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AUTOMATIC BALL THROWING MACHINE

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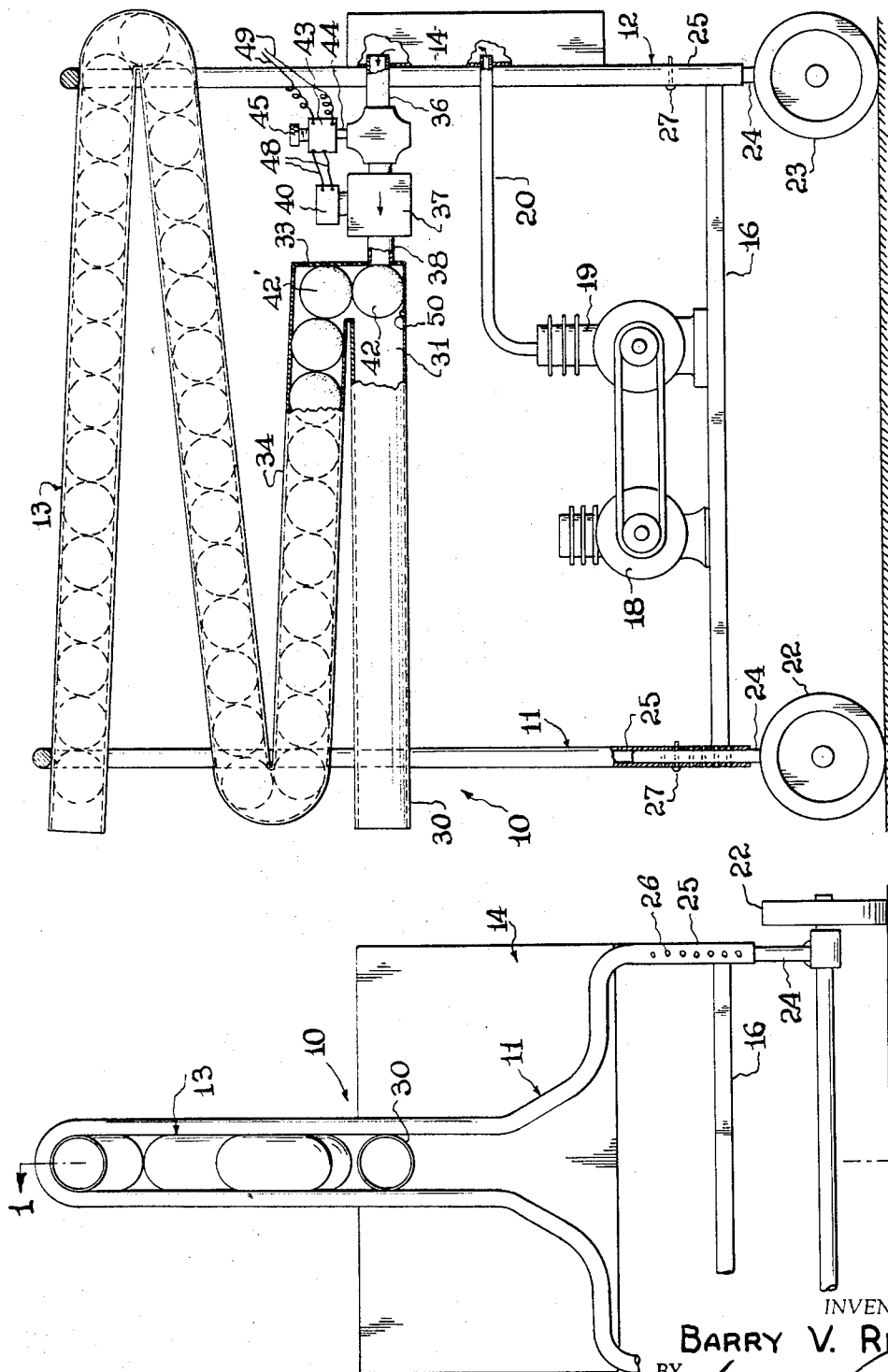


FIG. 1

FIG. 2

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## AUTOMATIC BALL THROWING MACHINE

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9 Claims. (Cl. 124-11)

This invention relates to ball throwing machines and more particularly to a unique fully automatic pneumatically-operated ball throwing machine for use by athletes and sportsmen while practicing hitting and catching projected balls.

