United States Patent

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[54] **BALL PROJECTING DEVICE HAVING TWO ROTATABLE WHEELS**
14 Claims, 8 Drawing Figs.

[52] **U.S. Cl.** **124/1,** 124/34, 124/51, 124/30, 124/50
[51] **Int. Cl.** **F41b 15/00**
[50] **Field of Search** 124/10, 41, 49, 50, 1, 6, 34

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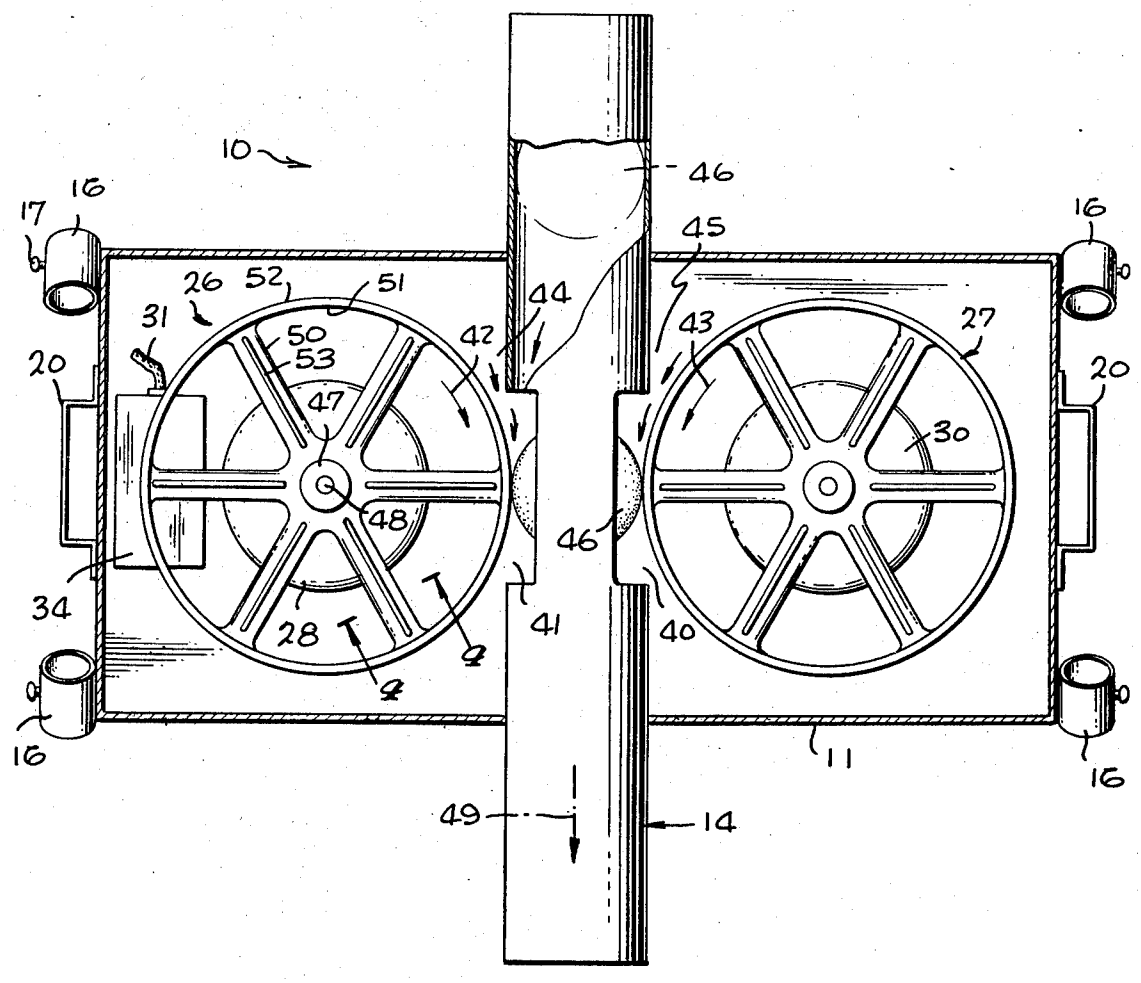
ABSTRACT: A portable ball pitching machine is disclosed herein which includes a case having a removable lid that encloses a pair of spaced counterrotating drive wheels driven by independent motors in a horizontal plane. A portion of each of the wheel peripheral edges project through opposite aligned side openings of an open-ended guide tube so that the distance between the confronting wheel edges is slightly smaller than the diameter of a ball adapted to be inserted into one end of the guide tube. Rotation of the wheels creates sufficient suction in the tube so that the ball is drawn into force imparting engagement with the opposing wheel peripheries whereby the frictional force of the engagement forcibly urges the ball through the remainder of the tube and delivers the ball at a relatively high velocity to an awaiting player.



