts employed are mostly relatively standard mechanical components which not only is an aid in the manufacture of embodiments of the invention, but also facilitates repairs should that be necessary. At the option of the operator the preferred form of machine will throw a straight ball, a curve in one direction or a curve in the opposite direction. Control over these functions may be maintained from a remote point by a coach who may or may not inform the batter beforehand which type of pitch will be thrown.

Further objects and advantages will become apparent from the following description taken in conjunction with the drawings in which:

FIGURE 1 is a side elevation of an embodiment of the invention;

FIGURE 2 is a plan view;

FIGURE 3 is an enlarged partial section as viewed at line 3—3 of FIG. 1;

FIGURE 4 is an enlarged partial section as viewed at line 4—4 of FIG. 1;

FIGURE 5 is an enlarged elevational view of the ball feeding mechanism; and

FIGURE 6 is a schematic wiring diagram.

Although the following disclosure offered for public dissemination is detailed to ensure adequacy and aid understanding, this is not intended to prejudice that purpose of a patent which is to cover each new inventive concept therein no matter how others may later disguise it by variations in form or additions or further improvements. The claims at the end hereof are intended as the chief aid toward this purpose; as it is these that meet the requirement of pointing out the parts, improvements, or combinations in which the inventive concepts are found.

Throwing apparatus

The illustrated embodiment includes a frame generally **10**. Two pulleys **11** and **12** carry an upper V-belt **13**. A lower V-belt **14** is mounted on two pulleys **15** and **16** which train it for movement about a lower path. Pulley **11** is secured to a shaft **17** journaled in bearings **18** on frame **10**. A shaft **19** journaled in bearings **20** rotatably supports pulley **15**. Pulleys **12** and **16** are secured to shafts **21** and **22** respectively with the shafts being journaled in bearings **23** and **24** respectively. Bearings **23** and **24** are slidably mounted on bolts **25** with the bearings being urged away from frame **10** by means of springs **26** therebetween. Springs **26** thus maintain a given tension on belts **13** and **14**.

Shafts **19** and **21** have pulleys **30** and **31** respectively secured thereto. A drive belt **32** engages pulleys **30** and **31** as well as an idler pulley **33** and a drive pulley **34**. This belt may be of double-V form (V-shaped inside and outside). Pulley **34** is secured to shaft **35** of electric motor **36**. The arrangement is such that the adjacent runs **13***a* and **14***a* of the two throwing belts move in the direction indicated by the arrows in FIG. 1 so that a

ball **37** received between the belts at an entrance point **38** will be discharged from between the belts at a discharge point **39**.

To obtain satisfactory performance, since balls are not exactly uniform, it is important that balls **37** are carried by belts **13** and **14** in a way to provide resiliency, i.e. that they not come into contact with the edges of the respective pulleys on which the belts ride. Furthermore, the distance between the adjacent faces of runs **13***a* and **14***a* of the belts should be such that the belts are slightly compressed where they contact a ball **37** as the ball moves between the pulleys. This is achieved by the positioning of the pulleys and by employing size B V-belts on size A pulleys. That is, the belts are one size larger than that with which the pulleys are intended to be employed. The result of this is best seen with reference to FIG. 4. With size A pulleys used with size A belts, the belts would be well seated into the grooves in the pulleys. However, it will be noted in FIG. 4 how the larger size B belts project well outside of the pulley grooves. This achieves the required resiliency at those points at which the ball moves directly between the two adjacent pulleys. One of those points is the discharge area of the throwing apparatus, a somewhat critical point in obtaining the desired operation.

Ball guides

Extending along the path of movement of the ball between the entrance and discharge points are a pair of side guides **41** and **42**. At about entrance point **48** the guides are flared outwardly as seen at **41***a* and **42***a* respectively. As best seen in FIG. 4, the guides are spaced apart a distance slightly greater than the diameter of the baseball **37**. Uniform throwing requires that the excess be very slight, not over about ⅛ inch. Hence, the balls should not vary in diameter by more than about ⅛ inch.

The mounting of guides **41** and **42** is best seen in FIG. 3. A bolt **43** is rotatably mounted on a bracket **44** and is held in place by a spring clip or C-washer **45** received in a groove in bolt **43**. The projecting end of bolt **43** is threaded into a support **46** secured to the respective guide **41** or **42**. By rotating bolt **43** and varying the extent to which the threads thereof are received in the tapped opening in support **46**, the support and the respective guide are moved toward or away, as the case may be, from bracket **44**.

