United States Patent

Sheets et al.

[15] **3,674,265**

[45] **July 4, 1972**

[54] FOOTBALL BLOCKING AND TACKLING SLED

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[22] Filed: **June 3, 1970**

[21] Appl. No.: **42,931**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 749,450, Aug. 1, 1968, abandoned.

[52] **U.S. Cl.** ..... **273/55 R**
[51] **Int. Cl.** **A63b 67/00**
[58] **Field of Search** 273/55

[56] **References Cited**

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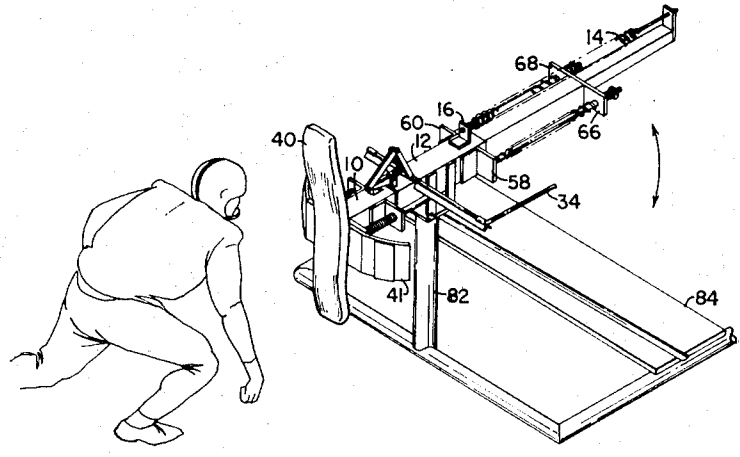
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[57] **ABSTRACT**

A mechanical training device which simulates the initial charge and retreat reactions of a football lineman. The lineman's body is simulated by a pad of resilient material which is coupled via a first set of compression springs to the forward end of a plunger which is slideable within a hollow guide sleeve between an extended and a retracted position. An expansion spring urges the plunger toward its extended position and opposes motion toward its retracted position. A latch mechanism holds the plunger in its retracted position until it is unlatched for forward motion toward its extended position. The forward motion of the plunger is resiliently limited by a second set of compression springs and the rearward motion is resiliently limited by a third set of compression springs. The expansion spring which drives the plunger forward is selected to simulate the initial charging force of a lineman and the compression springs on the forward end of the plunger simulate the lineman's natural shock-rebound properties. The compression springs which resiliently limit the plunger's rearward motion simulate the lineman's determined attempt to hold his ground after he switches from an offensive to a defensive posture. The angle of the plunger stroke and the force of the springs can be varied to simulate different types of linemen and different initial charge and retreat reactions. For training a plurality of linemen simultaneously, a plurality of devices are connected together so that a common release mechanism releases the latch mechanism of all devices simultaneously, but each device can be re-latched separately by its own lineman. A ball holding and "snap" simulating means is actuated simultaneously with the common latch release mechanism.

