Aug. 5, 1969 N. R. BRUCE 3,459,168

BALL-PITCHING MACHINE WITH FORCED AIR ASSIST

Filed Dec. 8, 1965



FIG. 6

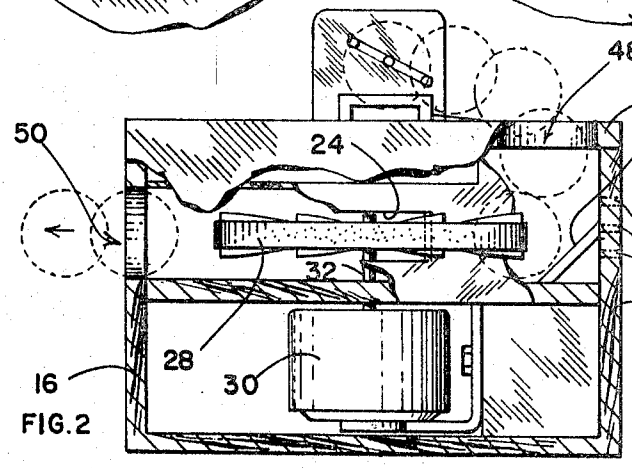


FIG. 2

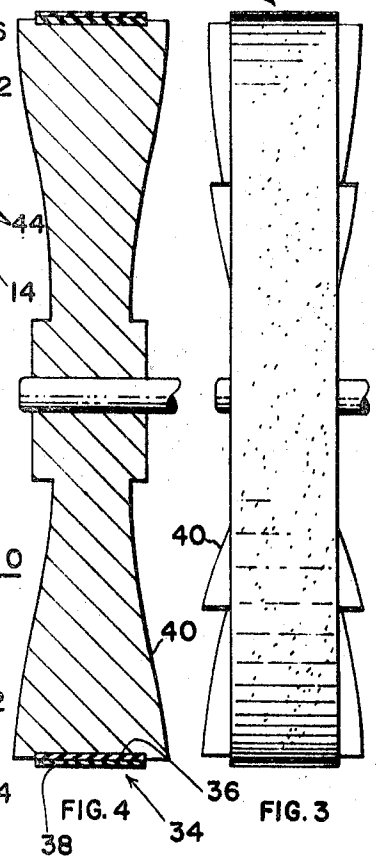


FIG. 4 FIG. 3

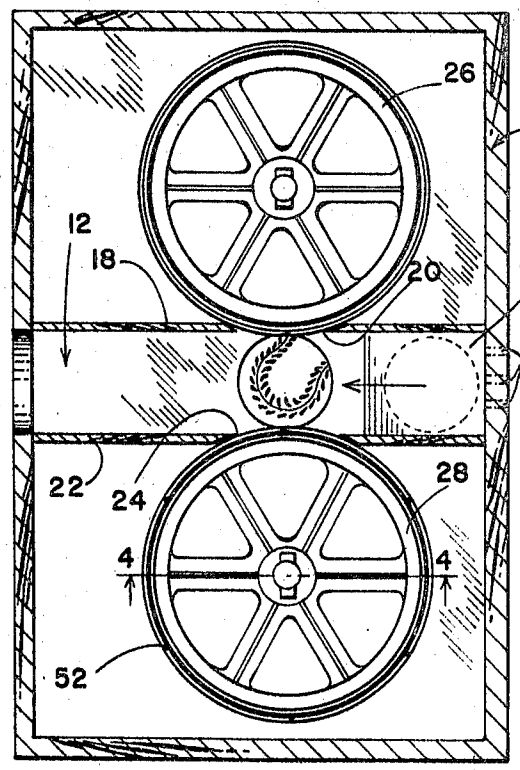


FIG. 1

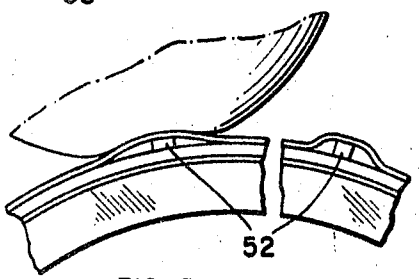


FIG. 5

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BALL-PITCHING MACHINE WITH FORCED AIR ASSIST

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U.S. Cl. 124—11 5 Claims

ABSTRACT OF THE DISCLOSURE

An improved ball-pitching machine is provided for use, for example, in baseball batting practice. The machine includes a barrel in which a stream of air is created to project the balls through the muzzle end thereof; and the machine also includes a pair of wheels having their annular surfaces extending into the barrel from opposite sides thereof, to assist in impelling the balls along the barrel, and also to impart various trajectory characteristics to the ball. Inserts may be placed between the wheel and its peripheral band to impart a random rotary motion to the projected ball in order to obtain the various trajectory characteristics.

This invention relates to projectile throwing devices in general and more specifically to a ball-pitching machine adapted particularly for plastic and similar lightweight balls.

It is an object of this invention to provide a ball-pitching machine, particularly for plastic or lightweight types of balls, which are easily damaged by excessive mechanical abrasion.

A further object of this invention is to provide an airstream to cause a lightweight ball to advance rapidly into moving surface projecting means in order to reduce the shock upon the ball when entering the surface means.

A still further object of the invention is to provide opposed rotating wheels of differing characteristics for throwing a lightweight ball, which differing characteristics produce erratic rotating effects upon the ball for causing a variety of ball trajectories.

Yet another object of this invention is to provide a pitching machine which will mix up its pitches, throwing curves, sliders, fast balls, and other trajectories which closely duplicate actual game experience.

In accordance with these and other objects which will become apparent hereinafter, the best mode contemplated for the present invention is disclosed in the accompanying drawing wherein:

FIGURE 1 is a top plan interior view of a ball-pitching mechanism, as seen with the top cover removed;

FIGURE 2 is an end view of the ball-pitching machine, with walls and portions broken away to reveal the interior;

