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## Constructing Athletic Equipment for Small High Schools

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CONSTRUCTING ATHLETIC EQUIPMENT  
FOR SMALL HIGH SCHOOLS

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A Research Paper  
Presented to  
the Graduate Faculty  
Central Washington College of Education

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In Partial Fulfillment  
of the Requirements for the Degree  
Master of Education

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by  
Gordon Snaza

July 1961

THIS PAPER IS APPROVED AS MEETING  
THE PLAN 2 REQUIREMENT FOR THE  
COMPLETION OF A RESEARCH PAPER.

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Everett A. Irish  
FOR THE GRADUATE FACULTY

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## CHAPTER I

### INTRODUCTION

Very few high schools in the nation have the wherewithal to purchase everything they need or would like to have for their athletic program. The average budget is rather lean, and the principal and coach are forced to cut corners to make ends meet. As a result, coaches must run their athletic program with just the bare necessities.

An imaginative administrator or coach won't give up easily. By thinking and working with the industrial arts department, the coach can come up with some excellent home-made substitutes. A word of caution. If you have the money, don't hesitate to buy the commercially manufactured product. You can't beat the real thing for value and safety.

The purpose of this paper was to make available to administrators and coaches a detailed and descriptive report on the construction of athletic equipment. This author, having coached in a small high school, knows the hardships coaches in small high schools encounter in acquiring athletic equipment and facilities.

## CHAPTER II

### ATHLETIC EQUIPMENT

#### I. FOOTBALL

Shoulder pad storage. This plan for storing football shoulder pads may be of interest to coaches who have limited storage space. Shoulder pads are often stacked one on top of the other; as a result, cantilever pads are flat by the time they are used again. The plan described below keeps the shoulder pads in excellent condition and takes very little floor space for storage because the entire area up to the ceiling can be utilized.

The racks are 8 feet high; 16 shoulder pads can be stored on each one. An ordinary board, 2" x 2" x 8', is used. Holes are drilled every six inches and a 3/4" dowel inserted. The dowels can be removed or inserted as the pads are taken on or off the rack. The shoulder pads can be placed over the top or can be put on the rack by simply opening the front or back of the pad.

The racks can be constructed by students in the industrial arts shop in a short time and at a nominal cost. Of course, a rack may be made in many different sizes depending on needs (11:58).

Blocking sled. This plan is to show how to adapt blocking dummies to a homemade charging sled.

According to Balloch (1:69), this sled can be made from tubing obtained from the shop department. Several sizes of tubing are used, such as 1" for the frame work and 2" to 2½" for the connecting members. The runners, made from 3/8" flat stock, are 6" wide by 6' long. The upright portion of the rack is built and fitted with a handle bar affair at the top to catch the hand loops of the dummies. Then a tube base is constructed at the bottom of the upright portion on which the dummy rests. This base is connected to the runner so that it will hinge, allowing for simple storage. Any number of sections can be built to accommodate as many athletes as the coach wants to perform sled drills. The sections are connected in sequence by running the 2" pipe stock through sleeves located on the runners and upright portions of each individual section. Consequently, as many sections as are desired may be placed in position.

The dummies are held in place by a simple strap at the base. The straight-type dummy is best suited for this purpose, but the bell-bottomed dummy can also be used.

Sideline markers. All football coaches like an attractive playing field. An important attraction of any



football field is the side-line markers. Wooden markers are easy to make and are also easily broken. Here is how to make safe, attractive, rubber side-line markers:

Secure some junk tires. By cutting the tire through in one place and then turning the tire inside out, the side walls become flatter and stand erect. After turning the tire inside out, holes are drilled in the tire and it is bolted back together. The tire is now painted white and black numerals added. You now have a completed side-line marker.

In cutting through the tires, the best method is to cut the beads of the tires with a large bolt cutter and then use a sharp knife to cut the tire between beads. The knife will cut better if kept wet. The tires can be turned inside out on a tire inspecting machine at a local tire shop. An electric drill is used to make quarter-inch holes to enable the tires to be bolted together.

