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2,644,334

FOOTBALL TRAINING APPARATUS

Filed Jan. 8, 1948

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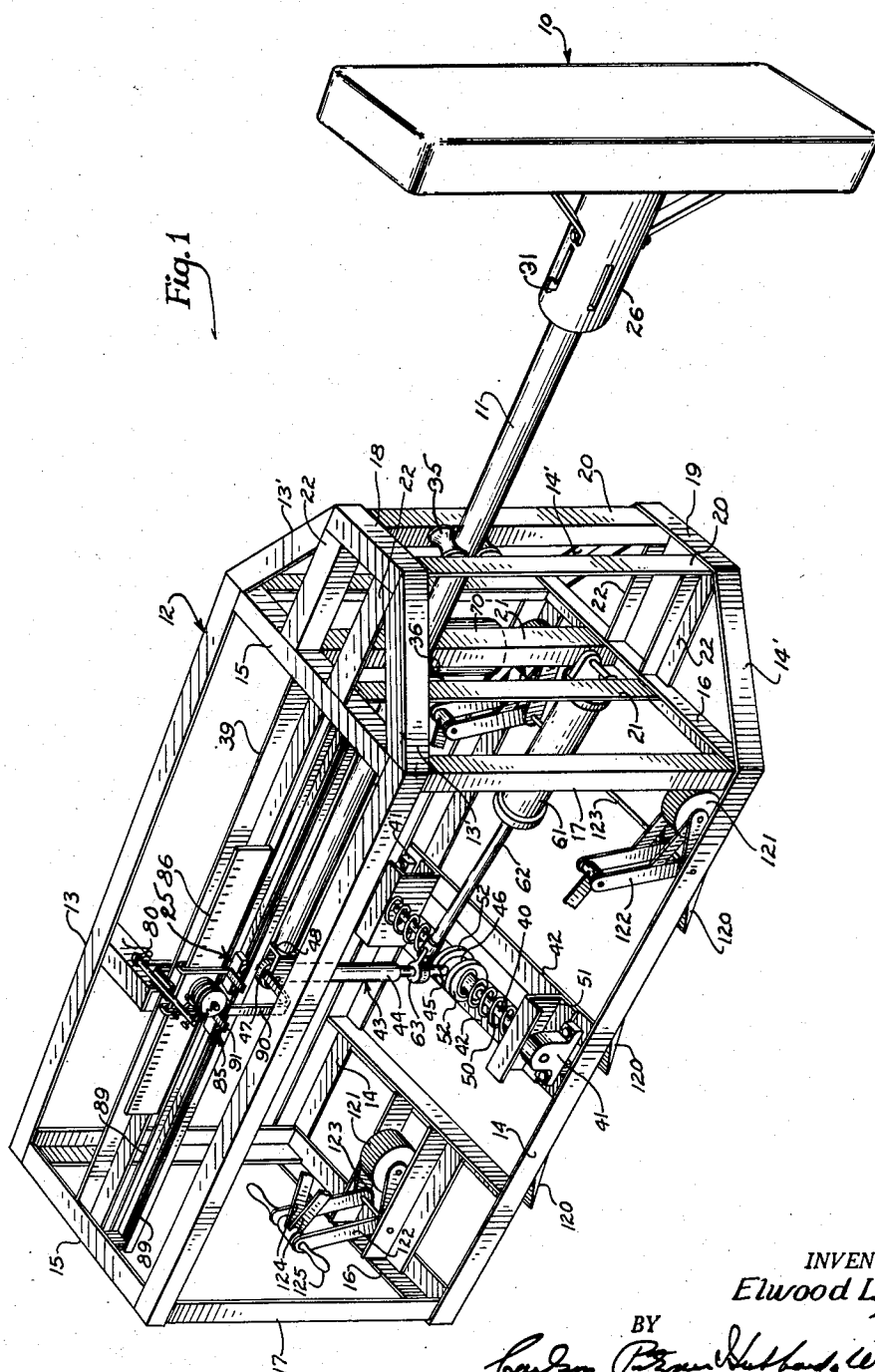