Curving apparatus

The curving mechanism is best illustrated by referring to FIG. 3. It will be seen that guide supports **46** have a rearwardly projecting bifurcated finger **49**. At one side there is a curving arm **50** pivotally mounted by means of pin **51** on bifurcated finger **49**. At the other side is a curving arm **52** pivotally mounted on pin **53**. Either one of these curving arms may be moved into the path of the ball at the side of the ball to give the ball a spin which will make it curve as it approaches the batter. The arms should be curved and initially nearly tangent to the path of the approaching ball, so as to have prolonged contact with the ball. Arms **50** and **52** have tough resilient pads **54** and **55** covering the adjacent faces thereof. These pads are formed of rubber, but could be felt, etc. A spring **56** connects arm **50** with bracket **44** and resiliently urges arm **50** towards bracket **44**. Similarly, a spring **57** connects the opposite bracket **44** with arm **52** and resiliently urges the arm **52** towards its respective bracket **44**. A solenoid **58** is secured to bracket **44**. It has an armature **58***a* connected by a link **59** to arm **50**. Arm **52** is connected by a link **60** to armature **61***a* of a solenoid **61** (not seen in FIG. 3 but appearing in FIG. 6).

Because of springs **56** and **57**, curving arm **50** nor-

mally assumes the idle position illustrated in dotted lines, while arm **52** normally assumes the idle position illustrated in full lines in FIG. 3. When the respective solenoid **58** or **61** is energized, the respective armature is extended thus pivoting the respective arm inwardly from its rest position. The arms stay in that position, except as described below, so long as the respective solenoid is energized. Upon deenergizing of the solenoid, the arm and armature are retracted by its spring **56** to its normal position.

The curving apparatus should be concealed from the batter's view so that he cannot detect which pitch to expect. In fact, the entire apparatus would be within a housing, not shown.

In order to spin the ball properly for a curve without deflecting it so far from the straight ball trajectory that the same directional setting of the thrower for both types of pitches would not be sufficiently accurate, certain considerations must be observed. The lateral pressure of the spin pad on the ball must be barely enough to maintain frictional contact, but this frictional contact must be maintained for a substantial distance. In other words, there must be a contact such as will overcome the ball's spin inertia without greatly altering its trajectory. The slight curvature of the spin pads as shown helps in this regard. It is possible that a curvature could be so carefully designed, approximately as illustrated, that the spin pad could be rigidly positioned during the pitch, although this position should probably be adjustable. Of course, the resilient facing would yield to some extent in any event. It is believed to be desirable, however, to have the spin pad readily yieldable to the lateral force resulting from the momentum of the ball, but at the same time substantially unyieldable with respect to the forward component of the thrust of the ball on the pad. These two considerations are achieved by using a solenoid **58** having a strength only sufficient for reliably overcoming spring **56** (which may be adjustable) and shifting the spin pad, and pivoting the spin pad at the axis **51** close to the path of the ball substantially spaced from the point of the initial engagement of the ball with the pad. In the illustrated form the ball does not engage the pad until it reaches approximate alignment with link **59**, where the point of initial contact is only about 10° inward about axis **51** from a line parallel to the ball's path. The drag resulting from the spin inertia of the ball will then have very little tendency toward moving the spin pad aside, but the pad will nevertheless move aside readily so as to apply only that deflecting pressure on the ball necessary to maintain a spin-producing contact.

Ball feeding apparatus

The ball feeding apparatus comprises a pair of spaced inclined rails **64** which support the balls **37** accurately centered in alignment with belts **13** and **14**. The feeding stop comprises a Y-shaped member having stop fingers **65** and **66** and a base finger **67**, all being secured to a rocker shaft **68**. Rocker shaft **68** is pivotally mounted on brackets **69** of frame **10**. Base finger **67** is connected by a link **70** to armature **71***a* of solenoid **71**. This solenoid is preferably of a type that includes a spring (not shown) normally urging armature **71***a* to an extended position. When the solenoid **71** is energized, the armature thereof is retracted.

Stop fingers **65** and **67** may be above or below the balls and are so proportioned and positioned that when the solenoid **71** is energized, stop finger **65** projects upwardly between rail **64** into the path of one of the baseballs **37** as seen in full lines in FIG. 5, finger **66** being withdrawn to let a ball roll down against finger **65**. When solenoid **71** is deenergized, the armature thereof rotates rocker shaft **68** in a counterclockwise direction to move stop finger **65** out of the path of the first ball on the rails while at the same time stop finger **66** moves up to be in the path of movement of the second ball on the rail. Thus, the first ball is released to roll by gravity down the rails and into the entrance point **38** between the V-belts **13** and **14**. Upon again energizing of the solenoid **71**, the armature thereof retracts rotating rocker shaft **68** in a clockwise direction. The ball that had been held back by stop finger **66** now moves down to be caught by stop finger **65**.

Preferably there is provided a signal light or other signal **72** (FIG. 6) to indicate to the batter when to get "set." When the coach presses the button, or when the ball is about to be pitched by automatic timing, the situation is analagous to the pitcher beginning his final wind-up.