16 Claims, 11 Drawing Figures



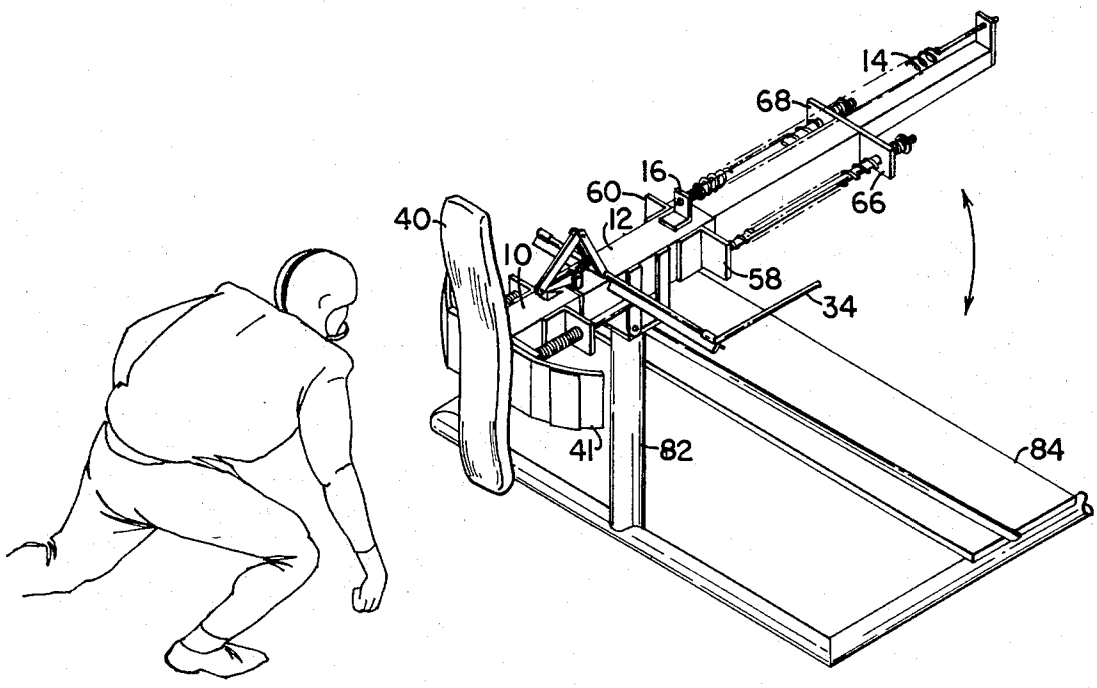


FIG_1

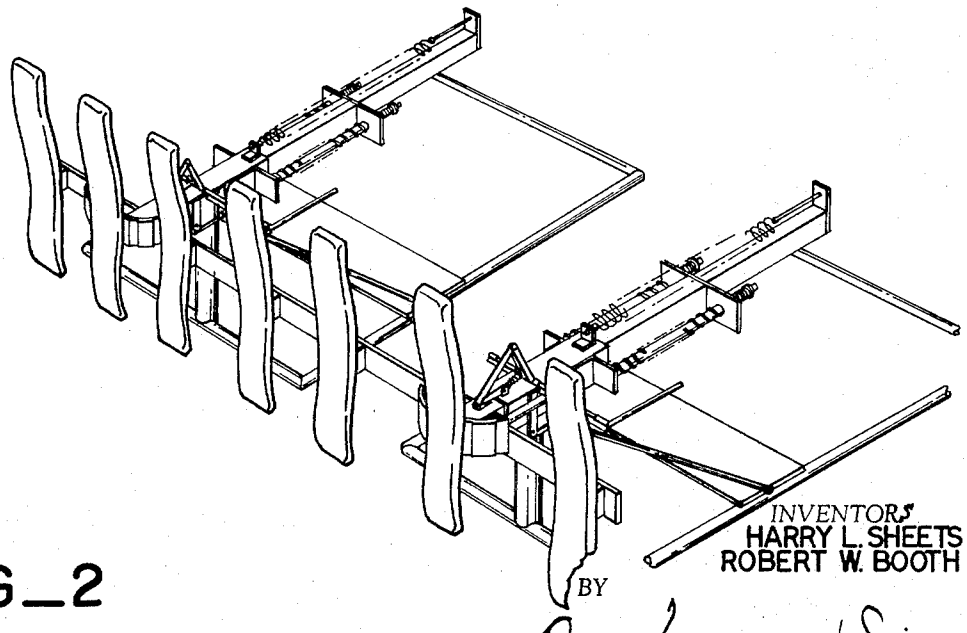


FIG_2

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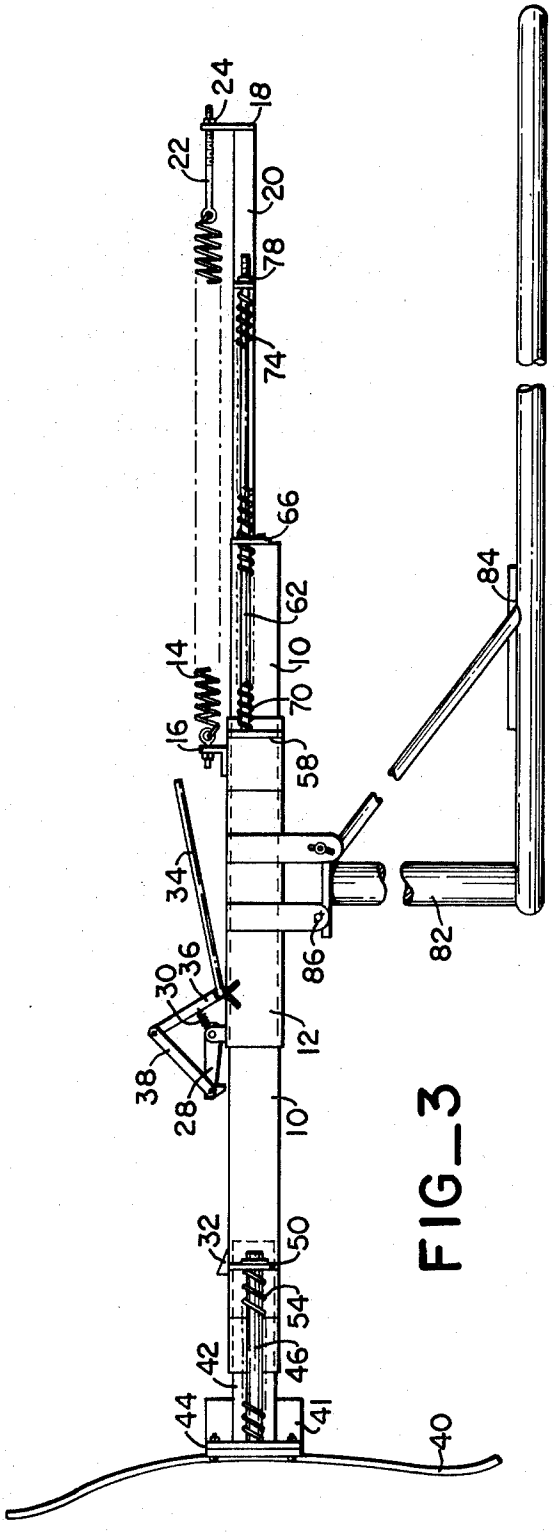