Fig. 1

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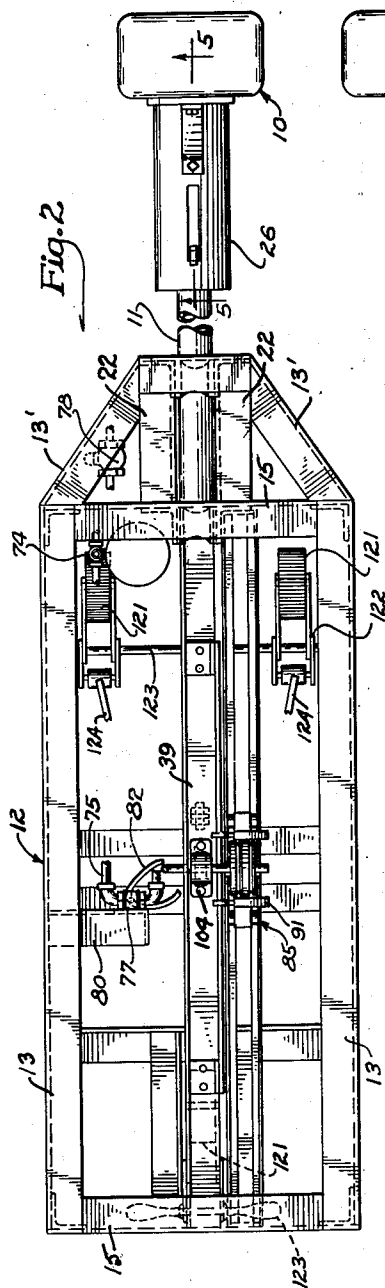
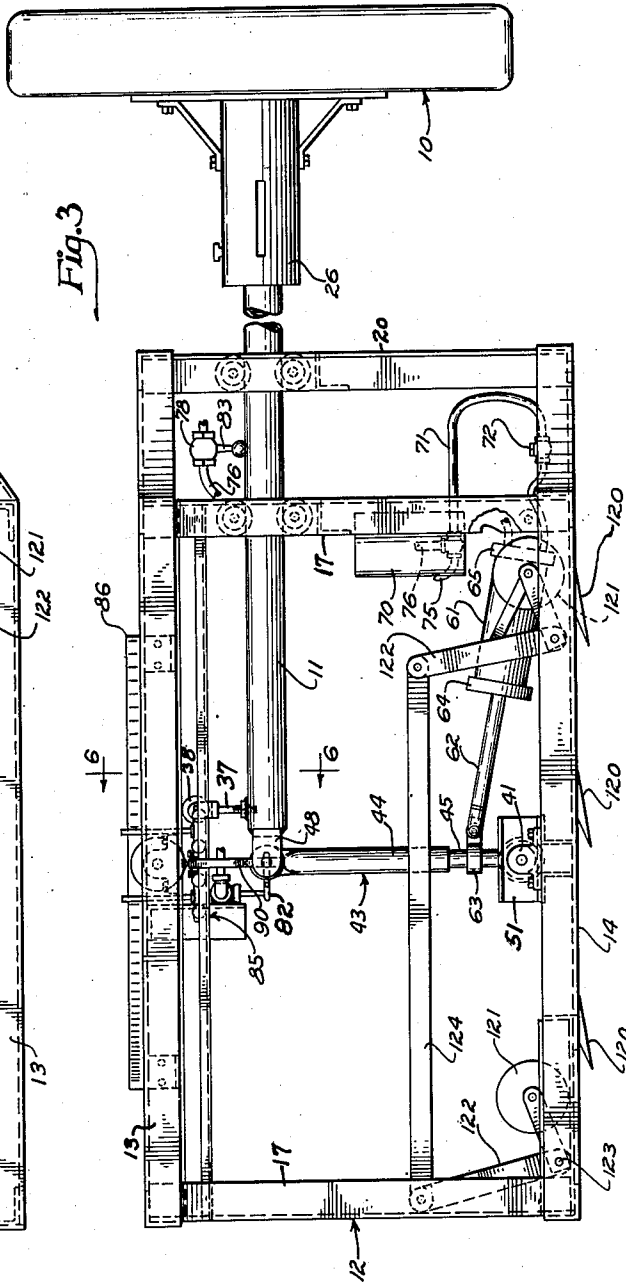
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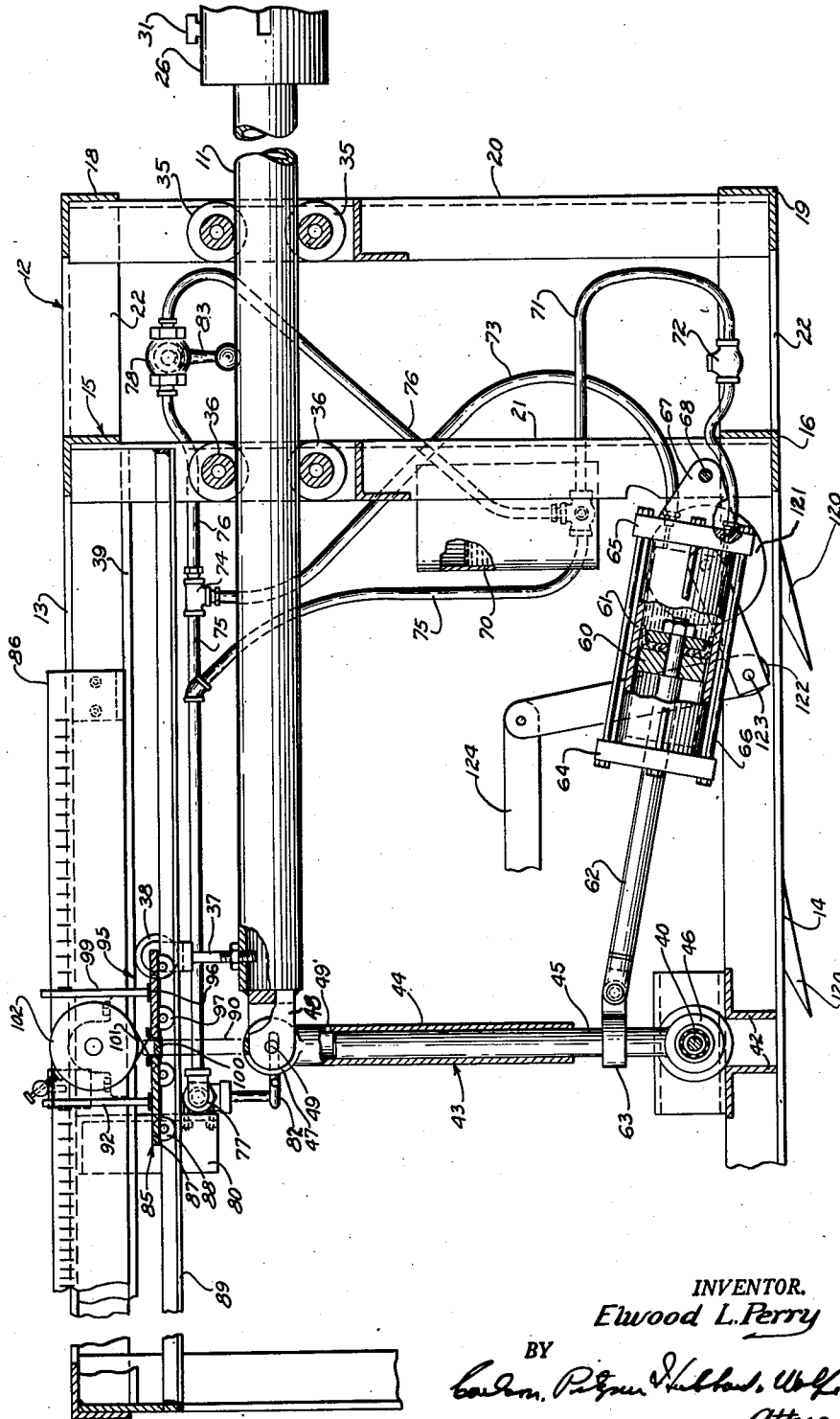
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Fig. 4



