This invention relates to a ball-throwing machine, and more particularly to an automatically operated ball-throwing machine for throwing baseballs, tennis balls or the like at predetermined intervals.

An object of the present invention is to provide a ball-throwing machine by means of which the balls may be thrown with considerable force at large distances.

Another object of the invention is to provide a ball-throwing machine which is readily adjustable for throwing the balls at various distances.

A further object of the invention is to provide a ball-throwing machine which is reliable in operation.

Another object of the invention is to provide a ball-throwing machine with a feeding mechanism, which is automatically controlled by the ball-throwing arm for feeding one ball at a time from a magazine to the ball-throwing arm when the latter is in its ball-throwing position.

Still another object of the present invention is to provide a ball-throwing machine with an adjustable counter mechanism, by means of which the operation of the ball-throwing machine may be readily adjusted for throwing a predetermined number of balls during a period of operation.

Other objects and structural details of the invention will be apparent from the following description when read in conjunction with the accompanying drawings forming part of this specification, wherein:

Fig. 1 is a side elevational view of a ball-throwing machine according to the invention,

Fig. 2 is a fragmentary side elevational view illustrating the counter device of the machine on an enlarged scale,

Fig. 3 is a fragmentary perspective view of a detail of the machine, some parts being broken away,

Fig. 4 is a fragmentary perspective view of another detail of the machine,

Fig. 5 is a perspective view of the ball-gripping device of the machine,

Fig. 6 is a fragmentary side elevational view of the machine showing the elements thereof in a different position,

Fig. 7 is a fragmentary view, partly in section, of the ball feeding device,

Fig. 8 illustrates the wiring diagram of the counter device, and

Fig. 9 is a side elevational view of a different embodiment of the gripping device of the machine.

Referring now to Figs. 1, 2, 4, and 6, 20 generally indicates a support comprising a pair of longitudinal bars 22, carried by a pair of front legs 24 (only one leg being shown in the drawings) and a pair of rear legs 26 (only one leg being shown in the drawings). The front legs 24 are connected with each other by a cross-bar 28, and the rear legs 26 are connected with each other by a cross-bar 30. Furthermore, on each side of the support the front legs 24 and the rear legs 26 are connected with each other by a lower longitudinal bar 32 and an upper longitudinal bar 34, all being in the shape of an angle iron. Moreover, on each side of the support 20 a reinforcing element 36 is connected with the longitudinal bars 22, 23, 32 and 34.

As best shown in Figs. 1 and 4, on each side of the support 20, an upright 38 is rigidly connected with the bars 22 and 34. Each upright has a platform 40 on which a bearing 42 is mounted. An actuating shaft 44 having a center crank 46 is rotatably mounted in said bearing 42. A crank arm 48 is arranged on each end of said crank shaft 44. Each arm 48 carries a stud 50 connected with one end at an actuating spring 52, the other end of which is engaged with a loop 54 at one end of a cord 56 passing through an eyelet 58 attached to the lower longitudinal bar 32 of the support 20. A loop 60 at the other end of the cord 56 is engaged with an adjustable device, generally indicated by 62, mounted on the rear leg 26 of the support 20 for adjusting the tension of the actuating spring 52.

The lower end of a ball throwing arm 64 is rigidly connected with the crank 46 of the crank shaft 44. As best shown in Figs. 1 and 3, the arm 48 is rigidly connected with a serrated portion 70. Each of the gripping fingers 66 is provided with a slot 72, and the gripping fingers 66 are provided with a nut 74 screwed on the projecting end of the bolt 74. As best shown in Figs. 1, 4, and 6, an engaging element 78 is swingably supported at 80 from lugs 82 carried by the crank portion 84 of the crank shaft 44. As shown in Figs. 3, 4 and 6, this engaging element 78 is provided at its lower end with a cam 84, the inclined surface of which merges into the surface of an edge of a lower engaging plate 86 arranged on said engaging element 78. Furthermore, at a distance from said cam 84 and at an opposite side of the engaging element 78 a second engaging cam 88 is arranged, the inclined surface of which merges into the surface of an edge of a second engaging plate 90. Springs 92 (see Figs. 4 and 9) are stretched between pins 94 projecting from the engaging element 78 and pins 96 projecting from the uprights 38. The springs 92 are weaker than the actuating springs 52.