FIG_3

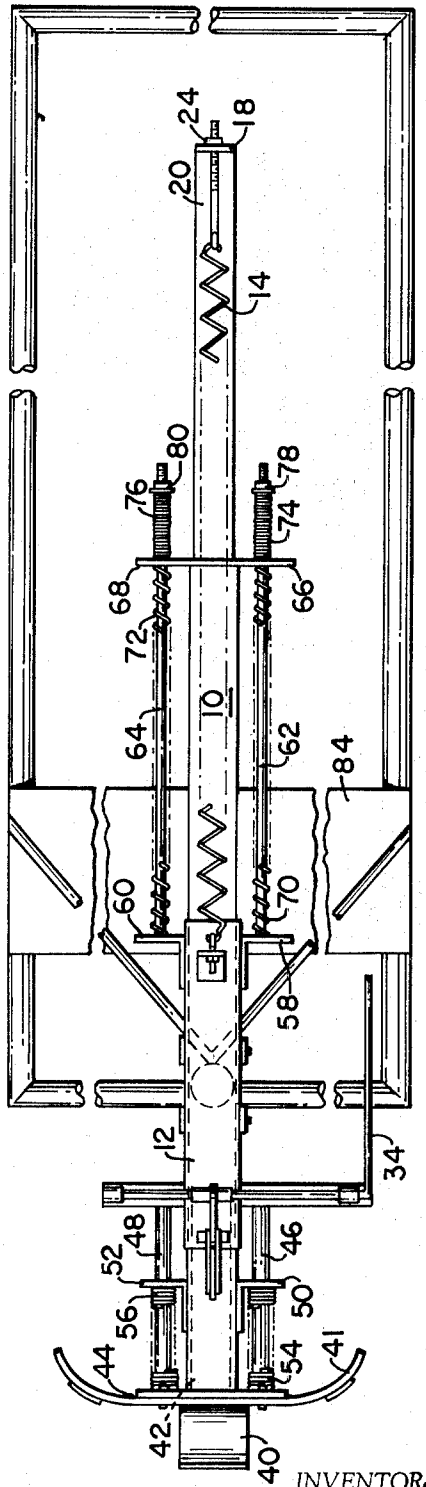


FIG_4

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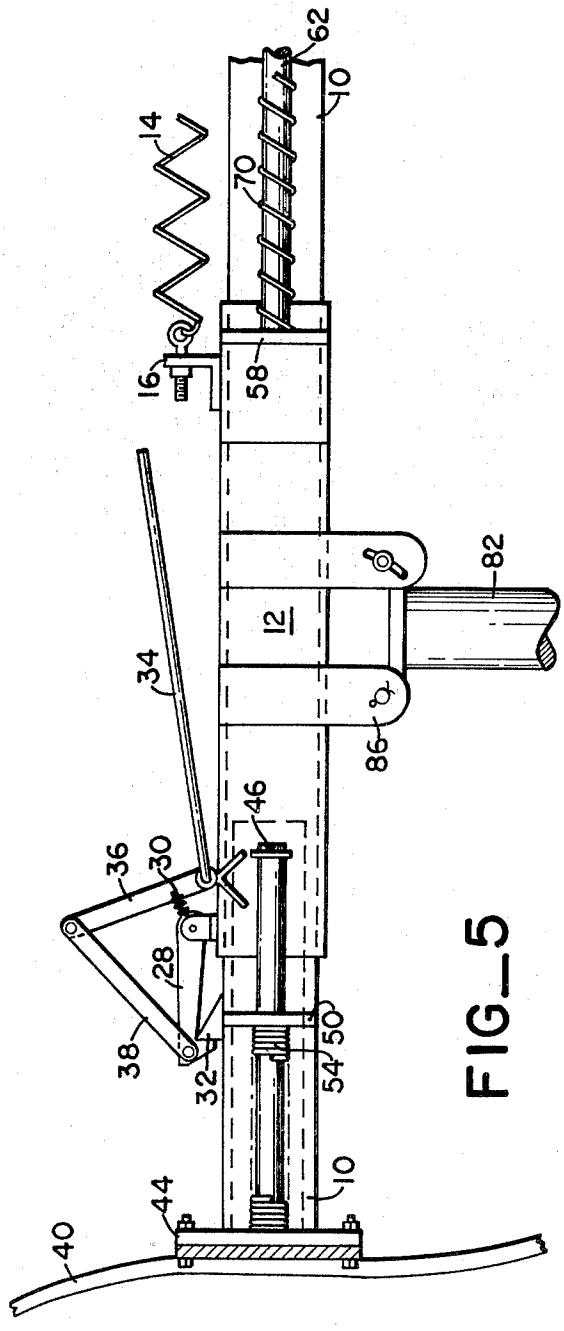


