

12

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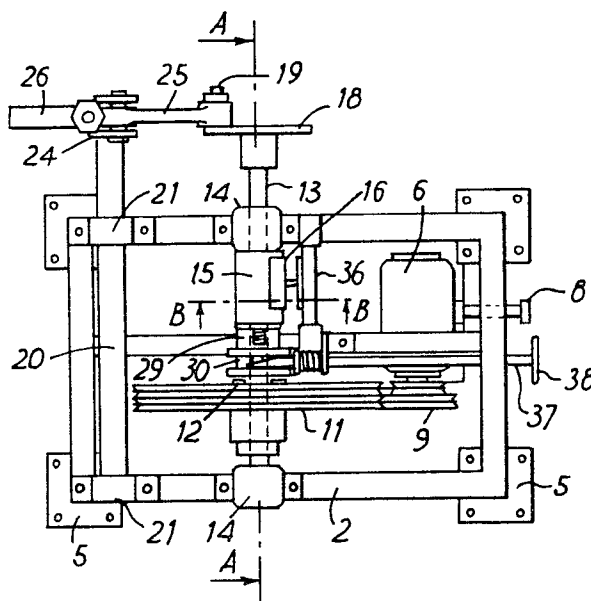
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Machine for kicking a ball such as a soccer ball.

A machine for kicking a ball such as a soccer ball comprising an axle (13) rotatably mounted on a base (1, 2) and provided with an eccentric section (18), a kicking bar (26) oscillating in response to rotation of said axle, a drive wheel (11) freely rotatable on said axle, a driving block (29) fixedly mounted on said axle, a brake (15) an extensible pin (32, 33) mounted on said driving block, a longitudinal surface (31) associated with said pin, and a rod (37, 46) selectively moveable from a first position where said rod engages said pin associated surface (35) when said pin is located within a certain angular range about said axle and a second position where said rod does not engage said pin associated surface, said pin (32) extensibly engaging said drive wheel (11) to transmit rotation from said drive wheel to said axle (13) and thereby oscillate said kicker bar (26) except when said rod is in said first position and said pin is within said certain angular range, said brake (15) frictionally contacting said eccentric section of said axle at least when said pin is within said certain angular range. Also disclosed is a ball support for three dimensional positioning of a ball relative to the kicker bar.



- 1 -

MACHINE FOR KICKING A BALL
SUCH AS A SOCCER BALL

The present invention relates to a device for soccer training designed to permit the use of highly efficient methods to perfect the practice of soccer and development of necessary skills by beginners as well as professionals. Observations of
5 many soccer games, including world championships, have revealed that a most common problem is a lack of adequate control of the ball at the point of reception thereof, resulting in misplays, including those occurring within short range of the goal. Such misplays most often occur because a player cannot instinctively properly
10 react to a particular ball flight trajectory in the absence of repetitive practice involving the same or similar conditions so as to perfect his technique to rapidly and instinctively react thereto in the most desirable manner. Furthermore, as is common knowledge, the complete control of the ball in all respects can
15 be attained only by methodical, repeated practice, in other words, by repeatedly practising the reception of a ball, in a given flight, with or without spin and at normal distances, such as may be created by kicking, as many times as desired or necessary. Only in this way can players acquire the knowledge and the in-
20 stinctive skills necessary to perform designated plays perfectly.

The above-mentioned method of repetitive practice is impossible to attain with even the most skilled players, since it is extremely difficult for a player to throw or kick the ball with the same trajectory even three times in succession. However,

- 2 -

such method of repetitive practice may be readily and easily attained using the present invention, which comprises a kicking machine composed of simple mechanisms. Such kicking machine is capable of repetitively imparting a selected trajectory to a soccer ball so that a player can receive a ball having such selected trajectory as many times as he desires. Thus, such kicking machine affords a beginner, an apprentice, or a professional the opportunity to perfect the technique of controlling a ball because of the availability of a machine repetitively to impart selected trajectories to the ball. Consequently, the kicking machine of the present invention provides a highly valuable device for training soccer players.

This invention relates to a machine for repetitively kicking a ball, such as a soccer ball, with a selected trajectory. The machine comprises a kicking unit and a ball support unit which may be integral with the kicker unit. The kicker unit includes a continuously driven shaft or axle, a kicking bar adapted to be rotatably displaced through a predetermined arc and a clutch member for drivingly connecting said kicking bar to said continuously driven shaft. Preferably, the kicker unit includes an axle or shaft rotatably mounted on a base and provided with an eccentric section, a kicking bar connected to said axle and oscillating in response to rotation of said axle, a drive wheel freely rotatable on said axle, a driving block fixedly mounted on said axle, a brake, an extensible pin mounted on said driving block, and a rod selectively moveable from

- 3 -

a first position where said rod engages a surface associated with said pin when said pin is located within a certain angular range about said axle and a second position where said rod does not engage said pin associated surface, said pin extensibly engaging
5 said drive wheel to transmit rotation from said drive wheel to said axle and thereby oscillate said kicker bar except when said rod is in said first position and said pin is within said certain angular range, said brake frictionally contacting said eccentric section of said axle at least when said pin is within said certain
10 angular range. By selectively moving the rod, the kicker bar is selectively oscillated.