The advantages of these side-line markers are obvious. First of all, they are safe. Nobody will be injured by falling on a rubber tire. Second, they are attractive. They do not become broken and cracked as do wooden ones. Third, by painting the numbers on four sides, they will be visible from all angles (7:54,79).

Helmet rack. One of the big problems faced by every school is properly storing and caring for athletic equipment.

In most schools storage space is very limited. As a result some athletic items take a beating. Helmets are one of these items. Where and how to store them is always a problem. The following helmet rack is a very satisfactory solution to this problem.

The helmet rack is made up of a full 4 x 8 sheet of  $\frac{3}{4}$  inch plywood. Through this plywood drill five rows of  $\frac{3}{4}$  inch holes, 11 inches apart. In these holes insert 2 foot pieces of  $\frac{3}{4}$  inch dowel rods, letting the dowel rods protrude an equal distance on either side of the plywood. Next cut 80 pieces of  $\frac{1}{2}$  inch plywood about 2 inches square and drill a  $\frac{3}{4}$  inch hole through the center of each. Push these square pieces over the dowel rods and glue them to the 4 x 8 sheet of plywood, forming a collar around the dowel rods on either side of the board to keep them from tipping.

Now add an upright piece at either end with a cross-piece at the bottom and put casters at the four corners so that the rack can easily be rolled in and out of the storage room.

This rack will accommodate 80 helmets (10:16,56).

Seven-man blocking sled. Most football coaches would like to have a seven-man charging sled. Small high schools are often deprived of this type of sled because of the cost.

The following explains in detail how a heavy-duty seven-man charging sled can be constructed by any high school shop class.

For simplicity, the information relating to the dimensions of the lumber needed is presented in the following order: the number of pieces, thickness x width x length, and the name and/or purpose of each piece of lumber.

- A: 3 pieces, 6" x 6" x 8', for sled runners with one end tapered.
- B: 7 pieces, 2" x 10" x 4', for diagonal braces.
- C: 7 pieces, 2" x 10" x 44", for sloped braces.
- D: 7 pieces, 2" x 10" x 40", for charging surface.
- E: 1 piece, 2" x 6" x 16', as front buffer for diagonal braces.
- F: 1 piece, 2" x 6" x 16', as front support for sloped braces.
- G: 1 piece, 2" x 4" x 16', as rear support for sloped braces.
- H: 1 piece, 2" x 6" x 16', as rear buffer for sloped braces.
- I: 1 piece, 2" x 6" x 16', as rear buffer for diagonal braces.
- J: 1 piece, 2" x 10" x 16', as baseboard for rear buffer.
- K: 1 piece, 2" x 4" x 16', as rear brace for tapered ends of runners.
- L: 7 pieces, 3½" x 10" x 13", for wedges between charging surfaces and sloped braces.
- M: 7 pieces, 2" x 10" x 13", as baseboards for sloped braces.

Throughout the construction of the seven-man sled, use 5/8" carriage head bolts with square shanks. It's advisable to use both flat and locker washers on the threaded end of the bolts before putting on the nuts. All flat and lock washers will be 5/8", and 124 of each type will be needed. The following 5/8" bolts will be used in the construction of the 1 sled: thirty 5" bolts; thirty-six 6" in length; thirty-seven 7" bolts; twelve 10" in length; and nine 12" bolts.