FIGURE 3 is an elevation view of the peripheral rim of one of the drive wheels, greatly enlarged with respect to FIGURE 2;

FIGURE 4 is a section in enlarged proportion, taken along line 4—4 of FIGURE 1;

FIGURE 5 is an enlarged schematic illustration of a particular drive wheel functional relationship with a soft ball; and

FIGURE 6 illustrates a ball-feeding mechanism on the top of the machine.

The drawing illustrates the principle of inventive concepts in one machine embodiment which is satisfactory for most soft ball purposes. The illustrated embodiment is constructed in a housing **10** having a barrel chute **12** extending from a back wall **14** to a front wall **16**. The barrel is no named because it serves as a longitudinal

guide through which balls may be projected. In this embodiment, the barrel is composed of a side wall **18** which has a side opening window **20**, and a side wall **22** having a side window **24**.

Drive wheels **26** and **28** are mounted horizontally within the housing **10** and the periphery of the drive wheels project through the windows **20** and **24** respectively. These peripheral portions of the two wheels act as a throat area within the barrel **12**. Each wheel is driven in a direction which causes the periphery of the wheel to enter the back portion of the window and exit from the front portion, thus providing a surface means which advances within the barrel in the direction of the front of the housing **10**.

In FIG. 2, motor **30** is shown as driving the wheel **28** by means of a shaftt **32**. A similar drive system is provided to power the wheel **26**.

The ball-throwing nature of the present invention embodies the principle of surfaces which act as a throat in which the ball is caused to enter. The throat between the surfaces is less than the diameter of the ball, and hence the ball is grasped by the surfaces and projected along the center line between the two surfaces.

This invention provides a novel drive action in this environment. Refer to the FIGURES 3 and 4. The wheels **26** and **28** are substantially identical in most respects. Both have a rim **34** which is covered by a rubber tread band **36** to give a degree of resiliency. The wheels may be die cast of lightweight metal or molded plastic, depending upon the particular application. The illustrated embodiment may be used for a variety of ball-throwing or pitching purposes. Generally, it is most useful for that type of ball which is somewhat resilient, and finds particular utility for pitching or throwing plastic or lightweight balls, rubber balls, plastic-covered baseballs, rubber-covered balls, tennis balls, and softballs. The need for such device for practice purposes will be obvious.