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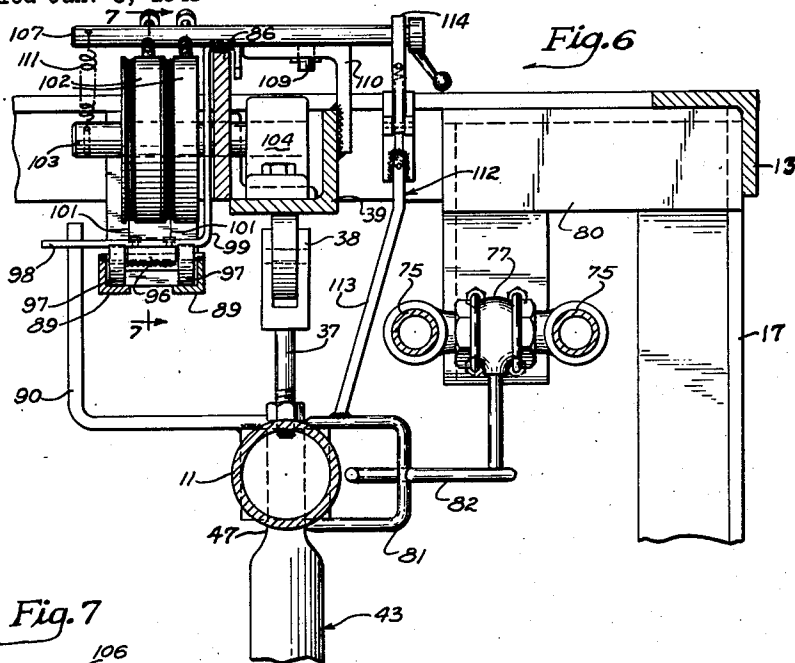
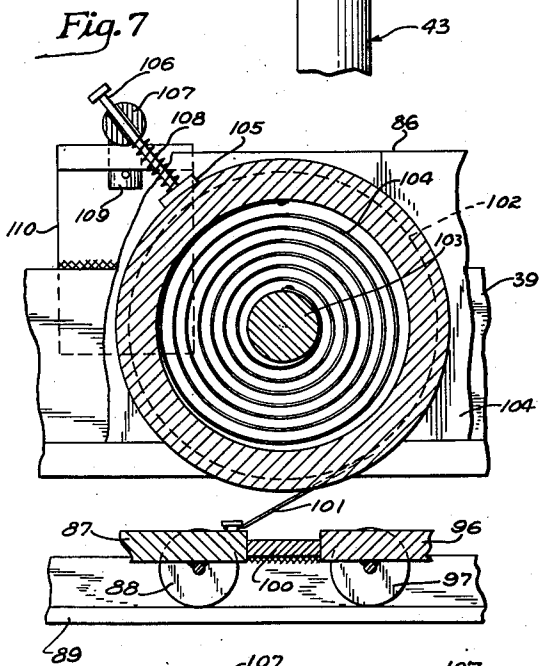
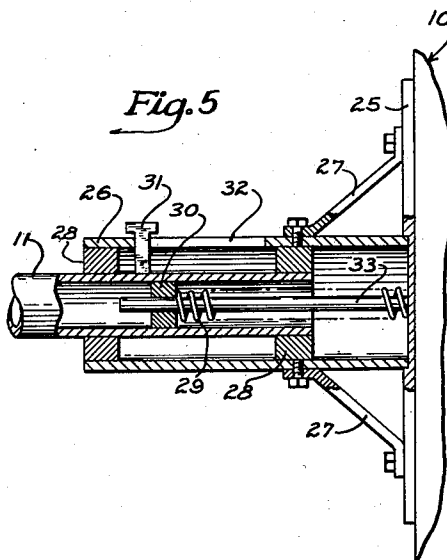
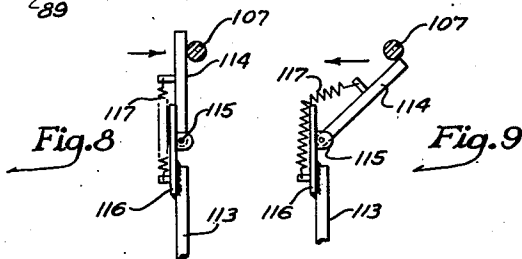
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FOOTBALL TRAINING APPARATUS