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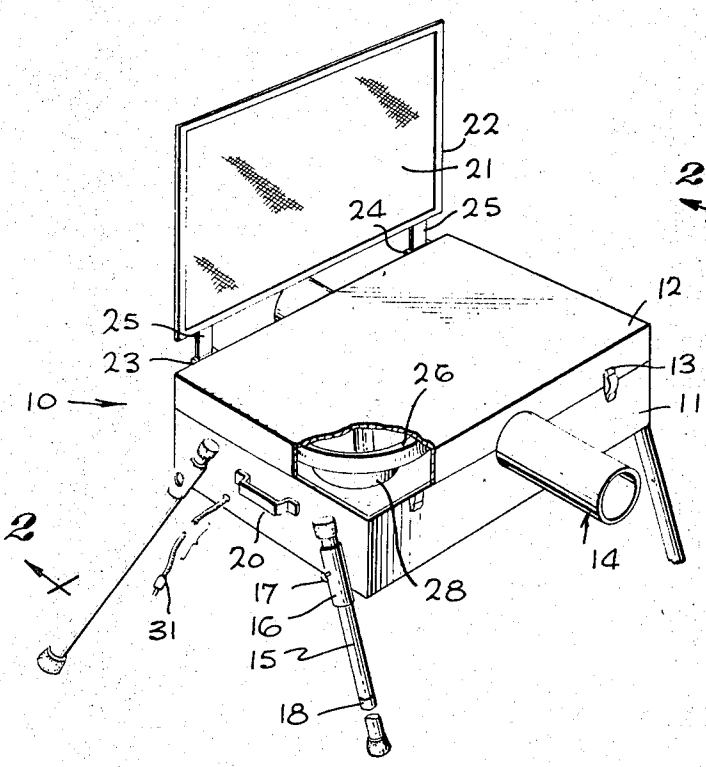