The ball support broadly includes a base, a frame carried by said base and selectively longitudinally positionable therealong, a carriage carried by said frame and selectively laterally position-
15 able therealong, and a pedestal carried by said carriage and selectively vertically positionable thereon for receiving the ball. Thus the ball support permits three dimensional positioning of the ball relative to the kicker bar and thereby allows the kicker bar to kick the ball with different trajectories and to permit repetitive
20 kicking of the ball with the same trajectory.

The invention will now be described in greater detail by way of Example with reference to the accompanying drawings in which:

Fig. 1 is a top view of one form of kicker unit according to the present invention;

25 Fig. 2 is a partially cut away side view of the kicker unit shown in Fig. 1;

Fig. 3 is a cross sectional view of the kicker unit shown in Fig. 1 taken along line A-A;

Fig. 4 is another sectional view of the kicker unit shown in Fig. 1 taken along line B-B;

Fig. 5 is an enlarged view of the area of the kicker unit designated by "C" in Fig. 3;

5 Fig. 6 is a top view of the area of the kicker unit designated by "C" in Fig. 3;

Fig. 7 is a side view of the area of the kicker unit designated by "C" in Fig. 3;

Fig. 8 is the same view of the kicker unit as shown in
10 Fig. 5, except that the kicker unit is shown in a different operating position;

Fig. 9 is a top view of a ball support that may be used with the kicker unit according to the present invention;

Fig. 10 is a cross sectional view of the ball support
15 shown in Fig. 9 taken along line D-D;

Fig. 11 is a cross sectional view of the ball support shown in Fig. 10 taken along line E-E;

Fig. 12 is a side view of the machine including the ball support in a first operating position; and

20 Fig. 13 is a side view of the machine including the ball support in yet another operating position.

As shown in Figs. 12 and 13 the machine for kicking balls according to the invention broadly includes a kicker unit A and a ball support and positioning unit B.

25 As best shown in Figs. 1 to 3, the kicker unit includes a generally rectilinear base or frame 1 made

- 5 -

up of perimetric frame members defining an upper horizontal platform 2 and a lower horizontal platform 3. Such rectilinear frame additionally includes vertical post members 4 at each corner, each having a base plate or shoe 5 by which the kicker unit may
5 be secured to a floor.

An electric motor 6 that powers the kicker unit is supported on the lower platform 3. Such motor 6 is not fixedly secured to the frame 1, but rather is selectively positionable by slidable mounting along two guides 7 with the location thereof being
10 selectable in response to rotation of a regulator bolt 8. The motor 6 has connected to its axle a scaled pulley 9 carrying three or more grooves of differing diameter for receiving a "V" belt 10, which transmits the rotation of the motor axle with selectively different velocities to a large freely rotating drive wheel 11
15 mounted on the upper platform 2. Alternatively, the scaled pulley 9 can be replaced by a common pulley, in which case the drive wheel 11 may have a plurality of grooves of differing diameter or the motor 6 preferably should be of variable speed character.

20 The drive wheel 11 is provided with an extending, radially disposed drive flange 12 on the inner side thereof, and the wheel 11 is mounted for free rotation on a horizontally disposed main axle 13. The main axle 13 is supported at one terminal end and inwardly of the other terminal end thereof by ball bearing mountings 14
25 secured to the upper platform 2 of the frame. As shown in Fig. 4, the main axle 13 is provided with a middle eccentric section 15 against which acts a pressure brake 16, the position of which is regulated by a regulator bolt 17. The terminal end of the main

- 6 -

axle 13 that extends beyond the upper platform 2 has a crank drive disc 18 attached thereto.

Also located on the upper platform 2 of the frame 1, and positioned parallel to and spaced from the main axle 13, is a second horizontal axle 20 supported at one terminal end and inwardly of the other terminal end thereof by a pair of fixed journal bearings 21. The extending terminal end of the axle 20 extends beyond the upper platform 2 and carries a clamping member 22 for clamping a vertically positioned swing bar 23 intermediate its ends and which is adapted to be rotatably displaced about the axis of the axle 20. On the upper end of the swing bar 23 is mounted a joint cuff 24 having a bifurcated extension providing a pivotal support for one terminal end of a connecting rod 25. The other end of the connecting rod 25 is pivotally connected to a bolt or pin 19 mounted adjacent to the periphery of the drive disc 18. As will be apparent the disc 18, pin 19, connecting rod 25 and cuff 24 form a crank type drive operable to convert rotation of the disc 13 into recipicatory rotative displacement of the swing bar 23 about the axis of the second axle 20.