FIG_5

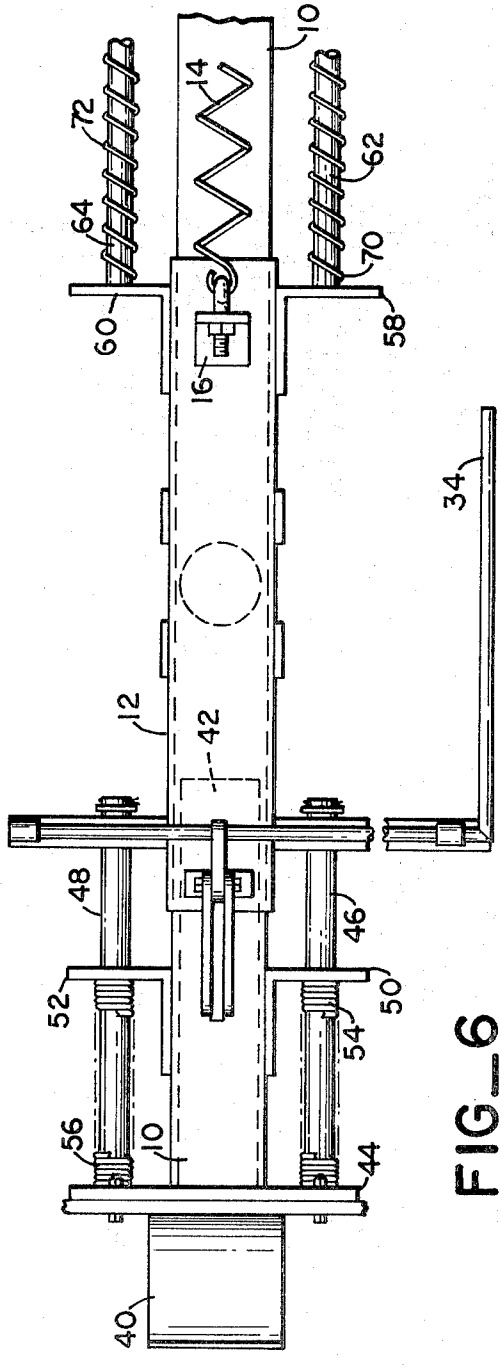


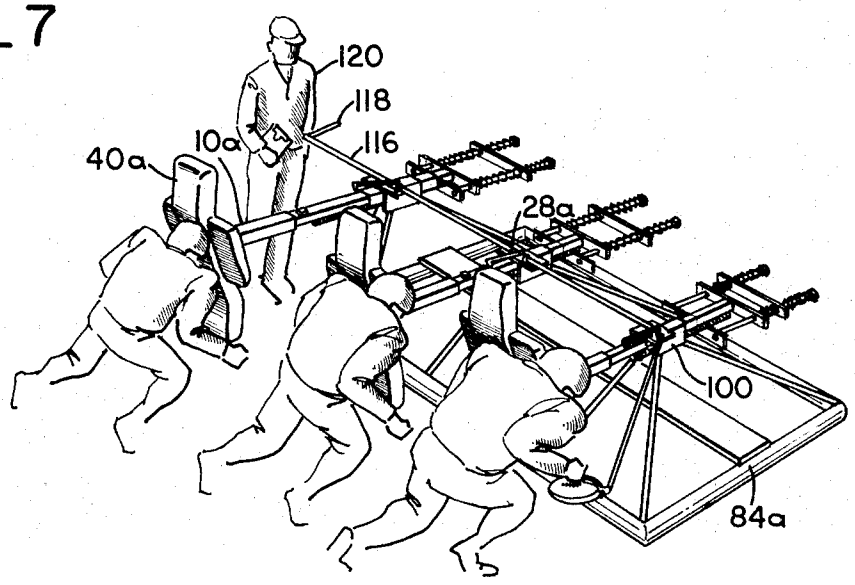
FIG_6

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FIG_7



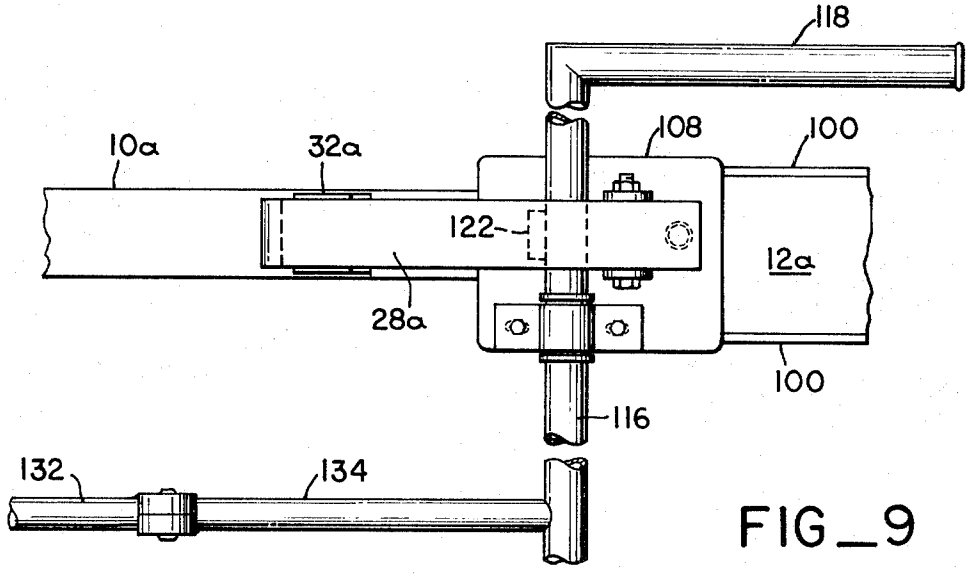


FIG_9

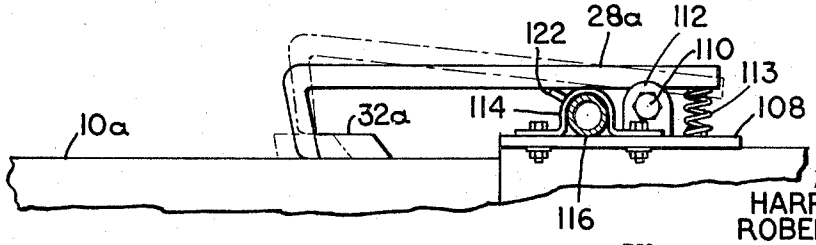


FIG_8

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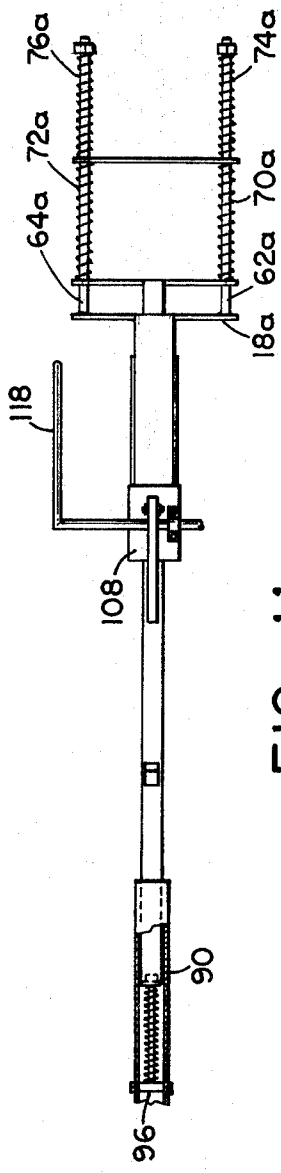