The surface of the rubber belt **36** is covered with friction material **38**, and one of the most effective of such friction material is a coarse sanding belt. It would appear that a coarse sanding belt would scuff and abrade plastic and rubber balls and quickly cause a degeneration of the surface of the ball. However, this invention makes the use of such friction material entirely practical and desirable, and virtually no scuffing or abrading of the balls results. Less positive friction surfaces have ineffective bite on sheer plastic surfaces, lacking positive pickup and spin-imparting ability.

One of the features of this invention which makes this abrasive belt surface feasible is the use of a moving column of air advancing at a rapid rate through the barrel in the direction of ball movement. The wheels **26** and **28** carry vanes **40**. The vanes **40** pick up a quantity of air and drive it through the barrel and out of the front of the housing **10**.

The balls are fed by dropping them into the barrel and against a sloping ramp **42**. The sloping ramp causes the balls to bounce forward and start a movement toward the front of the housing. Air vent holes **44**, through the rear wall **14**, allow the entry of air into the barrel. The forcing of air by the vanes **40** on the wheels acts in a venturi effect to cause air to enter the air holes **44** and join that air which is driven into the barrel by the wheels, thereby creating a fast-moving stream of air.

The natural bounce of the ball from the ramp **42**, and the enveloping stream of air, provides a transition so smooth that the ball quickly accelerates without appreciable scuff motion between the wheels and the ball as might be expected if a lesser amount of initial propulsion were given to the ball.

The housing **10** has a top wall **46**, through which a breech opening **48** is provided to feed balls vertically against the ramp **42** for the purpose of supply and to

cause the forward initial bouncing movement. The barrel **12** opens through the front wall **16** in a muzzle opening **50**. Air rushes through the openings **44** and out the muzzle end **50** along with projected balls in order that the balls may be given the initial movement and carried along with the air as the air is also projected. Hence, the ball has the actual physical drive propulsion from the wheels and is carried by a column of air enveloping the ball and carrying it along both prior to and after engagement by the drive wheel.

The drive wheel may be narrow or wide in comparison with the dimensions of the barrel according to the need of the air that is used in this air column action. In FIGURE 2 the wheel dimension is shown as about half of the vertical dimension of the barrel, although wider wheel dimensions are common with the heavier balls, such as tennis balls.

In addition to the novelty of the combination action thus described, this invention provides for giving the ball a definite predetermined whirl in order to provide "English" on the ball. In FIGURE 5, predomination inserts in the form of lateral rubber inserts **52** fit between the wheel and the band **36** in five or six places. These strips are about ⅛ x ⅛ in cross section and extend for the width of the rim portion of the wheel.

Most plastic balls on the market are not uniform, and, therefore, must be handled in a manner which will take into account the inherent quality range. If there is too much wheel "bite" they will be deformed or unnecessarily abraded if the ball is tough. If there is too little wheel "bite," there will not be a a sufficient pick-up of the speed in the event the ball is soft.

By adding the inserts **52**, a very slight hexagon or gear shape is achieved. This form is confined to one wheel. They are shown in the wheel **28** in the drawing. By using these inserts it is possible to pick up balls of various degrees of toughness and surface sheen with a single wheel setting.

Furthermore, the inserts, by acting on one side of the ball, will give a rotary motion to the ball as it is ejected from the muzzle end **50** of barrel **12** to produce an uncertain trajectory of the ball as it leaves the machine.

The position of the wheel carrying the predomination inserts may be changed if the characteristic of the machine is to be changed. This change may be with another wheel or different peripheral location and number, or may be changed from right to left side of the particular machine, or both variables may be employed.

The inserts **52** must be clearly understood to be a significant portion of this invention. By the use of these inserts **52**, a more dependable operation is achieved for several reasons. The throat width in the machine is far less critical, but a more positive bite on moderately dissimilar balls is nevertheless achieved. This feature practically eliminates the re-adjustment for ball variations.

Furthermore, the inserts provide a human quality to the pitching pattern. That is, a right-handed pitcher will throw more of his pitches curving to the left than to the right. The opposite is true of the left-handed pitcher. Therefore, according to whether the wheel carrying the inserts is placed on the right or the left side of the machine, the pitching characteristics of a live pitcher is simulated.