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4 Sheets-Sheet 4



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## UNITED STATES PATENT OFFICE

2,644,334

## FOOTBALL TRAINING APPARATUS

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Application January 8, 1948, Serial No. 1,239

13 Claims. (Cl. 73-379)

1

The invention relates to football training apparatus, and more particularly to apparatus for training players in the art of blocking and tackling.

One object of the invention is to provide apparatus of the above general character by which players may be given realistic training in both offensive and defensive tactics involving blocking and tackling, and which is adapted to accurately measure the reaction time of the player as well as the force he is able to exert against an opponent.

Another object is to provide football training apparatus of the type having an impact member or dummy and embodying novel means whereby the impact member may be operated to closely simulate a charging opponent.

Another object is to provide improved means for supporting the impact member and for supplying the force required to resist its displacement by the impact of a charging player.

Still another object is to provide improved fluid-operated means for controlling the return of the impact member after displacement by a charging player, including means for automatically limiting the return of the member to a predetermined starting position.

A further object is to provide a compact, portable football training apparatus which is simple and rugged in construction and which is adapted to function efficiently and to retain its accuracy under the extremely rough usage to which such apparatus is commonly subjected.

Other objects and advantages of the invention will become apparent from the following detailed description of the preferred embodiment illustrated in the accompanying drawings, in which:

Figure 1 is a perspective view of football training apparatus embodying the features of the invention.

Fig. 2 is a plan view of the apparatus.

Fig. 3 is a side elevational view of the apparatus.

Fig. 4 is a fragmentary longitudinal sectional view of the apparatus.

Fig. 5 is a fragmentary sectional view of the resilient support for the impact member taken in a plane substantially on the line 5-5 of Fig. 2.

Fig. 6 is a fragmentary sectional view taken in a plane substantially on the line 6-6 of Fig. 3.

Fig. 7 is a sectional view taken in a plane substantially on the line 7-7 of Fig. 6.

Figs. 8 and 9 are detail views of the reel brake control means.

2

While the invention is susceptible of various modifications and alternative constructions, I have shown in the drawings and will herein describe in detail the preferred embodiment, but it is to be understood that I do not thereby intend to limit the invention to the specific form disclosed, but intend to cover all modifications and alternative constructions falling within the spirit and scope of the invention as expressed in the appended claims.

In carrying out the invention, I provide a tackling dummy or impact member 10 adapted to be charged by a player undergoing training in blocking and tackling tactics. The impact member is supported for yielding movement under the impact of the charging player and means is provided for measuring and visually indicating the force exerted thereon by the player so that the coach or trainer can readily determine his effectiveness. Moreover, provision is made so that the coach may initiate a forward movement of the impact member 10 to simulate a charging opponent and may accurately measure the time required for the player to react and stop the advancing member in response to a signal accompanying its release.

In the apparatus selected to illustrate the invention, the impact member 10 is mounted at one end of an elongated rod or driving bar 11 which is supported and guided for axial horizontal movement in a rigid frame structure 12 adapted to be securely anchored to the playing surface. The frame 12 is an open box-like structure generally rectangular in transverse section and preferably constructed of angle iron members secured together in any suitable manner, as by welding. In the exemplary apparatus, the frame 12 comprises spaced parallel top and bottom side members 13 and 14, and top and bottom end members 15 and 16 interconnected by upright corner posts 17. At the front end of the frame, the side members 13 and 14 are extended beyond the corner posts 17, as indicated at 13' and 14', and these extensions are bent inwardly and connected by cross members 18 and 19 to form a tapered end section. The cross members 18 and 19 are connected by spaced uprights 20, and similarly spaced uprights 21 are provided between the end members 15 and 16 for supporting and guiding the driving bar 11, as will appear presently. Longitudinal reinforcing members 22 extend between the end members 15 and 16 and the companion cross members 18 and 19 to impart strength and rigidity to the forward section of the frame.

The impact member 10 may be of any pre-

3

ferred shape and construction and as herein shown comprises a heavily padded block dimensioned to correspond approximately to the size of an opposing player. To cushion the shock to the charging player, the impact member is resiliently mounted on the outer end of the driving bar 11. The means for so mounting the impact member comprises, in this instance, a flat base plate 25 (Fig. 5) suitably secured to the rear face of the member 10. The plate 25 is formed with a central recess for the reception of a rearwardly facing tubular socket 26 which is held rigid with the member 10 by means of brackets 27.