FIG_11

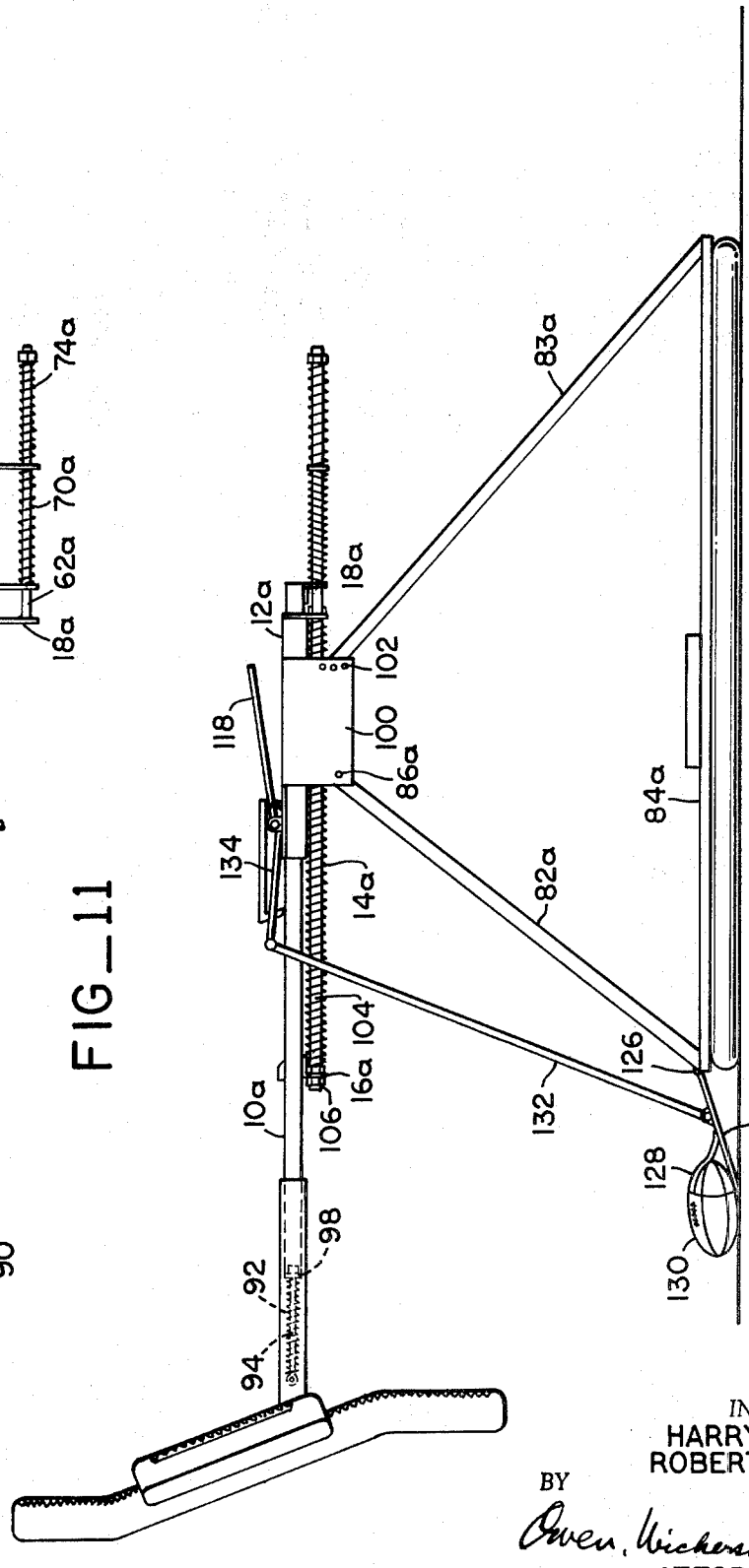


FIG_10

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FOOTBALL BLOCKING AND TACKLING SLED

This application is a continuation-in-part of application Ser. No. 749,450 filed Aug. 1, 1968, since then abandoned.

This invention relates to a mechanical training device for simulating the initial charge and retreat reactions of a football lineman. The invention is characterized by a novel structure for realistically simulating the action of an opposing lineman and is useful in the practice of offensive and defensive line blocking.

In the training of football linemen for optimum performance in offensive and defensive blocking timing, balance, coordination, and hair-trigger reactions are essential qualities that must be developed. Under actual game conditions the opposing linemen face each other in a crouching position almost head to head, both poised to charge at the instant the ball is snapped into play. If either lineman charges before the ball is snapped, his team will be penalized, and if either hesitates for even a split second after the ball is snapped, he is apt to be bowled over by the force of his opponent's charge. Thus, although weight and strength are definite assets to a lineman, his most important qualities are quick, dependable starting reactions plus the ability to develop a high initial charging speed and to maintain his balance and momentum after impact with the opposing lineman.

Training devices which simulate the initial charge of a lineman have been found to be very useful in training football linemen in the past due to the fact that such devices provide a uniform, controllable standard against which each lineman's reactions can be observed and measured during practice. An example of one prior art training device is disclosed in U.S. Pat. No. 3,329,428 which was issued on July 4, 1967 to J.A. Moran for "Football Offensive and Defensive Training Apparatus." In general terms, this device utilizes a plunger which is driven forward by the force of a large compression spring, with the forward movement of the plunger being resiliently limited by a small compression spring, and the shock of impact with the body of the user being absorbed by a bag of resilient material attached to the forward end of the plunger. Although this prior art training device does perform its intended function, it has several serious shortcomings. First, the large compression spring which drives the plunger cannot be conveniently adjusted to vary the force of the thrust. The only way to adjust the force is to dismantle the device and replace the large compression spring with a different spring. Next, the bag of resilient material on the end of the plunger does not realistically simulate the impact properties of an opposing lineman. Instead of passively yielding before an impact, an opposing lineman yields dynamically, i.e. even though his body motion may be checked, his muscles will rebound immediately and exert a fresh thrust against the checking force. This vital rebound is not provided by a bag of resilient material. In addition, the prior art device does not realistically simulate the defensive reactions of an opposing lineman. When a lineman's charge has been checked and reversed, he does not give ground evenly, but rather digs in and fights back in defensive posture. The increase in resistance resulting from this shift from offensive to defensive posture is also absent in the prior art device. Finally, this prior art device makes no provisiOn for regulating the angle of the plunger's stroke for simulating different types of charges.

In accordance with the present invention, however, a novel training device has been devised which overcomes the above noted shortcomings. The device of this invention includes a pad of resilient material which is coupled via a first set of compression springs to the forward end of a plunger which is slideable within a hollow guide sleeve between an extended and a retracted position. An expansion spring, which is mounted on the exterior of the guide sleeve for ease of adjustment, urges the plunger toward its extended position and opposes motion toward its retracted position. A latch mechanism holds the plunger in its retracted position until it is unlatched for forward motion toward its extended position. The forward motion of the plunger is resiliently limited by a second set of compression springs and the rearward motion is resiliently limited by a third set of compression springs. The expansion spring which drives the plunger forward is selected to simulate the initial charging force of a lineman and the compression springs on the forward end of the plunger simulate the lineman's natural shock-rebound properties. The compression springs which resiliently limit the plunger's rearward motion simulate the lineman's determined attempt to hold his ground after he switches from an offensive to a defensive posture. The angle of the plunger stroke and the force of the springs can be varied to simulate different types of linemen and different charge and retreat reactions.

In addition to overcoming the above noted shortcomings of the prior art devices, the training device of this invention also provides a simple, sturdy structure which is easy to adjust and maintain.