The lower end of the swing bar 23 is provided with a clamp 27 for adjustably attaching a foot or kicking element 26 thereto. Preferably the distance from the clamp 22 to joint cuff 24 is approximately one-third the distance from the clamp 22 to the lowest part of the foot 26, thereby giving a larger tangential velocity to the foot 26 than to the upper end of the swing bar 23, which is driven by the connecting rod 25.

- 7 -

Fixedly mounted on the main axle 13 between the eccentric section 15 and the drive wheel 11 is a main driving block 29 as shown in Fig. 5, Fig. 6, and Fig. 8. The main driving block 29 is provided with a peripheral circumferential channel 30 and a
5 generally peripheral longitudinal channel 31 in which a sliding block 32 and a compression spring 33 are disposed. The aforesaid drive flange 12 extending from the drive wheel 11, the sliding block 32 and the spring 33 form the primary elements of a manually controllable clutch for transmitting motions from the drive wheel 11
10 to the swing bar 23 through the drive disc 18 and connecting rod 25. The spring 33 normally biases the sliding block 32 toward and into driving engagement with the drive flange 12 attached to the drive wheel 11, which engagement results in the transmission of rotation
15 from the drive wheel 11 to the main axle 13. As shown in Figs. 6 and 8 the upper surface of the sliding block 32 is provided with a transverse slot, one wall of which defines a transverse section 34 and an inclined section 35.

The kicker unit also includes a horizontal third axle member 36
20 disposed generally parallel to and spaced from the main axle 13. As shown in Fig. 1, Fig. 6, and Fig. 7, a lever arm 37 in the nature of an elongated lever member is rotatably attached to one end of the third axle 36 and is disposed perpendicularly thereto. At one end the lever arm 37 extends beyond the frame 1
25 and carries a handle member 38. The other end of the lever arm 37 is shaped to provide an arcuate, bowed extension 39 having a tapered or beveled tip 46 disposed in the peripheral annular

channel 30 of the main driving block 29 and adapted to be dis-
placeably introduced into the transverse slot of the sliding
block 32 as shown in Fig. 6 and Fig. 7. The lever arm extension
39 is normally biased so as to dispose the tapered tip 46 within
5 the transverse slot by a spring 41 anchored in a support 42 fixed
to the frame 1, with such spring 41 operative to press the extension
39 toward the main driving block 29.

As noted earlier, the subject device includes a ball support
and positioning unit for selectively positioning the ball to be
10 kicked in the path of the foot 26 mounted at one dependent end of
the swing bar 23. A preferred ball support unit, as shown in
Figs. 9-13, may be used independently of or mounted on the kicker
unit. The illustrated ball support unit includes a rectangular
base frame 43 supported by four pointed or tapered stakes 44 for
15 spearing into the ground. Slidably mounted on the base frame 43
is a second and smaller rectangular frame 45 with its path of
slidable displacement being defined by means of guides 46. The
smaller frame 45 is displaced along the rectangular frame 43 by
rotating a threaded rod 47 extending through a non-rotatable nut 48
20 fixed to the smaller frame 45 and extending through a support bear-
ing 49 in the rectangular frame 45.

The end of the rod 47 is provided with a disc 50 having a handle
51 eccentrically mounted thereon.

A cart 53 is slidably carried on a pair of guides 52 trans-
25 versely mounted on and extending across the smaller frame 45.
The cart 53 may be displaced along the guides 52 in a direction
perpendicular to the path of displacement of the frame 45 by

rotating a second threaded rod 54 extending through a non-rotatable nut 55 fixed to the cart 53 and extending through a support bearing 56 in the smaller frame 45. An end of the rod 54 is provided with a disc 57 having a handle 58 eccentrically mounted thereon.

Passing generally vertically through the cart 53 is a threaded bolt 59 having a disc connected about its upper end. The disc carries three or more radial, symetrically disposed, upwardly extending rods 61 for receiving and supporting a ball such as a soccer ball the drawing showing four for illustrating purposes only. The height of the ball relative to the rectangular frame 43 may be varied by rotating the disc, which in turn rotates the threaded bolt 59.

To use the machine, the ball should be properly positioned relative to the foot 26 of the kicker unit. To position the ball, the rods 47, 54 should be rotated through the use of their associated discs 50, 57 and handles 51, 58. The rod 47 effects longitudinally displacement of the smaller frame 45 over the rectangular frame 43, whereas the other rod 54 effects transverse displacement of the cart 53 over the smaller frame 45. Additionally, vertical displacement of the ball may be effectuated by rotation of the threaded bolt 59. In this manner, the ball may be selectively positioned relative to the path of the foot 26 to vary the trajectory of the ball when kicked by the foot 26.

The kicker foot 26 is initially at rest due to the tapered tip 40 of the lower arm 37 being normally biased so as to be disposed in the peripheral annular channel 30 of the main driving block 29

- 10 -

and within the transverse slot of the sliding block 32 such that the tapered tip portion 40 operatively abuts the slot wall transverse section 34 and there operates to maintain the sliding block 32 in its retracted position and out of driving engagement with the drive flange 12 attached to the drive wheel 11. In this condition, the rotation of the motor 6, which is transmitted by the scaled pulley 9 and the belt 10 to the drive wheel 11, is not transmitted to the main axle 13.