As best shown in Figs. 1, 3, and 9, a rod 98 is carried by bearings 100 slidably mounted in slots 102 (only one slot shown) of bars 104 rigidly secured to and depending from the longitudinal rails 34. Each bar 104 carries at its lower end a lug 106 provided with a threaded bore 108. The upper end of setscrews 110 engaged with said threaded bores 108 are in engagement with the slidable bearings 100 for setting same in a predetermined position. The shaft 98 carried by said bearings 100 is arranged for cooperative engagement with the cam 84.

As best shown in Figs. 1, 3, 4, and 6, a locking device, generally indicated by 112, is mounted on a plate 114 carried by the longitudinal rails 34. This locking device 112 comprises a substantially cylindrical casing 116 slidably receiving a locking pin 118 projecting from the front end thereof. The projecting end of this locking pin 118 has an inclined surface arranged for cooperative engagement with the cam 88 of the engaging element 78. A longitudinal rod 120 is provided with the locking pin 118 passes through a bore of the casing 116 at the opposite end thereof and carries a stub 122. The locking pin 118 is under the action of a spring 124 wound around the rod 120 inside the casing 116. A transverse rod 126 is provided with the locking pin 118 passes through slots 128 (only one being shown) arranged on each side of the casing 116.

This transverse rod 126 is provided for engagement with sliders 130 slidably engaged with housings 132 carried by the longitudinal bars 34.

As shown in Fig. 1, an electro-motor 134 mounted on a plate 136 carried by the bar 32 drives through a belt 138 the input shaft 140 of a speed reducing transmission 142 mounted on a bracket structure 144 carried by the support 20. A sprocket wheel 146 secured to the output shaft 148 of the speed reducer 142 drives through a chain 150 (see Figs. 1, 3 and 9) a sprocket wheel 152 keyed to a driving crank shaft, generally indicated by 154, journaled in suitable bearings of the longitudinal rails 34. This driving crank shaft 154 has a center crank 156 provided with a roller 158 capable of engagement with the engaging element 78 and the platform 86 thereof during a rotation of the crank shaft 154.

Furthermore, this crank shaft 154 is provided with
two arms 160 arranged at an obtuse angle to the arms of the crank shaft 156. Each of the arms 160 carries a roller 162 capable of engagement with the end of the slider 130 during a rotation of the crank shaft 154. Moreover, as best shown in Figs. 1 and 2, an actuating element 164 is arranged at a counter-clockwise direction, generally indicated by 166, is secured to one end of the crank shaft 154. This actuating element 164 has a projection 168 which, during a rotation of the crank shaft 154, may engage one of a set of collars mounted on a sleeve 172 slightly arranged on a rod 174 secured to one of the bars 34. The sleeve 172 is under the action of a spring 176 stretched between its right hand end 178 (see Fig. 2) and a stationary portion of the support 20 for urging the sleeve 172 in the direction of the arrow A.

Applying the actuating element 164 a double armed locking element 178 is swingingly mounted at 180 on a plate 182 secured to the upper bar 22 of the support 20. The lower arm 184 of said locking element 178 is arranged for engagement with one or the other of the 220 of the slidable spring loaded sleeve 172 is pivoted at 186 to one end of a connecting rod 188, the other end of which is pivotally secured to the projecting end 190 of the center crank shaft 156. This sleeve is mounted on a plate 196 secured to the support 20. One end of a spring 198 is connected with the pivot connection 186 between the connecting rod 188 and the other end 190 of the center crank shaft 156; the other end of this spring 198 is connected with a bolt 200 secured to the support 20. This spring 198 tends to rotate the double armed locking lever 178 in counter-clockwise direction. The movement of the locking element 178 in counter-clockwise direction is limited by a stop 202 arranged on the plate 182 for engagement with the upper arm 204 of the locking element 178. A member 206 having a bore for said engagement with the rod 174 and carrying the movable resilient terminal 208 and the stationary terminal 210 of an electric switch, generally indicated by 212, is arranged to be engaged with said bore of the locking element 178. Depending upon the position of the member 206, an end plate 212 of the sleeve 172 comes into engagement with the movable resilient terminal 208 of the switch 212 after a predetermined number of revolutions of the crank shaft 154. As shown in Fig. 8, the engagement of the end plate 220 with the movable resilient terminal 208 causes a disengagement of the latter from the stationary terminal 210, whereby the motor circuit 218 is interrupted for a stopping of the motor 134.