Fig. 1

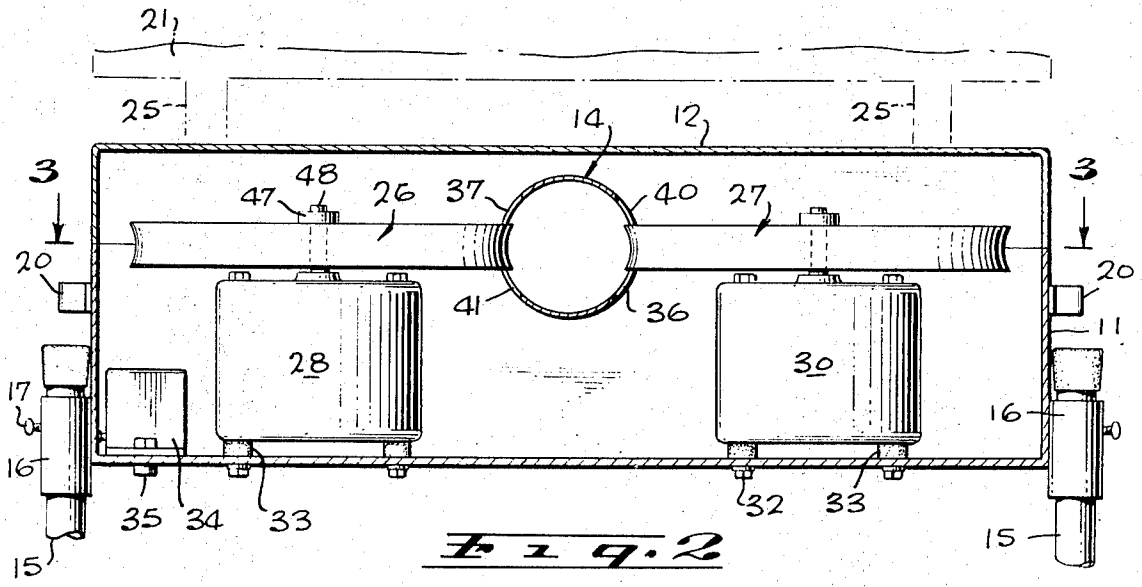

Fig. 2

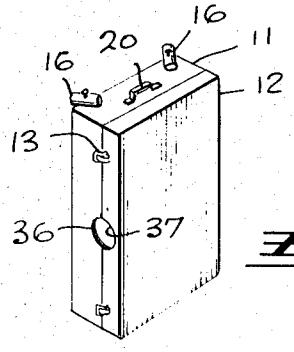

Fig. 1a

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Fig. 3

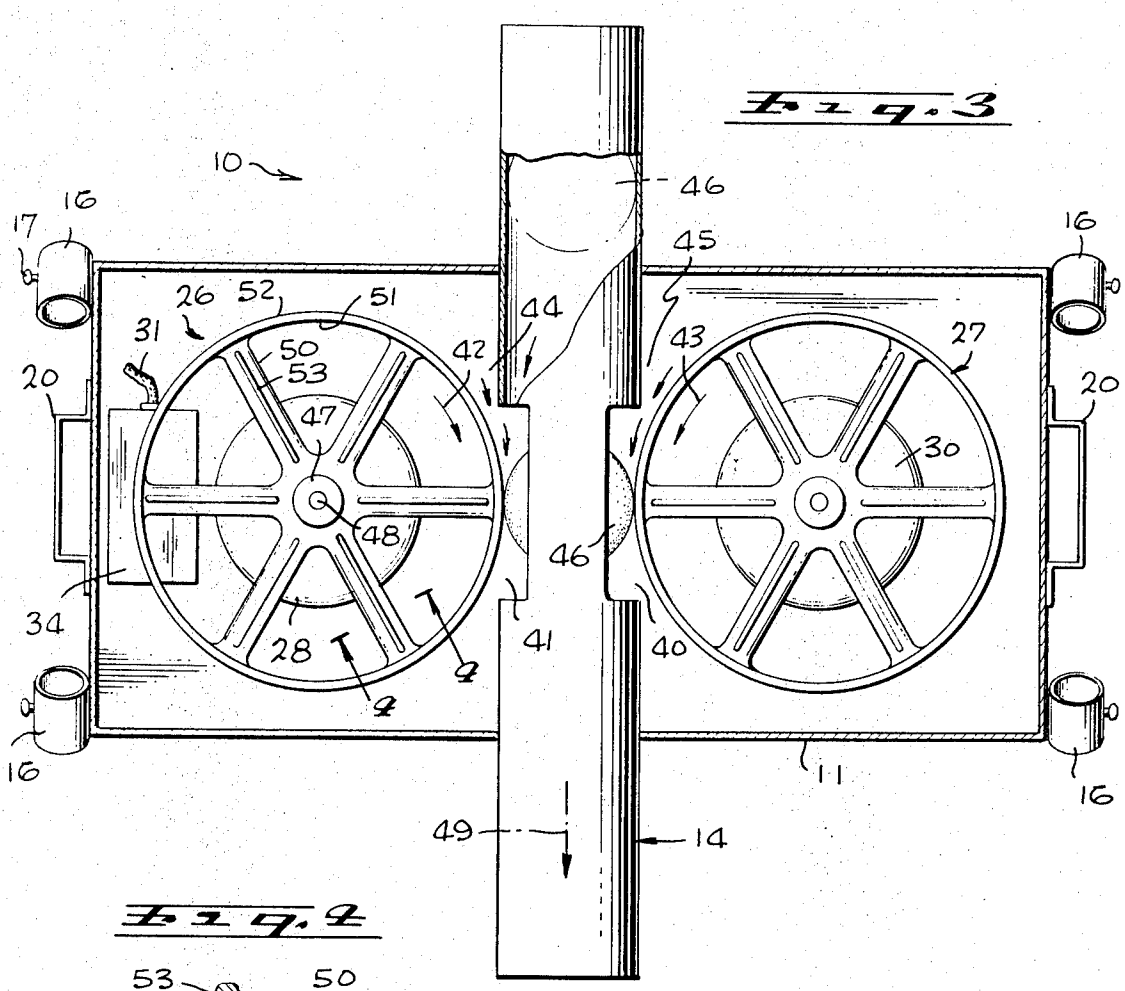


Fig. 4

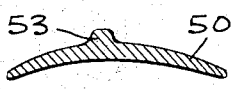


Fig. 7

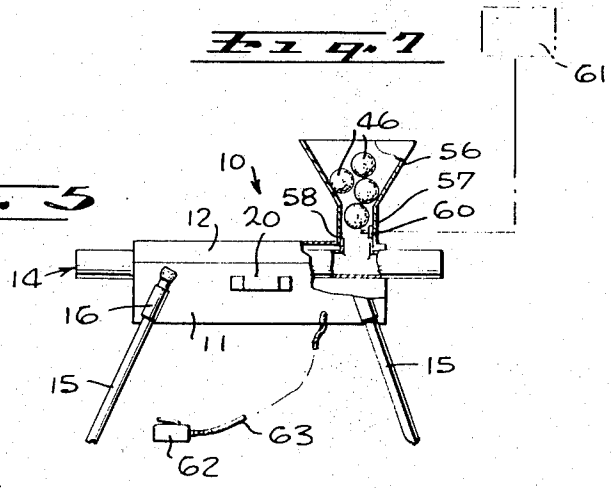
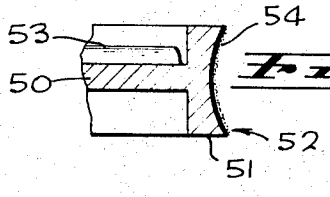


Fig. 5



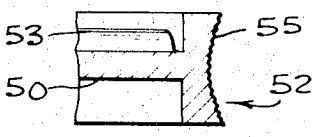


Fig. 6

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BALL PROJECTING DEVICE HAVING TWO ROTATABLE WHEELS

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to ball projecting, throwing, or pitching devices and is more particularly related to a novel ball pitching apparatus adapted to draw a ball from its initial position into forcible engagement with opposing drive wheels and is further adapted for guiding the ball after acceleration so that the ball may be delivered to an awaiting player desiring to hit or bat the ball thereby testing the skill of, and providing practice for, the awaiting person engaged in hitting such thrown ball.

2. Description of the Prior Art

In the past, ball pitching or throwing devices have been proposed wherein the balls are projected by engagement between the confronting or opposing peripheral edges of two rotating wheels or pulleys which are arranged on their axes in parallel spaced apart relationship. It has been found that such devices do not afford adequate directional control over the thrown ball and, accordingly, an objectionable percentage of the thrown balls are "wild pitches" or outside the zone in which the pitched balls may be batted by a person using the device. Furthermore, in some existing ball throwing or pitching machines, a hopper is provided from which the balls are intended to be delivered one at a time to the ball throwing rotating wheels via a passageway, and in such machines, the balls frequently jam in the passageway so that the supplying of balls to the throwing elements is interrupted and the machine continues to operate without throwing balls. Such interruption of the supplying of balls is particularly objectionable when the device or machine is coin operated and functions through a predetermined number of cycles for each deposited coin. Obviously, such jamming of the balls in the passageway requires the attention of servicing personnel to relieve the jam and restore the machine to its operative condition.