As shown in Fig. 5, the driving bar 11 is in the form of a heavy tube or pipe and the socket 26 is dimensioned to fit loosely over the end thereof. Within the socket 26 are a pair of axially spaced bushings 28 apertured to receive the end of the bar 11 with a sliding fit so as to permit relative axial movement between the bar and the impact member. A coiled compression spring 29 interposed between the cross member or plug 30 secured within the bar 11 and the adjacent face of the plate 25 urges the impact member outwardly to a limit position determined by a key 31 rigid with the bar and engaging in a longitudinal slot 32 in the socket 26. A guide pin 33 fixed to the plate 25 and slidably received in an opening in the plug 30 extends through the spring 29 to retain it in operative position.

Referring to Figs. 1 and 4 of the drawings, the driving bar 11 is supported and guided for axial movements by a pair of opposed rollers 35 journaled on the uprights 20 and a second similar pair of rollers 36 journaled on the uprights 21. The rollers are generally spool shaped or concave and are dimensioned to fit snugly over the bar 11 and thus hold it securely against lateral movements. To counteract weight of the impact member 10, the bar 11 is provided at its inner end with an upright rod 37 carrying a roller 38 adapted to run on a track formed by an angle bar 39 extending longitudinally of the frame between the end members 15.

Simple, but effective means is provided for yieldably urging the driving bar 11 and the impact member 10 forwardly and for imposing a substantial resistance to the rearward movement of the member under the impact of a charging player. This means includes a rock-shaft 40 disposed transversely of the frame 12 and journaled in bearings 41 (Fig. 1) carried by cross members 42 rigidly secured to the side members 14 of the frame. The shaft 40 is operatively connected with the driving bar 11 by an extensible lever arm 43 which is fixed to the shaft 40 to rock therewith. As herein shown, the lever arm 43 includes a pair of telescoping sections 44 and 45 (Fig. 4), the latter comprising a cylindrical rod having an integral hub 46 at its lower end adapted to be nonrotatably secured on the shaft 40. The lever arm section 44 is tubular in form and is dimensioned to receive the rod 45 with a sliding fit. At its upper end the section 44 is flattened as at 47 for reception in a forked fitting 48 rigidly secured to the inner end of the bar 11, the section being secured to the fitting by a pivot pin 49. A hole 49' is provided at the upper end of the section 44 to vent the same.

Acting on the shaft 40 and tending to rock it in a clockwise direction, as viewed in Figs. 1 and 4, are a pair of heavy torsion springs 50 disposed on opposite sides of the lever arm 43. Each

4

spring is anchored at one end to a stationary channel member 51 carried by the frame members 42 and at its other end to a collar 52 mounted on the shaft 40 and adapted to be non-rotatably secured thereto. The arrangement is such that the springs 50 exert a substantial torque on the shaft 40 and thus tend to shift the driving bar 11 and impact member 10 forwardly or outwardly from the frame 12. The force exerted by the springs 50 and thus the resistance opposed to the inward movement of the impact member may be regulated by adjustment of the collars 52 on the shaft.

To avoid any possibility of injuring the players using the apparatus, means is provided for regulating the speed at which the impact member 10 is advanced by the springs 50 following displacement of the member by a charging player. In accordance with the invention, the speed regulating means is equipped with novel controls which operate automatically to interrupt the return movement of the impact member at a predetermined or intermediate starting position, whereby power is stored up for advancing the member further under manual control to simulate a charging opponent.

The regulating and control means is preferably of the pressure fluid operated type and, as herein shown, is arranged for the use of a non-compressible fluid, such as oil. It includes a piston 60 (Fig. 4) movable with the impact member and working in a cylinder 61 stationarily supported on the frame 12. The piston 60 has a piston rod 62 pivotally connected at its outer end with the lever arm 43 by a yoke 63 clamped on the rod 45. The cylinder 61 is closed at opposite ends by headers 64 and 65 secured in place by through bolts 66. Header 64 is formed with an opening for the passage of the piston rod 62, while header 65 has an integrally formed forwardly projecting arm 67 pivotally secured by a pin 68 to the uprights 21. With this arrangement, the piston 60 reciprocates with the impact member 10, but through a substantially shortened range of travel due to its connection with the lever arm 43 near the pivotal axis of the arm.

Supported on the frame members 21 is a fluid reservoir 70 connected with the forward or closed end of the cylinder 61 by a conduit 71 in which is interposed a check valve 72 arranged to allow free flow of fluid into the cylinder as the piston 16 moves rearwardly, and to block return flow of fluid through the conduit 71. In the return or forward movement of the piston, fluid is discharged from the closed end of the cylinder 61 through a conduit 73 connected by a T-fitting 74 with two branch conduits 75 and 76, both of which lead to the reservoir 70 and in which are respectively interposed control valves 77 and 78.

The valves 77 and 78 may be of any suitable type and are shown herein as conventional rotary shut-off valves. The valve 77 is supported by a bracket 80 secured to one of the frame members 13 with the valve positioned for actuation by the driving bar 11 incident to its movements with the impact member. Such actuation is effected, in this instance, by an actuating arm 81 (Figs. 2 and 6) rigid with and projecting laterally from the bar 11 for coaction with a forked member 82 mounted on the movable member or stem of the valve 77. The arrangement is such that the valve is opened when the member 82 is rocked in a clockwise direction, as viewed in Fig. 2, and closed when rocked in the opposite direction.