In assembling the sled, make certain that all pieces are centered, parallel and/or perpendicular to each

other as indicated by the instructions and drawing. The sled should be assembled in the following manner:

1. Inserting three 10" bolts from the bottom side, bolt rear brace K to runners A, 12" from tapered ends. Outside dimensions from A-1 to A-3 will be 16". Therefore, A-2 will be centered at 96" from the other two runners.
2. Inserting three 12" and three 10" bolts, from the bottom side, bolt buffer H and support G to runners A, 9" from the front end of the runners.
3. Measure 48" from the front edge of boards G and H and mark a line on the top side of the runners A. Line up the back edge of baseboard J and buffer I with marked line on the runners and insert six 12" bolts from the bottom side of A. The inside dimensions from H to J will be 32".
4. Place wedges L between charging surface D and sloped braces C and insert fourteen 7" bolts from the front side through the D-L-C's.
5. In order to determine the desired slope or pitch of brace C and charging surface D, it's necessary to set one D-L-C in place on runner A. The slope or pitch should be approximately 11"--13" and will be the same in both boards C and D. Use finishing nails to temporarily set one diagonal brace B, and front support F, in place. In order to give maximum support to sloped brace C, it is important that front support F be as snugly against C as possible. As a guide, in order to get the desired slope of boards C and D, the gap between boards F and G-H will be approximately  $2\frac{1}{4}"$ -- $2\frac{1}{2}"$ . Recheck again for accuracy; mark on sloped brace C where buffer E will be bolted. Also mark where front support F will be bolted to runners A to give maximum support to C. In all probability, the front edge of F won't be flush with the front end of runners A. Remove the D-L-C and B. Bolt support F in place on A by inserting six 10" bolts from the bottom side of the runners.
6. Using sixteen 5" bolts, fasten the front end of baseboard M underneath and at right angles to support F. Using sixteen 7" bolts, fasten the other end of baseboard M underneath and at right angles to boards G and H. Sloped braces C-1, C-4, and C-7 will rest mostly on runners A-1, A-2, and A-3. It will be necessary to have one M board, 2" x 10" x 13", halved lengthwise, to bolt flush against each side of runner A-2.

7. Using four 5" bolts in fastening front buffer E to sloped braces C-1 and C-7. As a guide, front buffer E will be bolted to C approximately 18"--21" from the top of the sloped braces, depending on the desired pitch of charging surface D.
8. Set assembled parts D-L-C-E in place on runner baseboards, A-M-1 and A-M-7. Set diagonal braces B-1 and B-7 in place against front buffer E and rear buffer I. Check again for accuracy and desired pitch of C and D. Make certain front support F is tight against sloped braces C. Use four 6" bolts in fastening diagonal braces B-1 and B-7 to sloped braces C-1 and C-7, respectively. Use four 6" bolts in fastening B-1 and B-7 to baseboard J.
9. Sloped braces C are bolted to both boards M and G for maximum support. One 6" bolt goes down through boards C-M, and a 7" bolt goes through the width of board G, the thickness of board C, and comes out about front support F. Use two 6" bolts in fastening C-1 and C-7 to baseboard M. Use two 7" bolts in fastening support G to sloped braces C-1 and C-7.
10. Repeat steps (7), (8), and (9) in fastening buffer E to sloped braces C with ten 5" bolts; diagonal braces B to sloped braces C with ten 6" bolts; diagonal braces B to baseboard J with ten 6" bolts; and sloped braces C to baseboard M with six 6" bolts. C-2 will have two baseboards--one on each side of A-2. Complete the bolting of sled by using five 7" bolts in fastening support G to sloped braces C.

Little remains to be done once all of the bolts are drawn up securely. Padding of the charging surfaces is not a difficult task. Tie several layers of felt padding securely in place and then cover with canvas material. Use upholstering tacks driven into the edges of the charging surfaces to securely fasten the canvas in place. Complete the sled by giving it two coats of paint (4:11, 70-72).