The ball throwing or pitching machines heretofore proposed are also deficient in that the structure provided for feeding the successive balls from the hopper to the ball throwing elements does not accurately locate each ball relative to the throwing elements at the point of delivery to the batter so that the directional control over the thrown balls is further disturbed. Also, conventional machines have been found to be faulty and erratic in their operation when the balls are wet and, in that event, the directional control is so deficient as to expose the player, attendant and spectators to actual physical danger. In those instances where a hopper is not employed but the balls are manually introduced to the machine, the attendant inserting the balls into the machine is exposed to danger when the delivered ball is struck by the batter and hit in the direction of the attendant.

Still another problem encountered with conventional ball throwing machines resides in the fact that such machines are awkward and cumbersome and do not lend themselves to portable usage. In some instances, the apparatus has been mounted on wheels so as to be made mobile; however, such modification does not make the machine conveniently portable in that the device cannot be disassembled and repackaged so as to be light in weight permitting the repackaged assembly to be carried by hand from one location to another.

Conventional ball throwing or pitching machines are represented in the disclosures of U.S. Letters Pat. Nos. 1,203,468; 1,211,738; 2,112,611; 2,729,206; 2,918,915; and 2,716,973. However, these prior ball pitching machines suffer from one or more of the difficulties described above in that the machines are not truly portable, do not provide adequate directional control and fail to provide a means for preventing jamming.