To displace the kicker foot 26, one simply presses down the driving handle 38 on the lever arm 37, thereby rotating the same about the third axle 36 and lifting the beveled tip 40 out of the transverse slot of the sliding block 32. Without the tip 40 constraining the sliding block 32, the spring 33 presses the sliding block 32 forward to be operatively engaged by the drive flange 12 attached to the drive wheel 11, thereby transmitting the rotation of the drive wheel 11 to the main axle 13. Rotation of the main axle causes rotation of the crank drive disc 18, which in turn causes oscillatory rotation of the swing bar 23, and hence causes displacement of the kicker foot 26 at a predetermined velocity through the region where the ball is supported by the radial rods 61.

If the driving handle 38 of the lever arm 37 is released immediately after the depression thereof, by either manual or electromagnetic means, the swing bar 23 will make one complete oscillation corresponding to a single kick of the foot 26. Such single oscillation occurs because of the following sequence. Upon release of the driving handle 38, the spring 41 depresses the beveled tip 40 within the peripheral annular channel 30 such that when the main

- 11 -

driving block 29 makes approximately one rotation, the tapered tip 40 contacts the inclined wall section 35 of the transverse slot in the sliding block 32, whereupon slightly further rotation of the main driving block 29 causes the tapered tip 40 to retract
5 the sliding block 32 against the bias of the spring 33 and

out of contact with the drive flange 12. Consequently, after one complete rotation of the main driving block 29, the drive wheel 11 becomes disengaged from the main driving block 29.

Further rotation of the main axle 13 is prevented by contact
10 between the brake 16 and the eccentric section 15 of the main axle 13. The frictional contact between the brake 16 and the eccentric section 15 may be varied by adjusting the regulation bolt 17 to compensate for differing drive wheel rotational velocities, which may derive from the "V" belt 10 being placed in
15 different channels of the pulley 9.

Thus, it is apparent that the machine may repeatedly displace the kicker foot 26 with a selected velocity, including foot direction, speed and angular arc, which, given a preselected and constant position of the ball relative to the kicker unit, permits
20 the kicking of a ball repeatedly with the same trajectory. Also it should be apparent that the foot 26 may be clamped at various orientations to the swing bar 23 or may be loosely clamped thereto and allowed to gyrate. Further, the ball support may be attached to the kicker unit as an integral part thereof and also may be in-
25 capable of varying the ball position relative to the kicker unit. In this later instance, the kicker unit should be provided with means for permitting both vertical and a horizontal position adjustment of the foot 26 or the swing bar 23.

C L A I M S :

1. A machine for kicking a ball such as a soccer ball comprising:

a base; an axle rotatably mounted on said base; a kicker bar; means for oscillating said kicking bar in response to rotation of said axle; and means for selectively transmitting power from a power source to said axle for selectively rotating said axle.

2. A machine according to claim 1 further including clutch means for preventing the transmission of power from the power source to said axle after the power has rotated said axle approximately one rotation.

3. A machine according to claim 1 or claim 2 where there are provided brake means for inhibiting the rotation of said axle after the cessation of transmission of power to said axle.

4. A machine according to claim 3 wherein the selective transmitting means, the transmission preventing means, and the brake means comprise a brake, a rotatable drive wheel and a driving block fixedly mounted on the axle, a pin being mounted on the driving block and movable from a position in which it engages with the drive wheel to a position in which it is disengaged therefrom and a rod being mounted for selective movement from a first position in which it engages with an end surface of the

- 13 -

pin when the pin is located within a selected angular sector about the axle to a second position in which it does not engage the said end surface of the pin such that the pin engages the drive wheel except when the rod is in its first position and the pin is within the selected sector, and the brake inhibiting rotation of the axle at least when the pin is within the selected sector.

5. A machine according to any of claims 1 to 4 wherein said oscillating means oscillates said kicking bar approximately one oscillation in response to one rotation of said axle.

6. A machine according to any one of claims 1 to 5 wherein said oscillating means comprises a rod, one end of which is connected to said axle at a point eccentric to the rotational axis thereof and the other end of which is connected to said kicker bar.

7. A machine according to any one of claims 1 to 6 including means for horizontally translating said kicker bar and means for vertically translating said kicker bar.

8. A machine according to any one of claims 4 to 7 wherein the axle is provided with an eccentric surface portion, the eccentric surface portion frictionally contacting the brake when the pin is within the selected

sector.

9. A machine according to claim 8 wherein the brake is adjustably positionable to vary the frictional contact between the brake and the eccentric surface portion of the axle.

10. A support for a ball such as a soccer ball comprising a base, a frame carried by said base and selectively longitudinally positionable therealong, a carriage carried by said frame and selectively laterally positionable therealong, and a pedestal carried by said carriage and selectively vertically positionable thereon.