The valve 78, as shown, is provided with a hand

5

lever 83 (Figs. 3 and 4) by which it may be opened or closed manually. This valve is preferably mounted at one side of the frame 12 adjacent its forward end for convenient access by the coach or other person supervising the training of the players. In practice, valve 77 is positioned so that it is opened as an incident to the rearward movement of the impact member and is closed when the impact member approaches an intermediate or starting position in its return movement. The valve 77 may be set to meter the flow of fluid from the cylinder and thus restrict the return movement of the impact member to a predetermined safe speed. Assuming that the valve 78 is closed, the return movement of the impact member is interrupted by the closing of the valve 77 at the intermediate or starting position and is retained in such position until released for further advance at the will of the coach by manual operation of the valve 78. The rate of such further advance may be controlled by the extent to which the valve 78 is opened.

To enable the coach to determine the effectiveness of the players, means is provided for measuring and indicating the force exerted by a charging player on the impact member 10. In addition, means is provided for measuring and indicating the time required for a player to meet the impact member and stop its advance in response to a signal given simultaneously with the opening of the valve 78. This affords a convenient means by which the coach may detect slow-starting players and take steps to correct the faults in their playing technique.

For measuring and indicating the force of an impact exerted on the member 10, I provide an indicating device 85 movable with the impact member 10 and adapted to coact with a graduated scale 86 (Figs. 1, 4 and 6) stationarily supported on the frame 12. As best shown in Fig. 4, the indicating device 85 is in the form of a car comprising a generally rectangular body 87 supported by four wheels or rollers 88 on a track formed by angle bars 89 secured between the end frame members 15.

In the exemplary machine the track bars 89 are disposed above and at one side of the driving bar 11 (Fig. 6) and the latter bar is provided with an L-shaped arm 90 projecting laterally and upwardly to engage an operating finger 91 rigid with and extending laterally from the indicating device. The arrangement is such that the indicating device is shifted rearwardly along the track 89 an amount corresponding to the displacements of the impact member by the charging player.

A pointer 92 carried by and movable with the indicating device 85 coacts with the scale 86 to provide a visual indication of the displacement of the impact member 10. As shown in Fig. 6, the scale 86 comprises an elongated bar supported in an edge wise position on the angle bar 39, preferably with its upper edge projecting above the top of the frame 12. The exposed edge of the scale is formed with graduations calibrated in any suitable units representing the force opposed to the rearward movement of the impact member. Preferably, both sides of the scale are graduated and the end portion of the pointer 92 is looped over the edge of the bar so that the scale may be read from either side of the apparatus. When the scale is graduated to represent equal units of force, the graduations are somewhat more closely spaced adjacent the inner end of the scale to conform to the increase in resistance

6

offered by the springs 50 as their tension is progressively increased.

For measuring and visually indicating a player's reaction time, I provide a movable indicating device 95 having a rectangular body 96 supported by four wheels or rollers 97 on the track bars 89 adjacent the forward end of the frame. The indicating device is provided with a laterally projecting finger 98 (Fig. 6) engageable by the actuating arm 90 of the driving bar 11 as the impact member moves forwardly from its intermediate or starting position. A pointer 99 carried by the device coacts with the forward end portion of the scale bar 86 which is conveniently graduated in units representing time. The distance traveled by the indicating device thus corresponds to the distance through which the impact member advances following its release and until it is stopped by the impact of a charging player. Since the rate at which the impact member advances may be readily determined, the extent of movement of the indicating device provides an accurate indication of the speed with which the player reacts to the signal to start his charge.

Means is provided for returning the indicating devices 85 and 95 to their intermediate or starting positions after each operation, such positions being determined in this instance by a stop member 100 (Fig. 4) carried by the track bars 89. The returning means for the two devices are alike, each comprising a flexible member, such as a cord 101, connected at one end to the device and having its other end wound around a take-up reel 102. The reels are mounted in side-by-side relation on a shaft 103 (Fig. 6) journaled in a bearing 104 secured to the angle bar 39. In the particular embodiment illustrated, the reels 102 are of hollow cylindrical construction and each is formed with a peripheral groove for the accommodation of the cord 101. A spiral spring 104 disposed within the reel and having its opposite ends connected respectively to the reel and to the shaft 103 is tensioned as the cord 101 is unwound from the reel and is thereby rendered effective to rewind the cord and thus return the associated indicating device to the starting position.

Suitable brake means is provided for the reels 102 to limit the return movements of the indicating devices 85 and 95 to a safe speed. The brake means, as herein shown, comprises a brake shoe 105 (Fig. 7) for each reel supported by a headed pin 106 slidable in a diametrical aperture in a supporting rod 107 which is positioned above and at one side of the pair of reels. A spring 108 interposed between the shoe and the rod 107 yieldably urges the shoe into frictional engagement with the peripheral surface of the reel.