SUMMARY OF THE INVENTION

Accordingly, the apparatus of the present invention obviates the problems and difficulties encountered with prior art devices by providing a pair of counterrotating wheels having their confronting peripheral edges arranged in a common horizontal plane in fixed spaced apart relationship and being inserted through opposite sides of an elongated guide tube defining a ball passageway. Means are provided on the wheels for creating and directing air flow as the wheels are rotated so as to draw a ball intended to be pitched from one end of the tube into engagement with the periphery of the wheels whereby the ball is forcibly urged at high velocity out of the other end of the tube. Not only does the creation of directional air currents draw the ball intended to be pitched into engagement with the wheels, but the force of the air currents prevents jamming of balls in the guide tube. The provision of a guide tube further advances directional control of the pitched ball in that the ball is directed by the position of the guide tube after the speed of the ball has accelerated upon disengagement from the drive wheels.

Means are provided on the housing or case which are readily adjustable for determining the direction and elevation of the pitched ball and which are adapted to be readily disassembled for repackaging within the interior of the case so that the device may become portable. Furthermore, the case includes a mounting means for supporting a screen whereby an attendant introducing the balls to the guide tube preparatory to a pitch is adequately protected from hit or returned balls which are struck by the batting player.

Therefore, it is a primary object of the present invention to provide a novel ball throwing or pitching apparatus capable of establishing suitable control over the direction of the thrown balls as well as the velocity thereof.

Another object of the present invention is to provide a novel ball throwing or pitching machine wherein the balls are introduced one at a time to the ball throwing mechanism under the control of directional air currents whereby jamming of the balls in the passageway leading to the mechanism is prevented.

Still another object of the present invention is to provide a novel ball pitching machine capable of being readily disassembled and packaged in a carrying case so that the entire assembly is portable.

Still a further object of the present invention is to provide a novel ball pitching or throwing machine incorporating an elongated guide tube into which balls to be pitched are introduced at one end and forcibly drawn through the tube into engagement with counterrotating drive wheels where the ball is greatly accelerated for discharge through the opposite end of the tube.

Yet a further object of the present invention is to provide a novel ball pitching machine wherein the batter is protected by directional control means of the pitched ball, and the attendant for introducing balls intended to be pitched into the machine is protected by a deflection screen.

BRIEF DESCRIPTION OF THE DRAWINGS

The features of the present invention which are believed to be novel are set forth with particularity in the appended claims. The present invention, both as to its organization and manner of operation, together with further objects and advantages thereof, may best be understood by reference to the following description, taken in connection with the accompanying drawings, in which:

FIG. 1 is a perspective view of the novel portable ball pitching machine of the present invention having a portion of the case broken away to expose internal components;

FIG. 1*a* is a perspective view of the ball pitching machine illustrated in its portable configuration;

FIG. 2 is an enlarged longitudinal cross-sectional view of the ball pitching machine as taken in the direction of arrows 2–2 of FIG. 1;

FIG. 3 is a cross-sectional view of the ball pitching machine illustrating the counterrotational wheels engaging with a ball to be delivered as taken in the direction of arrows 3–3 of FIG. 2;

FIG. 4 is an enlarged cross-sectional view of a wheel spoke shown in FIG. 3 as taken in the direction of arrows 4–4 thereof;

FIG. 5 is a fragmentary sectional view of the ball engaging peripheral surface carried on each of the drive wheels;

FIG. 6 is a view similar to the view of FIG. 5 illustrating another embodiment of a peripheral surface; and

FIG. 7 is a side elevational view of the ball pitching machine incorporating a ball supply hopper and a ball feeding assembly.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1, the novel ball throwing or pitching machine of the present invention is illustrated in the general direction of arrow 10 which includes a case 11 having a removable lid 12 detachably secured thereto by means of latch fasteners 13 provided on the front wall and rear wall of the case. Projecting from opposite walls of the case is a guide tube 14 which is open on its opposite ends in order to receive a ball at the rear end and for discharging the ball at high velocity from its other end. The forward portion of the guide tube effectively directs the flight or delivery of the ball and the trajectory or elevation of the guide tube may be adjusted by positioning a plurality of telescoping legs, such as leg 15, that are employed to support the machine on a supporting surface such as a floor or the ground.

Each of the plurality of legs are secured to the opposite end walls of the case 11 by means of tubular sleeves 16. Each sleeve is secured to the end wall of the case 11 by any suitable means such as welding, and are angularly arranged with respect to the bottom surface of the case so that the leg members 15 project outwardly in front and behind the case, respectively. Each leg 15 is releasably secured to its respective sleeve 16 by means of a screw fastener 17. When the fastener 17 is actuated to loosen leg 15, the leg may be removed from sleeve 16 for subsequent storage within the case 11 in order to make the unit portable.