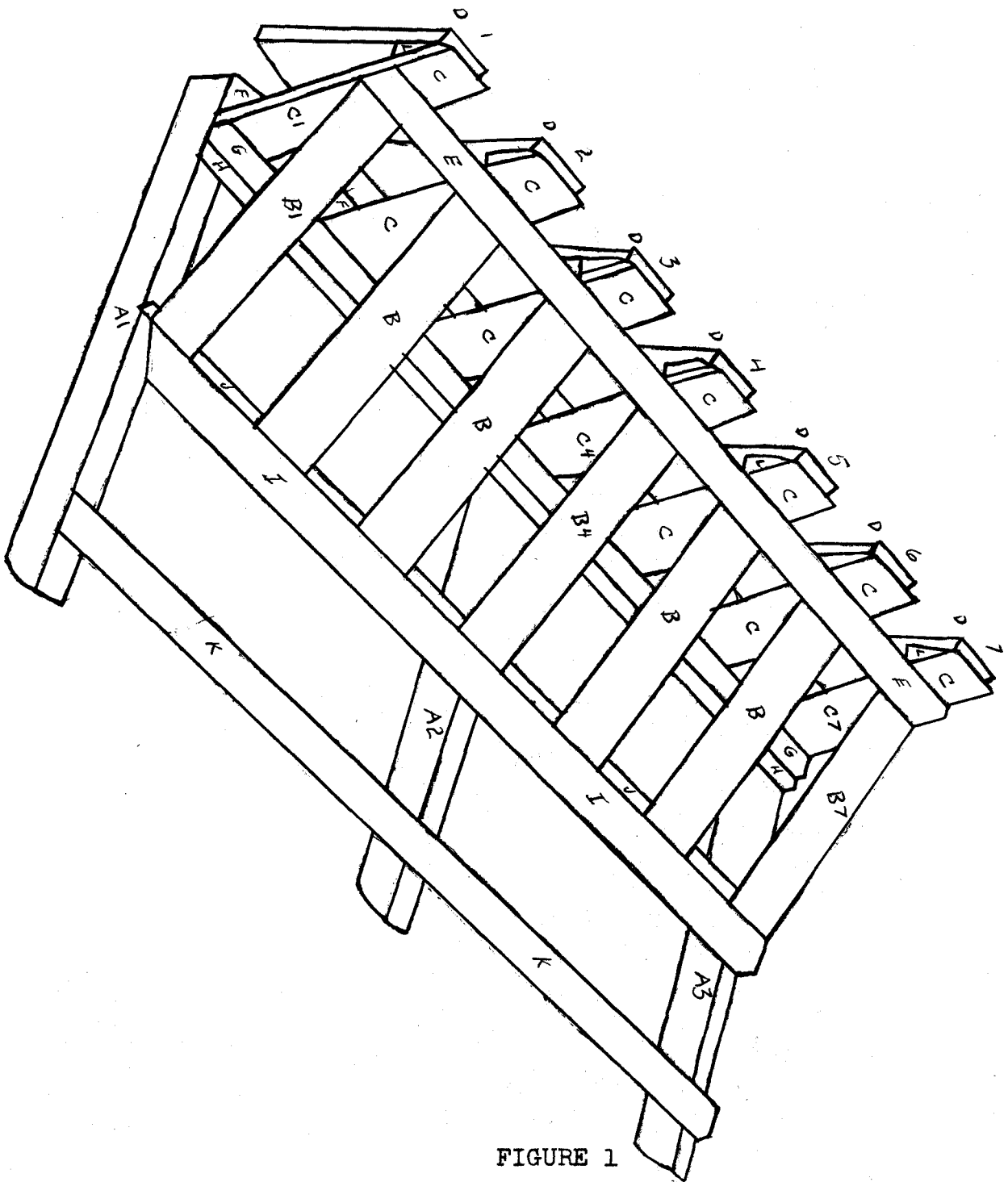


FIGURE 1

SEVEN-MAN BLOCKING SLED (4:11)

## II. TRACK

Starting blocks. These starting blocks are far from elaborate but are inexpensive, easy to make, and they work efficiently. The main body of the block is made of steel plate. Each block requires a piece of steel about 5 inches wide, 15 inches long, and approximately  $3/8$  of an inch thick. The steel should be heated 7 inches from one end and turned back until it rests at an angle of approximately 60 degrees to the base. A piece of plywood 6 inches by 5 inches by  $1/2$  inch is the next item required. Holes for  $1/4$  inch bolts should be drilled at diagonal corners in both the steel plate face and the plywood, countersinking the holes in the plywood so the bolt heads will be flush with the wood. The plywood should be attached tightly to the face of the steel plate. Then  $3/8$  inch holes should be drilled in the base of the steel plate for the spikes. Spikes 6 inches by  $1/4$  inch work the best and give sufficient support against the runner's push off.