To insure full return of the indicating devices to rest position after each operation, provision is made for releasing the reel brakes as the impact member 10 approaches the starting position. For this purpose the rod 107 is pivotally supported to swing away from the reels 102 and thereby retract the brake shoe 105 from the reels. Support for the rod is provided in this instance by a radially projecting pin 109 (Figs. 6 and 7) seated in a vertical aperture in an angle bracket 110 welded or otherwise secured to the angle bar 39 of the frame. A spring 111 connected between the outer end of the rod 107 and the corresponding end of the reel shaft 103 urges the rod toward the reels and thus tends to apply the brake shoes thereto.

7

The other end of the rod 107 is extended beyond the bracket 110 for engagement by an actuating member 112 carried by and reciprocable with the driving bar 11 which supports the impact member 10. Such engagement occurs when the driving bar is moving in the direction indicated by the arrow in Fig. 8. As the driving bar approaches its limit position, it swings the rod 107 far enough to allow the actuating member to pass the rod. To permit the actuating member to pass the brake release rod 107 without releasing the brakes in the rearward movement of the impact member, the actuating member is constructed in two sections. As shown in Figs. 8 and 9, one section 113 of the member is rigidly secured in an upright position to the valve actuator 81 and the other section 114 is pivotally secured between a pair of spaced lugs 115 projecting forwardly from an extension 116 of the section 113. A spring 117 connected between the two sections normally holds them extended or in axial alignment, as shown in Fig. 8, but permits the upper section to be deflected and pass under the brake rod 107 in the movement of the impact member in the direction indicated by the arrow in Fig. 9. After passing the brake rod, the section 114 is snapped back to an upright position by the spring 117 to enable it to release the reel brakes upon the return of the impact member to starting position.

It will be understood, of course, that when the apparatus is in use the frame 12 must be rigidly anchored to the playing surface. In the exemplary apparatus, the frame is securely held against rearward movement by a series of ground-gripping elements 120 mounted on the bottom frame members 14. The elements 120 may be of any suitable character, such as tapered or wedge-shaped pins and are preferably mounted so as to project downwardly and rearwardly from the frame. The members are thus driven into the playing surface or ground by the force exerted on the impact member which tends to push the frame rearwardly.

To facilitate movement of the apparatus from one place to another, the frame 12 is provided with a series of wheels or rollers 121, three in the present instance, which are adapted to be retracted when the apparatus is in use and to be shifted into operative position when it is desired to move the apparatus. The arrangement is such that the gripping elements are permitted to function when the rollers are retracted, but upon movement of the rollers to operative position the gripping elements are withdrawn and the entire weight of the apparatus is transferred to the rollers. As shown in Figs. 1 and 2, each of the rollers 121 is journaled in one leg of an angular bracket 122 which is pivotally mounted on a shaft 123 supported on and extending transversely of the frame 12. The other legs of the brackets 122 project generally upwardly and are interconnected for simultaneous movement by suitable links 124. Handles 125 may be provided on the rear bracket 122 for convenience in rocking the wheels between operative and retracted positions.

It will be apparent from the foregoing that the invention provides football training apparatus of novel and advantageous character. The apparatus includes an impact member which can be operated to simulate a charging opponent and means is provided for measuring and indicating both the force exerted by the charging player against the simulated opponent and the time required for the player to react and execute his

8

charge. The apparatus is compact and readily portable, thus making it convenient to use and, in general, it is well adapted to provide realistic training in both offensive and defensive tactics involving blocking and tackling.

I claim as my invention:

1. In football training apparatus, in combination, a stationary frame, an elongated bar supported in said frame for endwise movement and having one end projecting from said frame, an impact member mounted on the projecting end of said bar, a lever pivotally supported at one end on said frame and connected at its other end with said bar, spring means acting on said lever to urge said bar and said member toward a forward position and to determine the force required to be exerted on said member to shift said bar rearwardly, and means acting on said lever to releasably restrain said bar and said member from forward movement after being shifted rearwardly by an impact.

2. In football training apparatus, in combination, a stationary frame, an impact member, means supporting said member on said frame for movement relative thereto, spring means acting on said supporting means to urge said member outwardly from said frame, said spring means yielding to permit inward movement of the member upon receiving an impact, means automatically limiting the outward movement of said member by said spring means to a starting position after inward displacement of the member by an impact, and manually operable means for releasing said member for further outward movement from said starting position.

3. In football training apparatus, in combination, a stationary frame, an elongated bar supported in said frame for endwise movement and having one end projecting from said frame, an impact member mounted on the projecting end of said bar, a lever pivotally supported at one end on said frame and connected at its other end with said bar, spring means acting on said lever to urge said bar and said member to a forward position and to determine the force required to be exerted on said member to shift said bar rearwardly, and fluid operated means including a piston connected to said lever and working in a cylinder connected to said frame for releasably restraining said bar against movement to said forward position.

4. In football training apparatus having a movable impact member, spring means yieldably urging said member toward a forward position and resisting rearward movement of the member under the impact of a charging player, a stationarily supported cylinder, a piston working in said cylinder and operatively connected for movement with said impact member, a fluid reservoir, a conduit connecting said reservoir with one end of said cylinder for delivering fluid thereto incident to the rearward movement of said impact member and said piston, a check valve in said conduit preventing return flow of fluid therethrough, a second conduit connecting said one end of the cylinder with said reservoir for returning discharged fluid from the cylinder to the reservoir in the forward movement of said impact member and said piston, a valve interposed in said second conduit for controlling the flow of fluid therethrough, and means movable with said impact member for actuating said valve.