Another object of the present invention is to provide an apparatus that will test the comparative speed and strength of several linemen under identical conditions. With the present invention, this is accomplished by an embodiment comprised of a plurality of training devices preferably mounted on a common support frame and having a control mechanism that operates to release simultaneously the latch mechanisms on all of the devices. A ball holding means is also attached to and controlled by the control mechanism so that it can provide a properly timed starting signal to initiate the lineman's charge just as the latches are released. The comparative strength and timing of the linemen is measured by observing which one can re-latch his training device first.

Other objects and advantages of the invention will be apparent to those skilled in the art from the following description of several specific embodiments thereof, as illustrated in the attached drawings, in which:

FIG. **1** is a view in perspective of one illustrative embodiment of the invention in use;

FIG. **2** is a view in perspective of a second embodiment of the invention which is adapted for simultaneous use by several linemen;

FIG. **3** is a view in elevation of the embodiment of FIG. **1** with the plunger thereof shown in its extended position;

FIG. **4** is a plan view of the embodiment of FIG. **1** with the plunger thereof shown in its retracted position;

FIG. **5** is an enlarged view in elevation of the latch mechanism of the embodiment of FIG. **1** with the latch mechanism shown in its latched position;

FIG. **6** is a plan view of the latch mechanism shown in FIG. **5**;

FIG. **7** is a view in perspective of another embodiment of an invention using a plurality of devices and a common latch control mechanism;

FIG. **8** is an enlarged fragmentary view in side elevation of the latch mechanism for one of the devices shown in FIG. **7**;

FIG. **9** is a fragmentary plan view of the latch mechanism of FIG. **8**;

FIG. **10** is a view in side elevation of the apparatus of FIG. **7** showing one training device; and

FIG. **11** is a fragmentary plan view of the apparatus of FIG. **10**.

Referring to the drawing, FIG. **1** is a perspective view of one illustrative embodiment of the invention and FIGS. **3–6** are elevation and plan views of the same embodiment. This embodiment utilizes a rectangular plunger **10** which is slideable within a hollow rectangular guide sleeve **12** between an extended position (FIG. **3**) and a retracted position (FIG. **5**). The plunger **10** projects from both ends of the guide sleeve **12** in its extended position and retracted position. A large expansion spring **14** is connected between a bracket **16** welded on the exterior of the guide sleeve **12** and a bracket **18** welded on a drive arm **20** which is bolted to the rear end of the plunger **10**. The expansion spring **14** urges the plunger **10** toward its extended position and opposes motion of the plunger toward its retracted position. The tension of the expansion spring **14** can be easily adjusted by means of an eyebolt **22** and a wing

nut **24** which secure the rear end of the spring **14** to the bracket **18**.

A latch arm **28** is pivotally mounted on the front end of a guide sleeve **12** and is normally pressed against the top of the plunger **10** by means of a compression spring **30**. When the plunger **10** is moved rearwardly to its retracted position (FIG. **5**), the latch arm **28** rides up over a latching lug **32** which is welded to the top of the plunger **10** and latches the plunger **10** in its retracted position against the force of the expansion spring **14**. The latch arm **28** can be raised to release the plunger **10** for forward motion by means of a latch release arm **34** which is pivotally mounted on the top of the guide sleeve **12** and which is connected to the latch arm **28** by linkage arms **36** and **38**. After the latch arm **28** has been lifted by pressing down on the latch release arm **34**, it will be returned to its original position by the force of the compression spring **30** as soon as the latch release arm **34** is released.

A rigid vertical member covered with a pad of resilient material **40** is attached to the front end of a plunger **10**. A horizontal bumper guard **41** extending from opposite sides of the rigid vertical member protects the user from contact with exposed metal surfaces of the device. A dynamic shock absorber assembly couples the vertical and horizontal members **40** and **41** to the plunger **10**. This dynamic shock absorber includes a rectangular piston **42** which is bolted to the rigid vertical member supporting the pad **40** via an end plate **44** and which is slideable within a rectangular opening formed in the end of the rectangular plunger **10**. A pair of rods **46** and **48** are attached to the end plate **44** on opposite sides of the piston **42** and slideably engaged openings in a pair of brackets **50** and **52** which are welded to the side of the plunger **10**. A pair of compression springs **54** and **56** are mounted on respective rods **46** and **48** between the end plate **44** and the brackets **50** and **52**. Thus, when a force is applied against the pad of resilient material **40**, the springs **54** and **56** will be compressed and will develop a rebound force simulating the natural reaction of a lineman whose charge has been interrupted. FIG. **3** shows the piston **42** in its extended position, and FIGS. **4**, **5** and **6** show piston **42** in its retracted position with springs **54** and **56** fully compressed.

A pair of brackets **58** and **60** (FIG. **4**) are welded to the rear of the guide sleeve **12** and a second pair of rods **62** and **64** extend rearwardly therefrom and slideably engage openings in a pair of lugs **66** and **68** which are welded to the rear of the plunger **10**. A forward pair of compression springs **70** and **72** are mounted on respective rods **62** and **64**. When the plunger **10** moves forward, the front end of brackets **66** and **68** engage the rear end of the compression springs **70** and **72**, which thus resiliently limit the forward movement of plunger **10**. A rear pair of compression springs **74** and **76** are mounted on the respective rods **62** and **64** which extend to the rear of brackets **66** and **68**. These latter springs are secured at the free ends of rods **62** and **64** by bolt and washer assemblies **78** and **80**. When the plunger **10** moves rearwardly, the rear end of the brackets **66** and **68** engage the front end of compression springs **74** and **76**, which thus resiliently limit the rearward movement of plunger **10**.

The guide sleeve **12** is supported by a vertical support member **82** which is rigidly attached to a substantially flat rectangular base made of welded pipe. A platform **84** is attached to the top of the rectangular base to support the operator of the device. The guide sleeve **12** is attached to the support member **82** by a hinge assembly **86** which allows the angular orientation of the guide sleeve **12** to be varied within reasonable limits.