As shown in Fig. 8, a coin receiving device 222 of any suitable construction is arranged in the solenoid circuit 224 in order to receive a coin. The coin receiving device 222 is connected with the driving shaft 154 and the engaging element 78 of the engaging element 78. In this way, when a coin is ready for holding the sleeve 172 in its respective position obtained by a stepwise displacement by the actuating member 164.

Repeating now to Figs. 1 and 7, a supporting device, generally indicated by 236, carrying a magazine 238 is attached to the support 20 by screws or the like. A double armed lever 240 swingingly mounted on the supporting device 242 is shown in Fig. 2. When the magazine 238 is ready for a spring 244 in the position shown in full lines in Figs. 1 and 7. The spring 244 is stretched between the arm 246 of the lever 240 and the element 247 of the supporting device 248. A first engagement of the arm 248 is pivoted to the arm 250 of the double armed lever 250 to 252 passes through a bore 254 of the magazine 238 and a second holding pin 256 pivoted to the arm 246 of the supporting device 248 and the end of the magazine 238. When the lever 248 is in the position shown in full lines in Fig. 7, the first holding pin 256 projects into the magazine for holding the magazine for delivery, as shown in Fig. 2. The second holding pin 256 enters the interior of the magazine, whereby it comes into engagement with the ball of the supply of balls which now is the first ball. The release balls enters the gripping hand and is now held by the latter.

When, in a manner to be described hereinafter, the ball throwing arm is released from its ball receiving position 52 of the projecting aforesaid spring 52 for throwing the ball, the gripping head 66 is disengaged from the U-shaped member 264 so that now the double armed lever 260 is in the engagement of the position 52 of the double armed lever 260 in the support 20.

Upon release of the spring loaded slider 226 of the coin receiving device 222 the solenoid circuit 224 is interrupted at the terminals 228 and 230, so that now the spring 198 may return the rocking locking element 178 of the engaging element 78 to its original position shown in Fig. 2, with member 164 ready for holding the sleeve 172 in its respective position obtained by a stepwise displacement by the actuating member 164.

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Upon release of the spring loaded slider 226 of the coin receiving device 222 the solenoid circuit 224 is interrupted at the terminals 228 and 230, so that now the spring 198 may return the rocking locking element 178 of the engaging element 78 to its original position shown in Fig. 2, with member 164 ready for holding the sleeve 172 in its respective position obtained by a stepwise displacement by the actuating member 164.

Referring now to Figs. 1 and 7, a supporting device, generally indicated by 236, carrying a magazine 238 is attached to the support 20 by screws or the like. A double armed lever 240 swingingly mounted on the supporting device 242 is shown in Fig. 2. When the magazine 238 is ready for a spring 244 in the position shown in full lines in Figs. 1 and 7. The spring 244 is stretched between the arm 246 of the lever 240 and the element 247 of the supporting device 248. A first engagement of the arm 248 is pivoted to the arm 250 of the double armed lever 250 at 252 passes through a bore 254 of the magazine 238 and a second holding pin 256 pivoted to the arm 246 of the supporting device 248 and the end of the magazine 238. When the lever 248 is in the position shown in full lines in Fig. 7, the first holding pin 256 projects into the magazine for holding the magazine for delivery, as shown in Fig. 2. The second holding pin 256 enters the interior of the magazine, whereby it comes into engagement with the ball of the supply of balls which now is the first ball. The released balls enters the gripping hand and is now held by the latter.