This insert feature coupled with barrel tolerances causes the machine to mix up its pitches. It will throw curves or sliders or fast balls, and other types of pitching styles, which closely duplicate actual game experience. Without these inserts, the machine still will produce the various pitches, but the curves which it will then produce are not overweighted right or left as they should be or would be if thrown by a human pitcher.

This machine keeps a batter on his toes. He does not know what pitch to expect. A pitcher does this, and this is the reason for his effectiveness.

There is no machine known prior to this invention that approaches this basic concept. A pitching device which simply throws balls "down the groove" is, according to most batting instructors, nearly useless. It is safe to say that one of the essences of this machine according to this invention is that it throws a logical variety of pitches in the strike zone.

In order to provide automatic feed of balls, a feed device **54** employs a gear motor **56** which rotates a fork **58** at a predetermined rate of travel. A ramp **60** may be loaded with balls and they will be impelled toward the face end of the fork **58** by gravity. As the gear motor **56** rotates the fork **58**, one ball at a time will be moved sideways as suggested by the series of dotted outline shapes in FIGURE 2, and the ball so ejected from the ramp **60** will fall through the breech opening **48** into the barrel and thus be expelled out of the front of the pitching machine.

Whereas the invention has been shown and described herein in what is conceived to be the best mode contemplated, it is recognized that departures may be made therefrom within the scope of the invention which is therefore not to be limited to the details disclosed herein but is to be afforded the full scope of the invention as hereinafter claimed.

What is claimed is:

1. A device for projecting a plurality of resilient balls in series procession, comprising:

a barrel having a passageway extending therethrough and serving as a longitudinal guide through which the balls may be projected, said barrel having side openings therein extending into said passageway;

a pair of drive wheels mounted adjacent said barrel on opposite sides thereof, and each of said drive wheels having a peripheral portion extending through one of said side openings, the peripheral portions of the drive wheels extending through said openings and into said passageway to form a throat area within said barrel of smaller diameter than the diameter of said passageway;

drive means for said drive for imparting rotational motion thereto in a direction such that said peripheral portions of said drive wheels provide movable surface means within said passageway advancing from the rear of said barrel to the front thereof;

a plurality of vanes on the side surfaces of said wheels and extending to the peripheries thereof so that the ends of said vanes move into said openings in said barrel with said peripheral portions of said drive wheels, said side vanes picking up a quantity of air during rotation of said drive wheels and driving such quantity of air through said passageway and out the front of said barrel;

feed means for dropping balls into the rear of said passageway in said barrel; and

a rear wall at the rear of said barrel and having at least one air vent therein to allow the entry of air into said passageway, said last-mentioned air being drawn through said vent into said passageway by the aforesaid air driven through said passageway by said vanes.

2. The device of claim **1**, and which includes a sloping ramp at the rear of said passageway in said barrel and which imparts a natural forward bounce in said passageway to each ball dropped therein by said feed means.

3. The device of claim **1**, in which at least one of said wheels has a roughened peripheral surface.

4. The device of claim **1**, in which at least one of said wheels has a band around the periphery thereof, and which includes a plurality of lateral ridge members extending under said band for producing surface irregularities therein.

5. A device for projecting a plurality of balls in series procession, comprising:

a barrel having a passageway extending therethrough and serving as a longitudinal guide through which the balls may be projected, said barrel having side openings therein extending into said passageway;

a pair of drive wheels mounted adjacent said barrel on opposite sides thereof, and each of said drive wheels having a rim extending through a corresponding one of said openings and into said passageway to form a throat area within said barrel of smaller diameter than the diameter of said passageway;

drive means for said drive wheels for imparting rotational motion thereto in a direction such that said rims of said drive wheels provide movable surface means within said passageway advancing from the rear of said barrel to the front thereof;

means driving a stream of air through said barrel and out the front thereof; and

at least one of said wheels having a band around the rim thereof, and a plurality of lateral ridge members extending under said band for producing a surface irregularity therein.

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