The rules state that the block must be rigid and without spring. This steel plate provides no spring, but if any question should arise, a brace may be placed behind the face. This should eliminate all possible objections (5:10, 52).

Jumping standards. Small high schools find it difficult to buy all of their athletic equipment, especially track equipment. Two of the items in track equipment where economics may be practiced by employing homemade products are the high jump and pole vault standards. Here is a simple, practical, and economical set of standards that can be built at a low cost. The material needed is as follows:

High Jump Standards--Two 19 or 21 inch wire spoke car wheels. Two pieces of  $1\frac{1}{2}$  inch pipe 4 feet long. Two pieces of 1 inch pipe 5 feet long.

Pole Vault Standards--Two 19 or 21 inch wire spoke car wheels. Two pieces of  $1\frac{1}{2}$  inch pipe 6 feet long. Two pieces of 1 inch pipe 8 feet long.

If additional height is desired, the length of the 1 inch pipe may be increased accordingly.

The  $1\frac{1}{2}$  inch pipe should have a bushing welded inside it at the top and a similar bushing welded on the 1 inch pipe at the bottom. This bushing gives a snug fit and compensates for the difference between the outside diameter of the 1 inch pipe and the inside diameter of the  $1\frac{1}{2}$  inch pipe. The  $1\frac{1}{2}$  inch pipe is then welded to the wheel in a vertical position. The 1 inch pipe may be marked for height in one of two ways. In the first method holes are drilled all the way through the 1 inch pipe so that a pin would rest on top



of the  $1\frac{1}{2}$  inch pipe. Adjustments are then made by merely removing the pin and inserting it in another hole. In the second method a hole is cut in the  $1\frac{1}{2}$  inch pipe about 2 inches from the top. Then a  $\frac{3}{8}$  inch nut is welded over the hole so a  $\frac{3}{8}$  inch bolt may be used as a set screw. If this method is used, the 1 inch pipe need only be scored to gauge the height. A pin at the top of the 1 inch pipe serves as a suitable rest for the crossbar. If additional weight is desired in the base of the standards, concrete may be poured around the spokes of the wheel (3:18).

Broad-jump take off board. A very simple piece of track equipment that is a must for track fields is the broad-jump take off board. A very easy way of making this is to glue pieces of one-by-fours together until the desired height is reached, then glue a 1 inch by 8 inch by 4 inch hardwood piece on top. Before placing the take off board in the ground, soak it in linseed oil and give it several coats of paint.

Shot-put stop board. To make an effective shot-put stop board, simply glue pieces of one-by-fours together until correct height is reached. It is a good idea to stagger all the joints to give the board extra strength. Wood screws can also be added to the glued strips to make

sure they won't come loose. The 3'6" radius is then cut out with a band saw. After the one-by-fours are cut, a piece of hardwood is glued on the top (8:45).

### III. MISCELLANEOUS

Whirlpool tub. Most small schools do not have the money to purchase the extra equipment which can be helpful to coaches and students. A whirlpool bath is one such item. The following plan will help you construct a whirlpool at a very low cost.