Sportsmen and athletes have need to practice in hitting and catching thrown balls. To meet this need various devices have been devised for throwing a ball but these are subject to certain disadvantages and shortcomings sought to be obviated by the present invention. The present machine is fully automatic in operation and responsive to rise and fall of the pressure of pressurized gas relative to a predetermined value to operate jetting means discharging into the breech end of a ball projecting barrel. As soon as one ball is projected the gas pressure falls whereupon the valve closes until such time as the pressure rises and recycles the firing operation. The device can also be operated manually at any desired rate by manually controlling a switch or the air valve to the ball throwing barrel. Desirably the machine is supported on adjustable wheels which are useful in transporting the machine to a desired location as well as for supporting the barrel at different elevations. The machine includes its own power-driven compressor and air storage tank. A substantial supply of balls is fed into the breech of the barrel automatically and individually as a previous ball is ejected from the machine. A feature of the machine includes the use of pressurized air while projecting one ball to agitate others present in the hopper thereby assuring proper and free feeding of the balls to the breech.

Accordingly it is a primary object of the present invention to provide a simple, rugged, self-contained ball throwing machine arranged to be operated either automatically or semi-automatically.

Another object of the invention is the provision of a self-contained ball throwing machine operable from a supply of pressurized air and readily adjustable to project individual balls at any selected velocity.

Another object of the invention is the provision of a wheeled machine having its own gas compressor and provided with an automatic ball throwing barrel energized by pressurized gas provided by the compressor.

Another object of the invention is the provision of a pneumatically operated ball throwing machine utilizing pressurized air to project the ball and simultaneously to agitate the feed of the next ball into the breech of the barrel.

These and other more specific objects will appear upon reading the following specification and claims and upon considering in connection therewith the attached drawings to which they relate.

Referring now to the drawings in which a preferred embodiment of the invention is illustrated.

FIGURE 1 is a side elevational view partly in section showing a preferred embodiment of the present invention with the parts positioned to eject a ball present in the barrel; and

FIGURE 2 is a fragmentary front elevational view of the machine.

Referring initially more particularly to FIGURE 1, there is shown a ball throwing machine designated generally 10. This machine has a pair of inverted U-shaped members 11, 12 formed of any suitable structural stock, as tubing. These members are held in rigidly upright positions by cross members including serpentine tubular ball

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hopper 13, a pressurized gas storage tank 14 welded or otherwise secured to the frame members, and a platform 16. The latter serves to support an engine 18 driving a compressor 19 having an outlet opening into storage tank 14 through a conduit 20.

Main frame 11, 12 is preferably supported by front and rear carriages 22, 23. Each carriage includes a pair of upright tubes 24 which telescope into the downturned ends 25 of the main frame members. These telescoping tubes are provided with openings 26 to receive a lock pin 27 effective to hold the carriages and main frame in any desired adjusted position.

One of the principal components of the machine is the ball throwing barrel 30 having an open discharge end and a breech chamber 31 at its inner end. The upper portion of the breech is connected through a short vertical tube 33 with the outlet end of a serpentine tubular ball hopper 13. It will be understood that this hopper may be formed of a close wound coil spring, hose, or the like, provided proper safeguards are taken to support the tube against sagging and collapse in a manner likely to cause jamming of the balls. The internal diameter of both the gun barrel and the hopper tubing is important, it being pointed out that the internal diameter of the gun barrel is preferably somewhat smaller than for the hopper tubing and so sized as not to offer resistance to the rapid passage of the ball therealong during the firing operation. The hopper tubing is preferably sufficiently large for the balls to roll freely therealong from end to end of the tubing.

Pressurized gas storage tank 14 is connected to the breech end of barrel 30 by a conduit 36 opening into the upstream end of a fast action pressure differential type flow control valve 37 readily available in the open market. The discharge side of this valve opens through the gas jetting conduit 38 axially into the breech end of barrel 30. The details of valve 37 are not shown since these are well known to those skilled in the valve art. This valve is preferably controlled by an electric solenoid 40. Normally valve 37 is closed and solenoid 40 is deenergized. When the solenoid is energized the pressure differential across the valve proper is upset causing the valve to open fully with snap action thereby allowing a full flow of pressurized gas to pass axially into the breech end of the gun directly behind ball 42. As here shown, solenoid 40 is controlled by a pressure responsive switch 43 of any suitable construction connected to duct 44 on the high pressure side of valve 37. The switch is normally open and it is readily adjustable to close at any selected pressure by rotating control knob 45 to the proper position. Switch 43 is connected in circuit with the solenoid and a suitable source of electrical energy by wires 48, 49.

In the operation of the ball throwing machine just described, let it be assumed that it is desired to throw tennis balls to a player wishing to practice the return of such balls. The machine is adjusted to present the barrel at a suitable throwing angle and hopper 13 is filled with a supply of tennis balls with the lowermost one positioned in breech 31 and loosely held there by a slight bump or obstruction 50. This bump assures that the ball to be thrown will remain positioned properly immediately adjacent the outlet of jetting means 38 and in position to hold the overlying ball 42' in position to drop into the barrel as soon as the first ball is being ejected from the barrel. The main switch, not shown, to the power supply is closed and motor compressor 18, 19 is placed in operation. As soon as the pressure within the storage chamber and beneath the pressure responsive switch 43 reaches a predetermined value, switch 43 closes energizing solenoid 40 and instantly fully opening valve 37. Pressurized air then jets through jet 38 into the barrel breech causing the ball to pass over the obstruction 50 and to be ejected

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from the barrel at the desired velocity. The air pressure within passage 36 falls as the air expands and as the ball leaves the gun barrel. This permits switch 43 to open and deenergizes valve 40 permitting valve 37 to close sharply and quickly.