When, in a manner to be described hereinafter, the ball throwing arm is released from its ball receiving position 52 of the projecting aforesaid spring 52 for throwing the ball, the gripping head 66 is disengaged from the U-shaped member 264 so that now the double armed lever 260 is in the engagement of the position 52 of the double armed lever 260 in the support 20.
During the continuation of the rotation of the driving shaft 154 in the direction of the arrow C, the crank 156, with its roller 157, engaged with the platform 86, pulls the engaging element 78 downwardly whereby the ball throwing arm 64 is swung in counter-clockwise direction and the actuating spring 52 connected with the arms 48 of the driving shaft 154 are tensioned.

During the downward movement of the engaging element 78, the arm 84 thereof is brought into engagement with the shaft 154, as shown in Fig. 5. By the action of this arm 84, the downward movement of the engaging element 78 is controlled in such a way that, during a continuation of the rotation of the tensioning arm 156 of the driving shaft 154, the roller 157 becomes disengaged from the platform 86.

However, before this disengagement takes place, the upper cam 88 of the engaging element 78 engages the inclined surfaces of the lock 118, displacing same against the action of the spring 124.

Upon disengagement of the cam 88 from the locking pin 118 during the downward movement of the engaging element 78, the locking pin 118 is now pulled outwardly by the action of the spring 124 so that it comes into locking engagement with the upper surface of the platform 90, as shown in full lines in Fig. 5. At this time, the lowest cam 84 of the engaging element 78 is still in engagement with the rod 98, so that the engaging element 78 is prevented from a swinging movement in counter-clockwise direction, and, consequently, the upper platform 90 cannot be pressed from the locking pin 118. Thus, the ball throwing arm 64 is held in its ball receiving position against the action of the actuating spring 52.

During above described downward movement of the engaging element 78 and movement of the ball throwing arm 64 into its ball receiving position, the springs 92 stretched between the engaging element 78 and the uprights 38 are tensioned. Further, when the ball throwing arm 64 reaches its ball receiving position, 64, as shown in dash and dot lines in Fig. 1, a ball is automatically fed to the gripping head 66 from the magazine 238 in the manner described above. The ball then rests in the gripping head 66.

During the continuation of the rotation of the driving shaft 154 in the direction of the arrow C after above described locking engagement between the locking pin 118 and the platform 90 of the engaging element 78, the roller 84 of the crank 156 becomes disengaged from the platform 86, as shown in full lines in Fig. 5.

Thereafter, the rollers 162 of the releasing arms 160 (see Fig. 3) come into engagement with the ends 270 of the rollers 130 during the continuation of the rotation of the driving shaft 154. Said rollers 162 cause a displacement of the sliders 130 by the rollers 162 in longitudinal direction, whereby the ends 272 of said sliders 130 in engagement with the transverse rod 126 cause a displacement of the locking pin 118 against the action of the spring 124. This displacement of the locking pin 118, in turn, causes a release of the locking engagement between the pin and the platform 90, so that now the actuating springs 52 cause a sudden and fast rotation of the ball throwing arm 64 in clockwise direction for throwing the ball engaged with the gripping head 66. The actuating spring 52 now acts as a pendulum the movements of which are dampened by the spring 124.

Thus, by the action of the engaging element 78, and the actuating spring 52 having a tendency to hold the arms 48 of the driving shaft 154 and the ball throwing arm 64 in the position shown in Figs. 1 and 4, the ball throwing arm 64 reaches soon after the throwing of a ball the position shown in Figs. 1 and 4, and the machine is ready for throwing another ball in the manner described above.

During each revolution of the driving shaft 154 the ball throwing arm 64 receives and throws one ball. Furthermore, during each revolution of the actuating shaft 154 the counter device 166 is advanced one step by the projection 165 of the actuating element 164 secured to the actuating shaft 154.

As will be readily understood, the ball throwing mechanism as described so far, including the counter device 166 is advanced until the switch 212 is opened by the end plate 220 of the sleeve 172 as shown in Fig. 8. Thereafter, the machine is automatically stopped and is ready for operation upon insertion of another coin into the coin receiving device.
second engaging surface for releasing said ball throwing arm and causing a ball throwing movement of the latter under the action of said actuating spring.