Operation

FIG. 6 illustrates the wiring for the solenoids. Wires **74** and **75** connect to a suitable source of electric power to operate the various solenoids. A switch **76** is connected in series with solenoid **71** between wires **74** and **75**. A three-way switch **77** has a neutral position, an active contact **77***a* connected to solenoid **58**, and a second active contact **77***b* connected to solenoid **61**. Thus, switch **77** alternatively may be positioned: (1) to not energize either of solenoids **58** or **61**; (2) to energize only solenoid **58**; or (3) to energize only solenoid **61**. Motor **36** is energized continuously, when the machine's main switch is "on."

Each time that switch **76** is opened solenoid **71** is deenergized to release a ball **37** to enter the throwing apparatus and to be discharged from the machine. If switch **77** is then in the neutral position, both of the curving arms will be out of the path of the ball as it leaves the machine so that the trajectory of the ball will be relatively straight. If switch **77** is moved onto contact **77***a*, then solenoid **58** is energized to move curving arm **50** to the position illustrated in FIG. 3. In this position the outer portion of pad **54** is in the path of movement of ball **37**. If thereafter, the operator would open switch **76** to release a ball, that ball, upon leaving the discharge point **39**, will contact pad **54** and roll along the pad. This imparts a rotary motion to the ball as illustrated by arrow **80**. This rotary motion in turn causes the ball to move in a curved trajectory after leaving the pitching machine.

The ball would curve in the opposite direction if curving arm **52** were moved into the path of the ball rather than curving arm **50** as illustrated in FIG. 3. This, of course, would be achieved by the positioning of switch **77** on contact **77***b* instead of on contact **77***a*. Each time that switch **76** is closed, and then reopened, a ball will be discharged from the machine. As switch **76** is closed, signal **72** will be actuated, and when the batter has had time to get "set," the switch **76** is opened, as by releasing a button to pitch the ball.

Further details and modifications

Many variations are possible within the spirit of the invention. The curving unit may be omitted for low-priced "little league" pitching machines. It may also be improved to duplicate a wider variety of pitches. Means can be added for varying speed of throw and minutely changing the direction of throw. The latter can be coupled to the curve pads to make a correction automatically if a given curve pad is found to cause too much deflection. An automatic timer can actuate the ball feed circuit several times in sequence (perhaps in response to deposit of a coin). The ball-feeder can be of any desired type. A time delay relay can be provided in conjunction with button control (or a foot actuated control, if preferred) for enabling a batter to himself initiate the operation or "wind-up" and then have time to get "set" before the ball its thrown. The use of easily flexed belts, such as those which have many notches or transverse slits on their inner sides, aids low cost production by permitting the use of a smaller motor. A gasoline engine can be provided instead of the electric motor, and

in that event the solenoids and signal may be operated by a battery or a generator driven by the engine. Belt tightening springs can, of course, be omitted if other belt tightening facilities are provided. Of course, many additional changes will occur to others particularly as in the light of more experience.

I claim:

1. A ball pitching machine comprising: a frame; a pair of V-belts supported on pulleys rotatably mounted on the frame, one pair of said pulley being mounted for rotation about horizontal axes above a second pair of pulleys also mounted for rotation about horizontal axes, said pairs of pulleys being spaced apart a distance such that with a ball between the belts mounted thereon there will be a slight compression of the belts; power means connected to said pulleys to move the adjacent parts of said belts in a common direction from an entering end to a discharge end; means to feed balls one at a time to said entering end and including a solenoid operated ball release; fixed guide means mounted on the frame to center the ball laterally with respect to said adjacent parts; said solenoid operated ball release releasing the ball upon deenergization of the solenoid; and signaling means operatively connected to the ball release and energized upon energization of the ball release solenoid for signaling the batter to get "set."

2. A ball pitching machine comprising: power-driven means for pitching balls fed thereto and solenoid operated ball release means for feeding balls one at a time to said power-driven means; said solenoid operated ball release releasing the ball upon deenergization of the solenoid; and signaling means operatively connected to the ball release energized upon energization of the ball release solenoid for signaling the batter to get "set."

3. A baseball pitching machine comprising: a frame;

a pair of V-belts each supported solely on a pair of pulleys rotatably mounted on the frame, one pair of said pulleys being mounted for rotation about horizontal axes above a second pair of pulleys also mounted for rotation about horizontal axes, said pairs of pulleys being spaced apart a distance greater than the diameter of a baseball and said belts being of a thickness such that with a baseball passing between the belts at the pulleys there will be a slight compression of the belts; power means connected to said pulleys to move the adjacent runs of said belts in a common direction from an entering end to a discharge end; means to feed baseballs one at a time to said entering end, means to signal a batter shortly before release in connection with the operation of the feed means; and fixed guide means mounted on the frame to center the ball laterally with respect to said adjacent runs.

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RICHARD C. PINKHAM, *Primary Examiner.*

W. R. BROWNE, *Assistant Examiner.*