The operation of the above described embodiment can be best illustrated by considering a cycle of operation starting from the latched position illustrated in FIG. **1**. The user crouches facing the pad **40** as he would an opposing lineman, as shown in FIG. **1**, and the coach, who is not shown in the drawings, stands on platform **84** adjacent to latch release arm **34**. The coach gives a signal indicating that the ball has been snapped into play and he simultaneously moves the latch release arm **34** downward, thus releasing the plunger **10** for forward motion under the force of the expansion spring **14**. If the user is quick enough, he will leap forward and arrest the motion of pad **40** before it acquires enough momentum to knock him over. When the user strikes pad **40**, he will first compress the shock absorbing springs **54** and **56**, which simulate the opposing lineman's dynamic reaction to the shock of impact. If the user can maintain his momentum past the moment of impact, he will completely compress the springs **54** and **56** and being to move the plunger **10** backward against the force of the expansion spring **14**. As the plunger **10** moves backward, the rear end of brackets **66** and **68** will bear against the compression springs **74** and **76**, which will add to the mechanical lineman's resistance and simulate his change from an offensive to a defensive posture. If the user succeeds in overcoming this increased resistance, the latch arm **28** will ride up over latch lug **32** and return the device to its latched position. While the user is charging the mechanical lineman, it will normally slide along the ground in the manner of a sled, further simulating the normal defensive reactions of a lineman. If no sledding action is desired, however, it can be eliminated by adding weight to the platform **84**.

If the user is bowled over by the mechanical lineman's charge, the forward motion of the plunger **10** is resiliently limited by the springs **70** and **72** and it remains in the extended position until it is pushed back to its retracted position and re-latched.

As shown in FIG. **2**, the above described embodiment can be expanded to simulate an entire line by connecting a plurality of resilient pads together in a row with a spring assembly connected to each end of the row. This arrangement would, of course, require heavier springs, but except for this, the construction would be the same as the individual model.

In yet another embodiment of the present invention, shown in FIGS. **7** to **11**, a plurality of training devices each with its own plunger **10***a* and pad **40***a*, are arranged so that the individual performance of each man of a line team can be ascertained. In other words, with this apparatus all of the device plungers may be released at once by the instructor or coach, but they are recocked or re-latched individually as each lineman charges against his own pad. Each training device of this apparatus functions in the same general manner as the device previously described with respect to FIGS. **3–6**, although some structural differences will be noted.

As shown in FIG. **10**, the pad **40***a* is connected to a dynamic shock absorber assembly which, in this embodiment, comprises a tubular member **90** that surrounds an internal spring **92** which provides the same function as the springs **54** and **56** in the embodiment of FIGS. **3** and **4**. This spring surrounds a guide rod **94** which is connected at one end to the tubular member by a pin **96**. The member **90** is slidable over the end of the plunger **10***a* having an internal stop member **98** through which the guide rod can move and against which the other end of the spring **92** can bear.

The plunger **10***a* is slidable within a tubular guide **12***a* that is fixed between a pair of parallel side plates **100** forming a saddle assembly. These side plates are each provided with a pin **86***a* near their front end which connect to a pair of forward legs **82***a* that extend downwardly to a platform **84***a*. Near the rear end of each saddle plate are a plurality of holes **102** at different levels so that a pair of rear legs **83***a* can be pin connected at the desired hole to give the proper level adjustment for the device. Fixed to the underside of the main plunger **10***a* is a bracket **16***a* that supports a guide rod **104** for the main spring **14***a*. The threaded end of this guide rod extends through an opening in the bracket and is secured by a nut **106**. Another nut **108** on the opposite side of the bracket **16***a* serves as a stop for the main spring and can be threaded longitudinally to adjust the desired preload in the spring. The other end of the guide rod **104** extends through and is movable within a bracket **18***a* which is fixed to the end of the saddle guide **12***a*. The bracket **18***a* extends outwardly from opposite sides of the saddle guide and supports a pair of rods **62***a* and

64*a* that are parallel to the guide rod **104**. Mounted on these rods are pairs of front and rear compression springs **70***a*, **72***a*, **74***a* and **76***a* which provide the same recoil function as the springs **70**, **72**, **74** and **76** in the embodiment of FIGS. **3** and **4**.

Fixed to the saddle assembly near the forward end of each device, as shown in FIGS. **8** and **9**, is a mounting plate **108** for its latch mechanism. An elongated latch member **28***a* having a generally hooked shaped portion at one end is aligned with the plunger **10***a* directly above it. At a location spaced from its other end, this latch member is fixed (as by welding) to a short pin member **110** which is journaled within a pin of bearing brackets **112** fixed to the mounting plate **108**. At the extreme other end of the latch member **28***a* is a coil spring **113** which is also fixed to the mounting plate and provides a constant upward force which urges the front hooked end of the latch member against the top surface of the plunger **10***a*. Adjacent each latch member and fixed to the mounting plate on each device is another bearing bracket **114**. Extending through these aligned brackets along a line perpendicular to the plungers of a series of spaced apart training devices, as shown in FIG. **7**, is a rotary control rod **116**. At the end of this control rod is a handle **118** that is located conveniently for operation by an instructor or coach **120** who can stand near the end of the apparatus and observe a group of linemen. Fixed to the control rod are a series of cam members **122**, one for each latch member on each device of a group. Each cam member **122** is located directly beneath a latch member **28***a*, and when the control rod is rotated, the cam member pivots upwardly to engage and push the latch member up against the force of the spring **112**. In this embodiment of our invention, a ball snapping linkage is also provided to give the lineman a realistic starting signal. This linkage comprises a ball holding bracket **124** that is pivotally connected at one end **126** to the lower end of a forward frame member **82***a* or to the base of one of the training devices. A spring loaded clamp **128** may be fixed to this bracket to grip a football **130** or some simulated ball-like member. Pivotally connected to the bracket **124** at a point spaced from its pivot end is a long rod **132** that in turn is pivotally connected to a rod **134** fixed to the control rod **116**. Thus, movement of the control rod handle **116** also actuates the ball snapping linkage to raise the bracket **124** and the ball **130**, thereby signaling the linemen to commence their charge.