Have your shop build a framework that will accommodate two 55 gallon barrels welded end to end and cut to the correct length. Next cut one-third from the side of the barrel. To protect the user from the sharp edge, a flange of one-half inch metal is built and welded to the edge of the barrel. A  $1\frac{1}{2}$  or 2 horsepower motor is mounted to one end of the frame on rubber to help insulate and reduce vibration. A half-inch gear pump, which you may have to purchase, is mounted on the frame along with the motor. The tank is connected to the intake part of the pump with a half-inch pipe. A screen covering the outlet from the tank will prevent dirt from being sucked into the pump. To the exhaust part of the pump fasten a four-foot length of garden hose with a nozzle, which will enable

water to be brought up to the shoulder. A cover of light metal should be made to enclose the motor and the pump so they will not get wet. The machine should be placed near the shower where hot water and drain are handy (2:62).

Whirlpool activator. To construct your own whirlpool bath for a small high school, the following parts are needed: 1/4 horsepower single phase electric motor; 1/2 inch centrifugal pump (696 gallons per hour); 100 gallon Butler Water Tank (galvanized); 25 feet of garden hose with nozzle.

Connect six feet of hose to a hot water supply tank and six feet to a cold water line. This enables you to get the desired water temperature. To operate it, fill the tank to the desired water level and then secure the rotation of the water by means of the motor and pump which are connected by a 4-inch single step pulley.

One length of hose sucks the water out of the tank into the pump and another shoots the water from the pump back into the tank. The whirling motion is secured by means of the nozzle on the end of this hose.

This bath is large enough for a person to sit in, enabling treatment of any part of the body (9:54,79).

Demonstration board. The construction of this board is easy, and can be done in a short time in the manual training shop.

Materials needed for the construction of this demonstration board are as follows: two pieces 14" by 22" galvanized tin; one piece one-quarter-inch plywood 14" by 22"; two pieces 1" by 1" wood (any kind) 22" long; two pieces 1" by 1" wood (any kind) 14" long; eleven magnets; and twenty-two one-quarter-inch dowels.

The two pieces of galvanized tin are placed on either side of the plywood. The four pieces of 1" by 1" wood form the frame and should be rabbeted so that the two pieces of galvanized tin and the plywood will fit into the grooves.

On one side should be painted a basketball court and on the other side a football field. Painting just the lines of the court and field should be ample.

One-quarter-inch dowels are used to make the football and basketball players. The cylindrical rod magnets are about 5 to 6 centimeters long and may be purchased through the science department from any chemical supply house. The dowels are drilled slightly smaller than the circumference of the magnets. The magnets are driven into the dowels halfway, and cut off with a hack saw. The remaining half

is used in the next dowel. When finished, the dowels are painted two different colors, and the magnetic demonstration board is complete (6:11).

## BIBLIOGRAPHY

## BIBLIOGRAPHY

1. Balloch, Ray W. "Use Those Dummies," Athletic Journal, 39:69, September, 1958.
2. \_\_\_\_\_ . "A Hydrotherapy Machine for \$35," Athletic Journal, 39:62, November, 1958.
3. Clark, Don. "Build Your Own Standards," Athletic Journal, 34:18-20, March, 1954.
4. Fuoss, Donald E. "Your Own 7-Man Charging Sled," Scholastic Coach, 23:11, 70-72, January, 1954.
5. Grieve, Andrew W. "Make It Yourself," Athletic Journal, 32:10, 52, January, 1952.
6. Harwick, Fred G. "Combination Magnetic Demonstration Board," Athletic Journal, 32:11, January, 1954.
7. Hooper, Jerry D. "Sideline Markers," Athletic Journal, 31:54, 79, September, 1950.
8. Kidwell, Collie J. "Make Your Own Track Equipment," Scholastic Coach, 22:45, January, 1953.
9. Page, Richard. "Whirlpool Bath," Athletic Journal, 31:54, 79, September, 1950.
10. Smarks, Paul. "Do-It-Yourself Equipment," Scholastic Coach, 26:16, 56, January, 1957.
11. Zirbes, Kenneth H. "Storing Football Shoulder Pads," Athletic Journal, 39:58, September, 1958.