While valve 37 is open, pressurized air admitted to the barrel of the gun is also effective to agitate the balls in the hopper and leaves the lower one partially suspended in air and free to drop quickly into the barrel breech as the pressure collapses following closure of valve 37. Accordingly the next ball 42' is properly positioned in the breech as the valve closes and is in instant readiness to be projected as soon as the air pressure rises. With a compressor of adequate capacity the system cycles very rapidly and as fast as one ball every 5 to 10 seconds.

The machine continues to cycle in the manner described and to agitate the balls in the hopper until the supply has been exhausted.

If it is desired to eject the balls under manual control, this is accomplished by providing a manual switch between the power supply and solenoid 40 so that this solenoid can be energized momentarily at a desired frequency. It will also be appreciated that the velocity and distance to which the balls are projected is readily varied by adjusting screw 45 to vary the pressure of the gas supplied to jet 38, the higher pressure being effective to project the balls further and at higher velocity.

While the particular automatic ball throwing machine for use by sportsmen herein shown and disclosed in detail is fully capable of attaining the objects and providing the advantages hereinbefore stated, it is to be understood that it is merely illustrative of the presently preferred embodiment of the invention and that no limitations are intended to the details of construction or design herein shown other than as defined in the appended claims.

I claim:

1. A ball throwing machine for use by tennis, soft ball and the like players, said machine having a main frame, a ball throwing barrel mounted on said frame having a discharge end and a breech end, ball hopper means for storing and feeding a plurality of balls individually into the breech end of said barrel, means for supply pressurized air to said breech end including pressure responsive means operable in response to a predetermined air pressure to jet air into said breech end rearward of a ball therein to propel the same along said barrel and out of the discharge end thereof at a desired velocity, said pressure responsive means including pressure sensitive switch means connected in circuit with a normally closed snap-action solenoid valve opening quickly when energized by said switch means as the air supply reaches said predetermined air pressure value, and said pressure responsive means being thereafter operable in response to lowering of the air pressure to close off all air flow into said barrel until the supply pressure again rises to said predetermined pressure.

2. A ball throwing machine as defined in claim 1 characterized in the provision of adjustable wheels supporting said main frame and useful in moving said machine from place to place and for supporting said barrel at a desired inclination to the horizontal when in use to throw balls.

3. A ball throwing machine as defined in claim 3 char-

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acterized in that said means for supplying pressurized air includes power driven air compressor means and an air storage tank mounted on said main frame and having means for jetting pressurized air from said tank axially through the breech end of said barrel.

4. A ball throwing machine as defined in claim 3 characterized in that the interior of the barrel breech includes means positioned to hold the next ball in position to be propelled through the barrel in a desired starting position forward of said air jetting means.

5. A ball throwing machine as defined in claim 4 characterized in that the internal diameter of said barrel is only slightly greater than that of the ball being propelled therethrough so as to offer only negligible resistance to the passage of the ball therealong while preventing the escape of any material quantity of pressurized air.

6. A ball throwing machine as defined in claim 1 characterized in that said machine functions automatically to propel balls from said barrel in response to the rise of air pressure to said predetermined value and the entry of the next ball into the breech end of the barrel while the air flow thereinto is momentarily closed off.

7. An automatic ball throwing machine for use by sportsmen in practicing, hitting and catching propelled balls, said machine having a ball propelling barrel provided at its breech end with means for jetting pressurized air thereinto behind a ball to be propelled, pressurized air supply means connected to said jetting means and including a fast-action two-positioned solenoid-controlled valve, and a pressure sensitive switch means connected in circuit with said solenoid-controlled valve to open said valve abruptly when the air pressure rises to a predetermined valve and to abruptly close said valve as the pressure falls during the projection of a ball through said barrel.

8. A ball throwing machine as defined in claim 7 characterized in the provision of means for feeding a single ball into said barrel breech during the interval said valve is closed and while the air pressure is rising to said predetermined pressure.

9. A ball throwing machine as defined in claim 8 characterized in that said ball feeding means comprises a tubular hopper closely embracing a row of balls, said tubular hopper being in communication with said barrel breech whereby the pressurized air jetting thereinto to project a ball flows in part into said hopper and agitates the balls therein to maintain the same in a free condition in instant readiness to advance as the next ball passes into the barrel breech.

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