5. In football training apparatus having a movable impact member, spring means yieldably

urging said member toward a forward position and resisting rearward movement of the member under the impact of a charging player, a stationarily supported cylinder, a piston working in said cylinder and operatively connected for movement with said impact member, a fluid reservoir, a conduit connecting said reservoir with one end of said cylinder for delivering fluid thereto incident to the rearward movement of said impact member and said piston, a check valve in said conduit preventing return flow of fluid therethrough, a second conduit connecting said one end of the cylinder with said reservoir for returning discharged fluid from the cylinder to the reservoir in the forward movement of said impact member and said piston, a pair of valves interposed in said second conduit each independently controlling flow of fluid through the conduit, and means movable with said impact member for actuating one of said valves to close the conduit and thereby interrupt the forward movement of the impact member at a predetermined point in its travel, the other of said valves being operable manually to open said conduit and initiate the forward movement of said impact member from said predetermined point.

6. Football training apparatus comprising, in combination, an impact member adapted to be charged by a player, means urging said member in a forward direction, said means yielding to permit rearward movement of the member under the impact of a charging player, means retaining said member in an intermediate position, manually operable means for releasing said member for movement forwardly from said intermediate position simultaneously with the signaling of the player to charge the member, and means operated in response to the forward movement of said member for measuring and indicating the time elapsing between such signaling and the engagement of the impact member by the player.

7. In football training apparatus, in combination, a stationary frame, an impact member, means supporting said member on said frame for movement relative thereto, spring means acting on said supporting means to urge said member outwardly from said frame, said spring means yielding to permit inward movement of the member upon receiving an impact, means automatically limiting the outward movement of said member by said spring means to a starting position after inward displacement of the member by an impact, manually operable means for releasing said member for further outward movement from said starting position, and means for indicating the lapsed time between the release of said member and the receipt of the next impact thereby.

8. In football training apparatus, in combination, a stationary frame, an impact member, means supporting said member on said frame for movement relative thereto, spring means acting on said supporting means to urge said member outwardly from said frame, said spring means yielding to permit inward movement of the member upon receiving an impact, means automatically limiting the outward movement of said member by said spring means to a starting position after inward displacement of the member by an impact, manually operable means for releasing said member for further outward movement from said starting position, and an indicating element adapted to move with said member upon its release from said starting position

and to remain in its advanced position when movement of the member is interrupted by receipt of an impact, said element cooperating with a scale to indicate the elapsed time between the release of said member to the receipt of the impact.

9. Football training apparatus comprising, in combination, an impact member adapted to be charged by a player, means urging said member in a forward direction, said means yielding to permit rearward movement of the member under the impact of a charging player, means retaining said member in an intermediate position, manually operable means for releasing said member for movement forwardly from said intermediate position simultaneously with the signaling of the player to charge the member, means operated as an incident to the forward movement of said member for measuring and indicating the elapsed time between such signaling and the contact of the player with said member, and other means for measuring and indicating the force exerted by the player on said member.

10. Football training apparatus comprising, in combination, an impact member adapted to be charged by a player, means urging said member in a forward direction and yielding to permit rearward movement of the member under the impact of a charging player, and means for measuring and indicating the force of the impact imparted to said member by the player comprising a measuring device supported and guided for movement in a path parallel to the path of movement of said member, means movable with said member engageable with said device in the rearward movement of the member to displace the device from a normal rest position, and means carried by said device cooperating with a stationarily supported graduated scale for visually indicating the extent of the displacement of said device.

11. In football training apparatus having a yieldable impact member adapted to be shifted an amount corresponding to the force of an impact received from a charging player, means for visually indicating the force of such impact comprising a stationarily supported graduated scale, an indicator element supported and guided for movement longitudinally of said scale, spring actuated means yieldably urging said element to a zero position relative to said scale, means shiftable with said impact member engageable with said element to move said element along said scale to a position corresponding to the force of the impact imparted to said member, said spring actuated means acting to return the element to zero position, and brake means associated with said spring actuated means for regulating the rate of return of the element independently of the rate of return of said impact member.

12. In football training apparatus having a stationary frame, a member supported on said frame and movable rearwardly from a forward position upon receiving an impact, means yieldably urging said member toward said forward position and resisting rearward movement thereof comprising a shaft journaled on said frame with its axis disposed transversely of the path of movement of said member, a torsion spring connected between said frame and said shaft tensioned to rock the shaft in one direction, and a lever arm rigid with said shaft and operatively connected with said member.

13. In football training apparatus having a stationary frame, an impact receiving member,

11

means supporting said member including an elongated bar movable longitudinally in said frame, means yieldably urging said bar and said member forwardly and resisting rearward movement thereof upon receipt of an impact by said member, said means comprising a shaft journaled on said frame, a torsion spring connected between the frame and said shaft, a lever arm fixed to said shaft and projecting radially therefrom, and a tubular member pivotally connected

12

to said bar and telescopingly engaging said lever arm.

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