FIG. 3

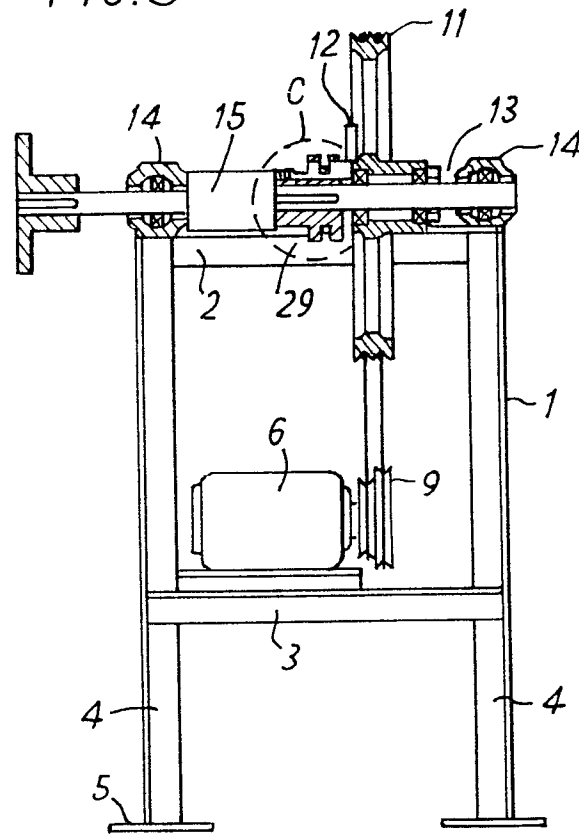


FIG. 4

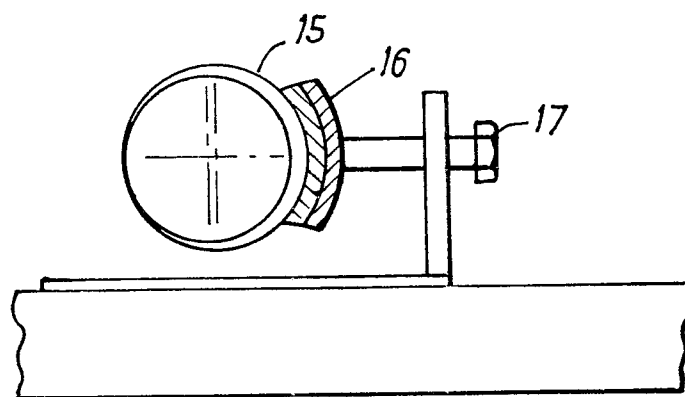


FIG. 8

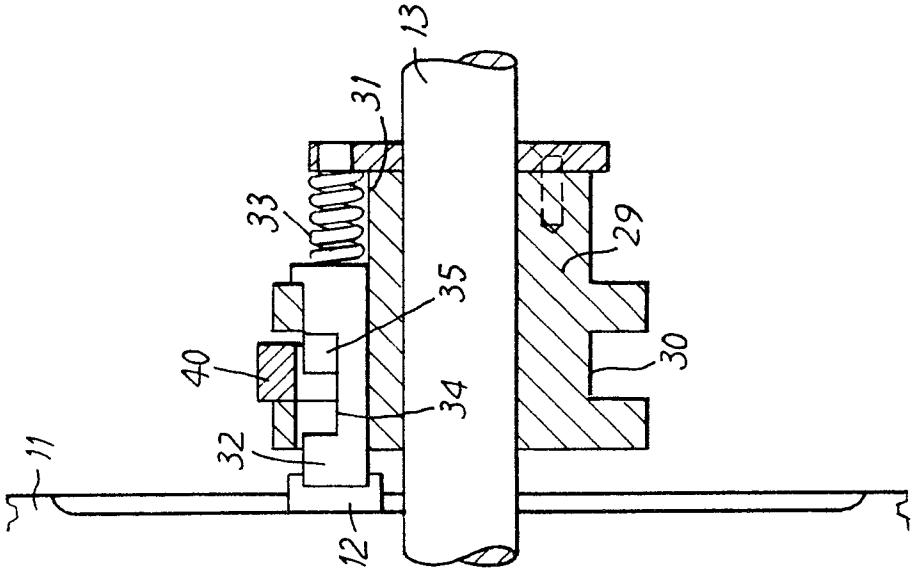


FIG. 5

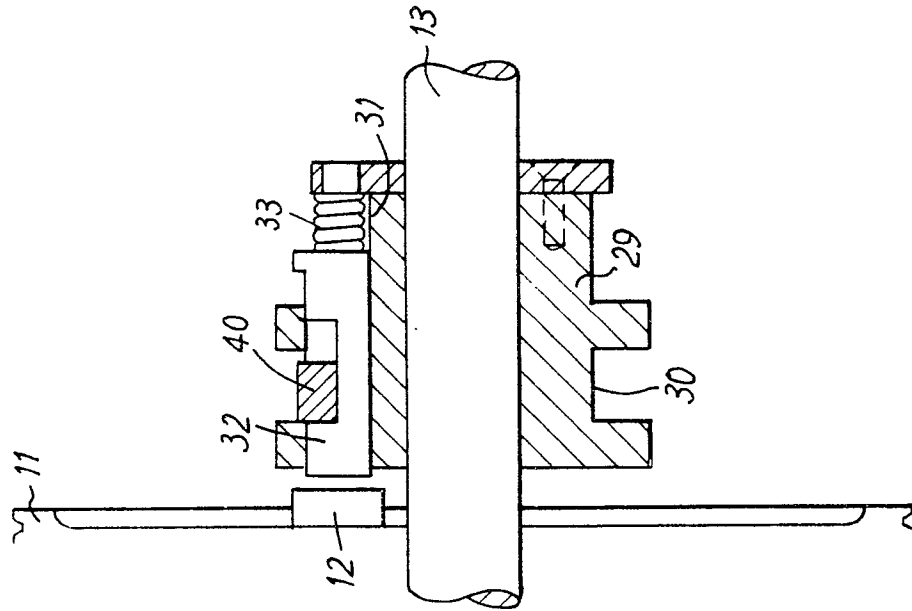


FIG. 6

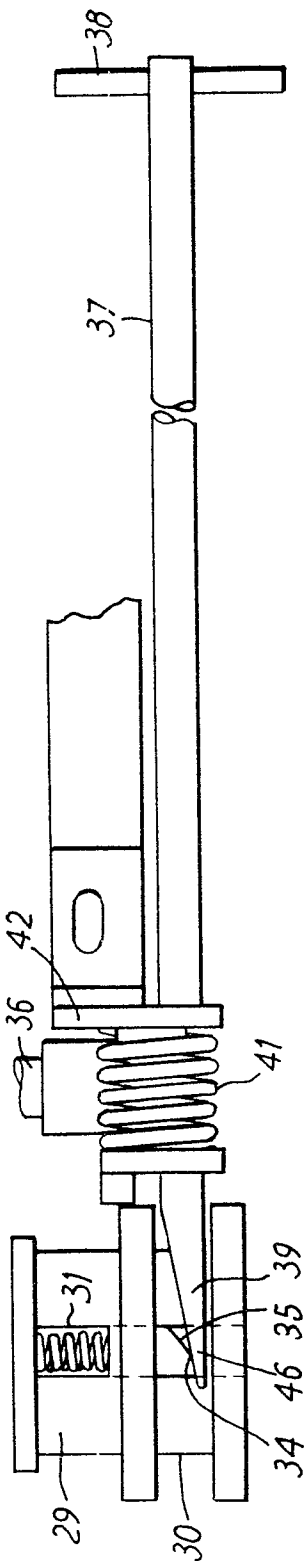


FIG. 7

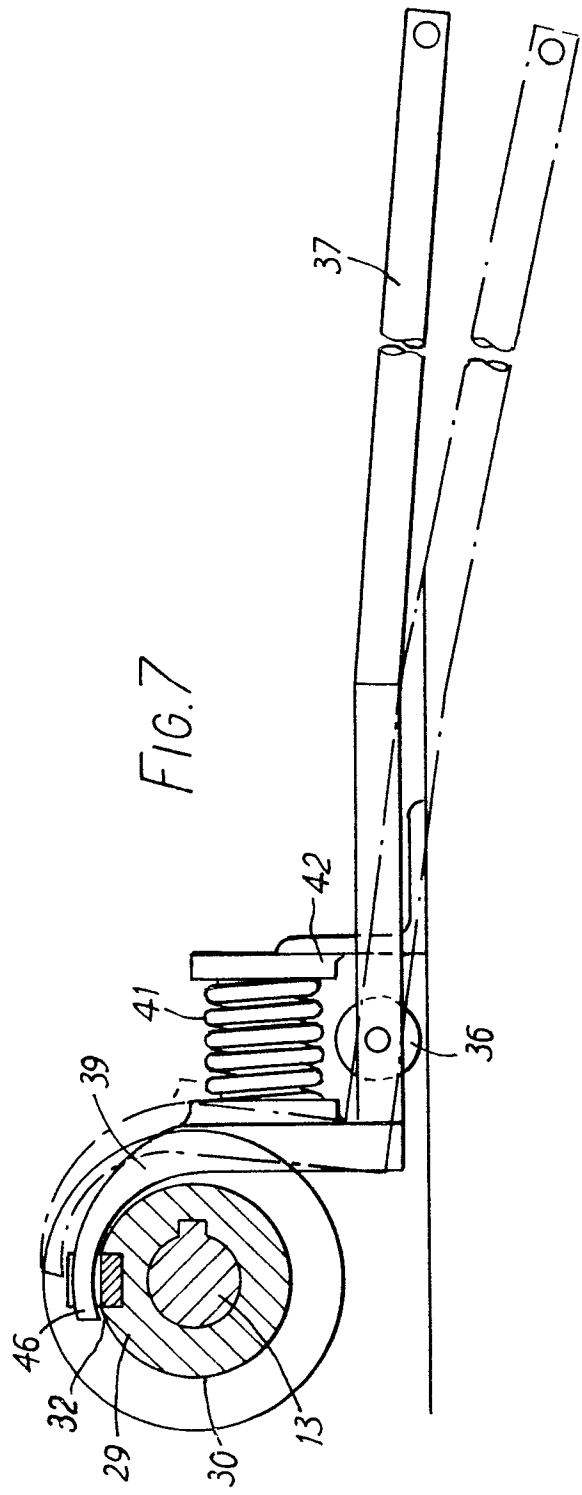


FIG. 9

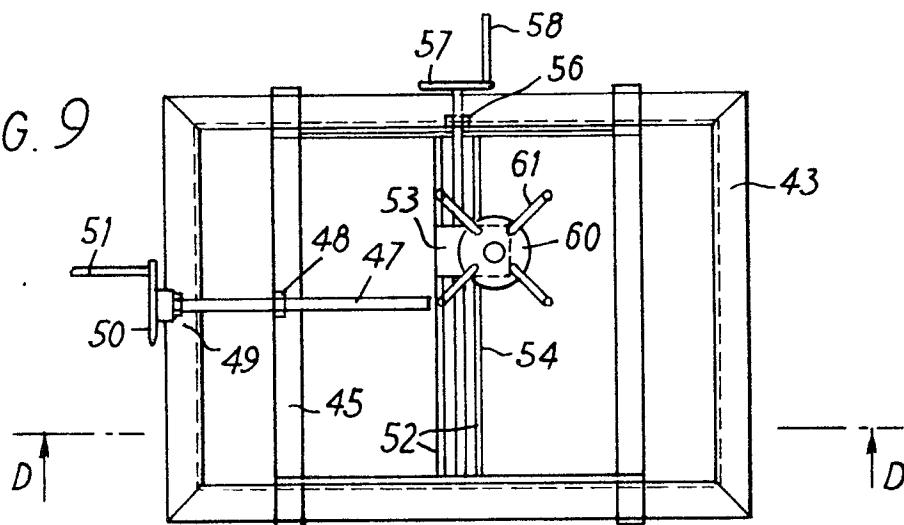


FIG. 10

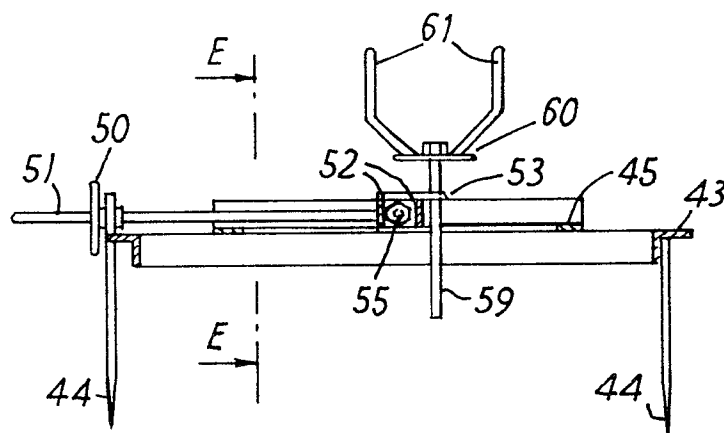