Furthermore, each of the legs 15 may include a section 18 which is slidably received within the major portion of the leg 15 in telescoping relationship so that the legs may be selectively extended to accommodate for uneven terrain on which the machine is supported or for elevating or lowering the forward portion of guide tube 14 for directional throwing of the ball. For example, if it is desired to increase elevation of the pitched ball, the rear legs may be set lower than the forward legs. When it is desired to lower the elevation of the discharged ball, the front legs may be shortened which have the effect of lowering the discharge end of the guide tube 14.

When it is desired to disassemble the machine to make a portable unit, the lid 12 is removed and the legs 15 are removed from attachment with tubular sleeves 16. Also, the guide tube 14 is removed from its mount on the case 11 and the legs and tube are placed inside the case after which the lid 12 is secured to enclose the case and the component parts. The disassembled unit may now be readily carried by means of handles 20 which are suitably secured to the opposite end walls of the case 11.

The embodiment shown in FIG. 1 further illustrates the incorporation of a screen 21 which is suitably carried by a frame 22 that is mounted at the rear of case 11 by means of fixtures 23 and 24 carried on the rear of lid 12. Each fixture 23 and 24 includes a slot for receiving a bracket 25 so that the screen 21 is supported thereby in an upright position immediately forward of the rear opening to guide tube 14. By including the screen 21, an attendant inserting the balls into the rear opening of the guide tube is protected from injury which may be sustained from a ball hit by the batter. It is to be understood that the screen 21 may be mounted to case 11 by other means such as by being detachably coupled onto the angular forward legs supporting the case 11, if desired.

The interior of the case 11 is occupied by a pair of drive wheels 26 and 27 that are independently driven by electric motors 28 and 30, respectively. The motors 28 and 30 are coupled to a conventional electrical outlet by means of a cord and plug 31.

Referring now to FIG. 1*a*, the ball pitching machine of the present invention is shown in its portable configuration in which the legs 15 and guide tube 14 are detached from the case 11 and stored in the interior thereof by the closure of lid 12. Latches 13 secure the lid to the case 11 and handle 20 may be employed to manually carry the assembly.

Referring now to FIG. 2, the interior of case 11 houses motors 28 and 30 which are mounted on the bottom thereof by means of conventional fasteners 32 and spacers 33. The operation of the motors are under control of an ON–OFF switch 34 by means of actuator 35 which projects exteriorly of the case 11 via an aperture in the bottom thereof. Cord 31 is suitably connected to the switch 34 and the switch 34 is connected to the motors 28 and 30 via a suitable wiring circuit (not shown).

Located midway between the opposite end side wall of the case 11, guide tube 14 is mounted in a pair of arcuate sections 36 and 37 formed in the upper edge of the front and rear walls of the case 11 and the front and rear flanges of the lid 12, respectively. By this mounting means, the guide tube is supported so that the extreme front and rear portions of the tube extend beyond the dimensional parameters of the case 11. If desired, the guide tube may be releasably secured to the case 11 by any suitable fastening means. It is to be particularly noted that the central portion of the guide tube 14 is located in the interior of the enclosed case 11 and is provided with a pair of lateral openings 40 and 41 which are in alignment on opposite sides of the guide tube. Openings 40 and 41 are adapted to receive a portion of the drive wheel peripheral edges so that the distance between the peripheries is slightly smaller than the inside diameter of the tube 14. The confronting edges or peripheries of the two rotating drive wheels 26 and 27 are arranged with their vertical axes in parallel spaced apart relationship whereby the insertion of a ball between the confronting edges will cause the ball to be projected into the forward portion of the tube 14 for ultimate discharge therefrom at accelerated velocity. By employing motors 28 and 30, each drive wheel is independently driven and complex pulley arrangements are avoided with their attendant increase in component parts and servicing problems.