In the operation of the apparatus of FIG. **7**, wherein two or more training devices are used to train an equal number of linemen simultaneously, all devices are initially latched. In this latched position, the plunger **10***a* on each device is pushed against its main spring **14***a* so that a cam or lug member **32***a* is held by the hooked front end of the latch member **28***a*. The linemen now assume the set position, and when the coach actuates the control handle **16**, the ball is snapped upwardly and simultaneously all latch members **128***a* operate to release all of the plungers **10***a*. The lineman with the quickest and strongest charge will hit his pad and return his plunger to the latched position first, assuming the springs of all device are set to the same position. The present invention thus provides a highly effective apparatus for testing the relative merits of a group of linemen. While FIG. **7** shows only three plunger devices in a group it should be apparent that as many as desired could be connected together for operation by the single control lever.

Although this invention has been described in connection with the specific embodiments shown, it should be understood that the invention is by no means limited to these disclosed embodiments. Many modifications can be made in the disclosed structure without altering its essential functions. For example, although the plunger and hollow guide sleeve are shown as rectangular in form, they could be made in cylindrical form if desired. Also, a single concentric compression spring could be used in place of the matched pairs of compression springs described above. These and many other modifications will be apparent to those skilled in the art, and this invention includes all modifications falling within the scope of the following claims.

We claim:

1. A football training device comprising a relatively rigid support structure, a hollow guide sleeve attached to said support structure, a plunger extending beyond both ends of and slideable within said hollow guide sleeve between an extended and a retracted position, an impact member coupled to the forward end of said plunger for engaging the body of the user, first spring means coupled at one end to said plunger and at its other end to said support structure for urging said plunger toward its extended position and for opposing the motion of said plunger toward its retracted position, latch means attached to said hollow guide sleeve and latch engaging means attached to said plunger for latching the plunger in its retracted position against the force of said first spring means, latch release means coupled to said latch means for unlatching said plunger for movement from its retracted position to its extended position, second spring means coupled to said plunger for resiliently limiting the movement of said plunger toward its extended position, and third spring means coupled to said plunger that commences to provide increased resistance against the movement of said plunger as it nears its retracted position.

2. A football training device as defined in claim **1** wherein said support structure comprises a pair of parallel plates attached to opposite sides of said hollow guide sleeve, forward leg members pivotally attached to the forward ends of said plates and rear leg members attached to the rear ends of said plates and a lower frame member connected to the lower ends of said leg members.

3. A football training device as defined in claim **1** wherein said first spring means comprises an expansion spring coupled between said plunger and said hollow guide sleeve and further comprising means for varying the tension of said expansion spring.

4. A football training device as defined in claim **3** wherein said second spring means comprises a first compression spring coupled between said plunger and said hollow guide sleeve and wherein said third spring means comprises a second compression spring coupled between said plunger and said hollow guide sleeve.

5. A football training device as defined in claim **4** and further comprising means for varying the angular relationship between said hollow guide sleeve and said support structure.

6. A football training device as defined in claim **5** wherein said impact member comprises a pad of resilient material shaped to engage the body of the user and a compression spring coupled between said pad of resilient material and the end of said plunger to dynamically absorb the impact between said pad of resilient material and the body of the user.

7. A football training device as defined in claim **6** wherein said expansion spring and said first and second compression springs are coupled to the exterior of said hollow guide sleeve.

8. A football training device as defined in claim **1** wherein said plunger extends beyond both ends of said hollow guide sleeve, said impact member being coupled to the forward end of said plunger and said first spring means being coupled to the rear end of said plunger, and further comprising two rods both attached at one end to opposing exterior sides of said hollow guide sleeve and both extending rearwardly substantially parallel with said plunger, said second spring means comprising a first pair of compression springs each mounted on the forward end of a corresponding rod, said third spring means comprising a second pair of compression springs each mounted on the rear end of a corresponding rod, and an abutment member attached to said plunger and extending transversely from both sides thereof to slideably engage both of said rods between said first and second pairs of compression springs mounted thereon, whereby said abutment member will bear against the rear end of said first pair of compression springs to resiliently limit the movement of said plunger in the forward direction and will bear against the forward end of said second pair of compression springs to resiliently limit the movement of said plunger in the rearward direction.

9. A football training device as defined in claim **8** wherein said first spring means comprises an expansion spring coupled

between the rear end of said plunger and the exterior of said hollow guide sleeve and further comprising means for varying the tension of said expansion spring.

10. A football training device as defined in claim **9** and further comprising means for varying the angular relationship between said hollow guide sleeve and said support structure.

11. A football training device as defined in claim **10** wherein said impact member comprises a pad of resilient material shaped to engage the body of the user and a third pair of compression springs coupled between said pad of resilient material and the forward end of said plunger to dynamically absorb the impact between said pad of resilient material and the body of the user.

12. A football training device as defined in claim **11** and further comprising a plurality of said impact members coupled to the forward end of said plunger.

13. An apparatus for training a plurality of football linemen comprising a series of training devices one for each lineman spaced apart in a side by side arrangement, each said device including a relatively rigid support structure, a guide means attached to said support structure, a plunger slideable within said guide means between an extended and a retracted position, an impact member coupled to one end of said plunger for engaging the body of the lineman, first spring means coupled to said plunger for urging said plunger toward its extended position and for opposing the motion of said plunger toward its retracted position, second spring means coupled to said plunger for resiliently limiting the movement of said plunger toward its extended position, and third spring means coupled to said plunger that commences to provide increased resistance against the movement of said plunger as it nears its retracted position, latch means attached to said guide means and latch engaging means attached to said plunger for latching the plunger on each said device in its retracted position against the force of its said first spring means, and latch release means for engaging all of said latch means simultaneously and thereby unlatching all of said plungers for all of said devices so that they are allowed to move from their retracted position to their extended position.

14. The apparatus as described in claim **13** wherein said latch release means comprises a rod extending generally perpendicular to the plunger axis of each said device and cam means fixed to said rod at spaced intervals and engageable with said latch means to push them upwardly to a release position when said rod is rotated.

15. The apparatus as described in claim **14** including a simulated ball snapping means connected to and operated by said latch release means.

16. The apparatus as described in claim **15** wherein said ball snapping means includes a ball shaped object, means for holding said object and pivotally connected at one end to said support structure of one said training device near the ground level, and linkage means connected to said rod for moving said object upwardly when said rod is rotated to its latch release position.

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