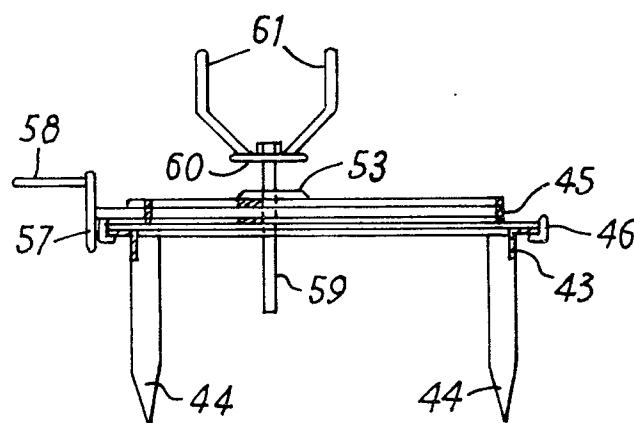
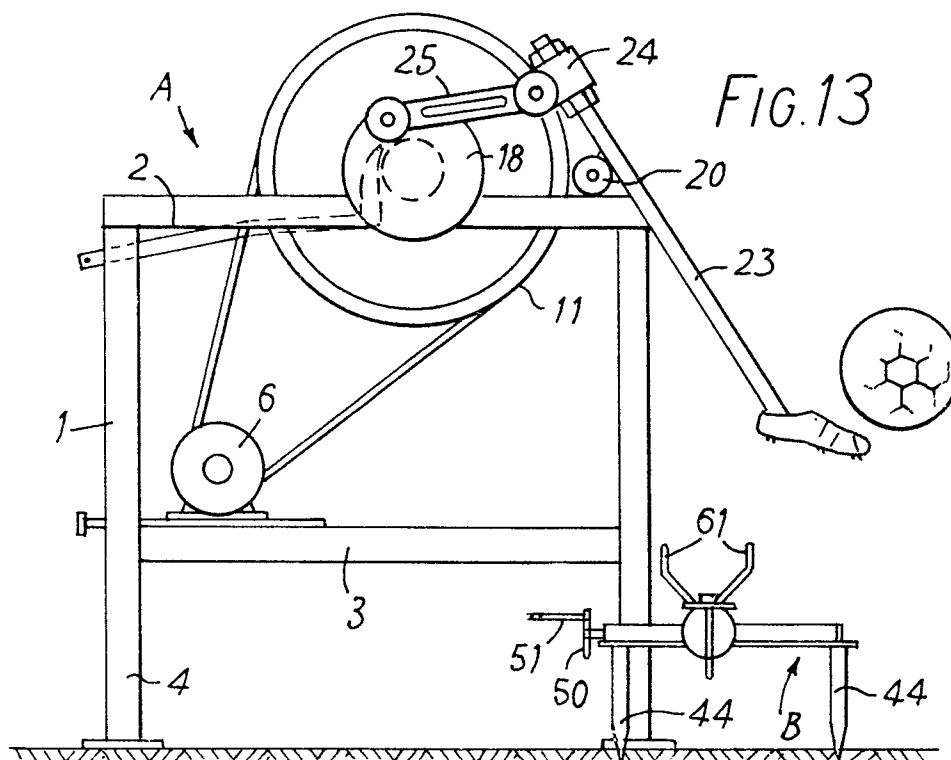
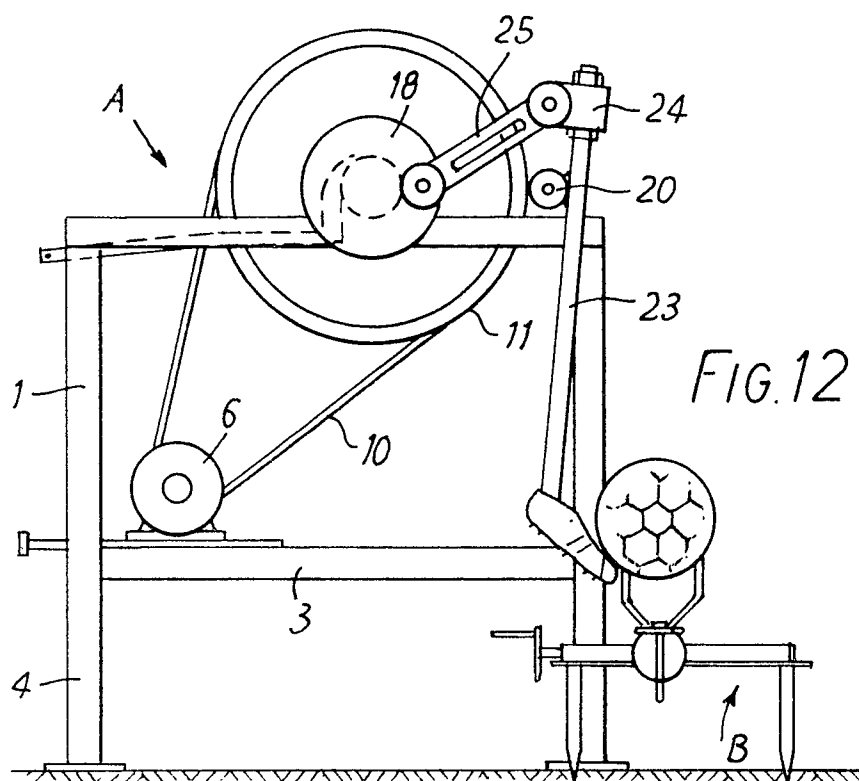


FIG. 11





0031655



European Patent
Office

EUROPEAN SEARCH REPORT

Application number
EP 80 30 4424

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl.)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
	<u>GB - A - 850 907</u> (SCHEIWILLER) * Page 8, line 29 to page 10, line 3; figure 1 * ---	1-6	A 63 B 69/40
X	<u>DE - A - 3 252 453</u> (GIOVAGNOLI) * Column 4, line 61 to column 5, line 18; figures 1-4 * ---	1, 5, 6	
	<u>WO - A - 80/01835</u> (MORGAN) * Page 5, lines 4-10; page 7, line 15 to page 8, line 24; figure 3 * ---	1, 5	
	<u>DE - A - 2 511 149</u> (KIESS) * Page 5, paragraph 4 to page 6, paragraph 1; figures 1, 2 * -----	1, 5	A 63 B
			TECHNICAL FIELDS SEARCHED (Int. Cl.)
			CATEGORY OF CITED DOCUMENTS
			X: particularly relevant A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons
			&: member of the same patent family, corresponding document
The present search report has been drawn up for all claims			
Place of search	Date of completion of the search	Examiner	
the Hague	26-03-1981	GERMANO	