Referring now to FIG. 3, it is to be noted that the drive wheels 26 and 27 are rotated in counterrotational directions as indicated by arrows identified respectively by numerals 42 and 43. By this means, air currents are created and directed according to a series of arrows 44 and 45 which create a pressure differential in the tube 14 at its rear portion so that a ball 46 introduced into the rear passageway portion of the enclosed tube 14 is drawn by the pressure differential through the tube into engagement with the confronting edges of the drive wheels 26 and 27. In solid lines, ball 46 is illustrated in engagement with the drive wheels and the ball is slightly compressed since the diameter of the ball is slightly larger than the dimensional distance between the confronting edges. The ball is discharged at an accelerated velocity from the forward portion of the tube 14 in the direction of the awaiting player. The air current developed in the direction of arrows 44 and 45 tend to pull the ball 46 through the rear portion of the tube 14 toward the drive wheels so that the ball will have no tendency to bind or jam in the elongated passageway of the tube. In the embodiment shown in FIG. 3, the ball is introduced through the opening at the rear portion of the tube by an attendant and introduced at a speed which will insure that the ball will move forward through the tube into engagement with the drive wheel.

It is to be noted that each of the drive wheels 26 and 27 includes a hub 47 which is suitably attached to a drive shaft 48

rotated by its associated motor. Radially projecting from hub 47, there is provided a plurality of spokes 50 which terminate in a circular rim 51 having a peripheral edge 52. Each of the spokes 50 is formed with an integral upwardly projecting vane 53 that, in combination as the drive wheel rotates, generates air currents of sufficient velocity in the direction of arrows 44 and 45 to provide a substantial suction to be created in the rear portion of tube 14 for drawing the ball 46 through the passageway.

It is apparent that any ball 46 introduced into the tube passageway at the rear end thereof opposite to the direction of movement of the drive wheel peripheral edges will be gripped by such edges and will be propelled through the forward passageway of the tube in the direction of arrow 49. The balls delivered to the rear passageway are preferably resilient, such as characterized by plastic materials, rubber or the like, and which have a diameter slightly greater than the clearance provided by the passageway between the opposing drive wheel edges. Thus, each ball will be compressed during its travel through the midportion of the passageway and the peripheral edges of the drive wheels will securely engage the ball during such travel to provide a uniform speed of discharge and reliable control.

In FIG. 4, a cross section of a spoke 50 is illustrated showing the vane 53. In FIG. 5, a cross section of the rim 51 is illustrated showing that the peripheral edge 52 is relatively concave so as to conform to the speherical configuration of the ball 46. The edge 52 may be provided with a fill of plastic material 54 so that adequate friction is created between the edge 52 and the ball 46 so that sufficient force is imparted to the ball by the driving wheels. In FIG. 6, another embodiment is illustrated wherein the peripheral edge 52 is provided with a plurality of serrations or irregularities 55 for achieving a force imparting action to the ball 46. The material of the drive wheel may be cast aluminum in which instance the irregularities 55 will be formed as a result of the normal finish developed from the cast.

Referrring now to FIG. 7, the ball pitching machine 10 is provided with a hopper 56 into which a plurality of balls 46 may be held. The hopper includes a funnel 57 which is detachably coupled to a fitting 58 on the rear portion of tube 14 so that the internal passageway of the tube is in communication with the interior of the hopper via the funnel 57 for releasably supporting the supply of balls 46. The trip lever may be actuated by a timing device 61 so that the plurality of balls may be sequentially released in a series at spaced intervals to the drive wheel. Also, the trip latch 57 may be operated by a foot actuated ON–OFF switch 62 that may be placed in a location convenient to the player intending to hit or bat the pitched ball. Switch 62 may be connected to the latch 57 by means of a cord 63.

Therefore, it can be seen that the novel ball pitching or throwing machine of the present invention provides a substantial directional control of a pitched ball by means of the guide 14 which can be elevated or depressed by adjustment of the plurality of case supporting legs 15. Also, by generating air currents in a forward direction through the guide tube 14, sufficient suction is created in the rear portion of the tube to draw the ball through the tube from the rear portion thereof into force imparting engagement with the confronting edges of the drive wheels 26 and 27. Such action avoids jamming. Furthermore, the machine is made portable by providing detachable legs and guide 14 which components may be suitably stored in the interior of the case 11 and enclosed therein by the lid 12. The lid 12 also serves to enclose the moving parts of the machine when it is operating for the purpose of pitching balls as well as to secure the tube in place on case 11. Therefore, no moving parts are exposed which could inadvertently injure or hurt either the batter or the attendant supplying the machine with balls. The attendant is further protected by the provision of a screen 21. It has been found in practice that to obtain an efficient result, electric motors 28 and 30 may be run at the same speed and/or constant speed and it is to be further understood that any other known means may be employed to feed the balls to the guide tube 14.