3. In a ball throwing machine as claimed in claim 2, a cam on said engaging element, and abutting means on said cam, said cam being arranged for engagement with said abutting means during the movement of said engaging element to secure a disengagement of said tensioning element from said first engaging surface at a predetermined interval.

4. In a ball throwing machine as claimed in claim 2, a cam on said engaging element, abutting means adjustably mounted on said support, and setting means cooperate with said abutting means for setting same in a predetermined position, said cam being arranged for engagement with said abutting means during the movement of said engaging element to secure a disengagement of said tensioning element from said first engaging surface at a predetermined interval.

5. A ball throwing machine comprising in combination: a support, a ball throwing arm swingably mounted on said support, an actuating spring connected with said ball throwing arm and said support, an engaging element swingably suspended from said ball throwing arm, a first platform arranged on and projecting from said engaging element, a second platform arranged on and projecting from said engaging element, a shaft rotatably mounted on said second platform, a drive connected with said shaft for rotating same, a tensioning element mounted on said shaft, said tensioning element being capable of temporary engagement with said first platform during a revolution of said shaft for bringing said ball throwing arm into a ball receiving position and tensioning said engaging spring, locking means arranged on said support for locking engagement with said second platform when the ball throwing arm is in its ball receiving position, and a releasing element mounted on said shaft, said releasing element being capable of temporary engagement with said locking means during a revolution of said shaft so as to disengage same from said second platform for releasing said ball throwing arm and causing a ball throwing movement of the latter under the action of said actuating spring.

6. In a ball throwing machine as claimed in claim 5, a cam arranged on said engaging element for displacing said spring loaded locking means against the action of its spring during the movement of the engaging element by said tensioning element so as to bring said locking means into position for engagement with said second platform under the action of its spring.

7. A ball throwing machine as claimed in claim 5, said first and second platforms being arranged at opposite sides of said engaging element.

8. A ball throwing machine comprising in combination: a support, a ball throwing arm swingably mounted on said support, an actuating spring connected with said ball throwing arm and said support, an engaging element swingably suspended from said ball throwing arm, a first platform arranged on and projecting from one side of said engaging element, a first cam arranged on said engaging element on the same side as said first platform, abutting means on said support for cooperation with said first cam, a second platform arranged on and projecting from the opposite side of said engaging element, a second cam arranged on said engaging element on the opposite side of said engaging element to secure a disengagement of said tensioning element from said first engaging surface at a predetermined interval during a revolution of said shaft for bringing said ball throwing arm into a ball receiving position and tensioning said actuating spring, spring loaded locking means shiftable mounted on said support and releasable from engagement with the first platform to secure a disenagement of said locking means from said first platform.

9. In a ball throwing machine as claimed in claim 8, resilient means arranged between said engaging element and said support for dampening the movements of said engaging element upon said support, said resilient means being capable of temporary engagement with said engaging element during the movement of said engaging element by said tensioning element so as to secure an engagement of said engaging element with said first platform during a revolution of said shaft for bringing said ball throwing arm into a ball receiving position under the action of said actuating spring.

10. A ball throwing machine comprising in combination: a support, a ball throwing arm swingably mounted on said support, an actuating spring connected with said ball throwing arm and said support, said cam being arranged for engagement with said abutting means during the movement of said engaging element to secure a disengagement of said tensioning element from said first engaging surface at a predetermined interval.

11. In a ball throwing machine as claimed in claim 10, said motor switch being adjustable relative to said through member.
the inactive position of said toothed member, said toothed member being capable of engaging said motor switch for opening same against the action of its resilient means upon displacement from its inactive position into an active position after a predetermined number of steps depending on the selected position of the motor switch, a coin-controlled closing switch, and electromagnetic means in circuit with said coin-controlled closing switch and associated with said pawl for disengaging same from said toothed member upon energization by a closing of said coin-controlled closing switch so as to release said toothed member for return into its inactive position by said spring.

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