While particular embodiments of the present invention have been shown and described, it will be obvious to those skilled in the art that changes and modifications may be made without departing from this invention in its broader aspects, and, therefore, the aim in the appended claims is to cover all such changes and modification as fall within the true spirit and scope of this invention.

I claim:

1. A ball pitching machine comprising:

a case having a hollow interior;

a pair of rigid, nonexpandable counterrotating circular drive members rotatably carried in the hollow of said case so as to be enclosed thereby and arranged with their axes in vertical parallel spaced apart relationship so that a predetermined clearance is established between opposing edge portions of said drive members;

guide means supported on said case extending through the hollow thereof between said drive members in said established clearance having opposite end portions substantially extending beyond the front and rear limits of said case and for the introduction of a ball in force imparting engagement with said opposing edge portions of the drive members in a selected direction of movement of said edge portions;

means operably coupled to said drive members for effecting the continuous rotation of said drive members to produce movement of said edge portions in said selected direction of movement, said guide comprising an elongated hollow open-ended tube defining an internal passageway for receiving a ball to be pitched via its rear end portion and further to discharge the ball from its forward end portion after the ball has been accelerated by said drive members; and

said guide tube being formed at its mid-section with opposite aligned openings on each side thereof; and wherein each said opening defines a reduced area for receiving only segments of the rotating portion of a selected drive member.

2. The invention as defined in claim 1 wherein the diameter of said guide tube passageway is slightly greater than said established clearance between said drive member edge portions whereby the ball will be compressed during its travel through said passageway between said opposing edge portions.

3. The invention as defined in claim 2 wherein said case includes a removable lid cooperating with opposing sidewall edges of said case to enclose said drive members and further to receive and store support legs and guide means in a portable configuration.

4. The invention as defined in claim 1 wherein said case includes peripheral sidewalls carried by a common bottom wall and a removable lid detachably connected with the free ends of said sidewalls to enclose said drive members, said rotating means and the mid-section of said guide means.

5. The invention as defined in claim 4 wherein said lid cooperates with said case when connected thereto to support and releasably retain said guide means in fixed position on said case between the opposing and mated edges of said lid and said case respectively.

6. The invention as defined in claim 4 wherein said case sidewalls and said lid are formed with corresponding arcuate cutouts to fixedly receive and support said guide means on said case.

7. The invention as defined in claim 6 including means adjustably connected to said case to elevate and lower a selected end portion of said guide means so as to effectively establish directional control of the pitched ball.

8. The invention as defined in claim 7 wherein:

said last mentioned means includes a pair of tubular sleeves secured on each end sidewall of said case at an angle to the top and bottom surfaces thereof;

a leg movably carried in and through the opening of each of said sleeves to cooperatively support the machine on a supporting surface; and

fastener means releasably coupling each of said legs to each of said sleeves respectively so that said legs may be selectively positioned to elevate or lower said selected end portion of said guide means.

9. The invention as defined in claim 7 including:

a pair of tubular sleeves secured on each side of said case at an angle to the top and bottom surfaces thereof;

a leg movably carried in each of said sleeves, in combination, to cooperatively support the machine on a supporting surface;

fastener means releasably coupling each of said legs to each of said sleeves respectively so that said legs may be selectively positioned to elevate or lower said selected end portion of said guide means;

said case includes a removable lid enclosing said drive members and further adapted to receive and store said legs and guide means in a portable configuration; and

a handle fixedly secured to said case between said end pairs of sleeves to be gripped by the hand of a person for carrying the machine in said portable configuration.

10. The invention as defined in claim 7 wherein each of said drive members includes a rigid rim having an arcuate peripheral edge surface formed with irregularities to grip the ball as the ball progresses between said opposing edge portions.

11. The invention as defined in claim 7 wherein each of said drive members includes a rigid rim having an arcuate peripheral edge surface carrying a plastic coating to frictionally grip the ball as the ball progresses between said opposing edge portions.

12. The invention as defined in claim 7 including a hopper carried on a selected one of said guide means end portions in communication therewith for supplying a quantity of balls thereto in a consecutive series.

13. The invention as defined in claim 12 including means operatively coupled to said hopper for selectively releasing the balls carried therein to said guide means.

14. The invention as defined in claim 7 including vanes carried on each of said drive members and in cooperating relationship with said guide means for establishing a directional air flow effective to draw the ball into gripping relationship with said edge portions.