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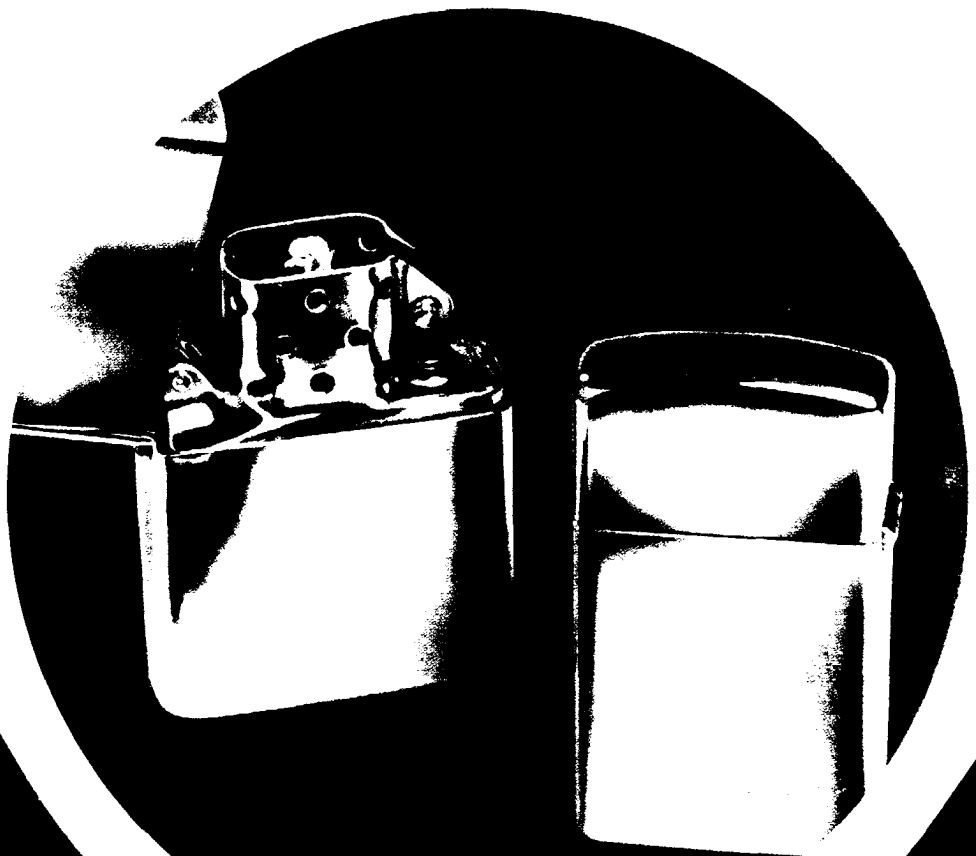


Lead solder preforms play important role in production of world famed Zippo lighters. See page 3.

lead

LEAD INDUSTRIES ASSOCIATION, INC.

292 MADISON AVENUE, NEW YORK, N. Y. 10017

Lead is a four letter word...

The politician generally gets wide popular support when he takes a stand against lead. It is almost as popular as a stand *for* motherhood. And about as meaningful.

Lead belongs in many more places than it doesn't belong. Lead doesn't belong in paint for housing interiors . . . or other surfaces accessible to children. Lead *does* belong in exterior industrial building paint that must withstand the ravages of weather.

Lead does not belong in toys which can be chewed or swallowed by children. Lead does belong where soundproofing is a requisite. In the plant and office this use of lead eliminates sound pollution.

Lead belongs where X-ray or gamma radiation can be harmful: whether in the dentist's chair or the nuclear laboratory.

Lead belongs in gasoline. It is not a health hazard and it has been proved a contributor to engine efficiency and fu conservation. In any case, lead does be long in electric batteries that start you car and provide standby power in hosp tals and communications systems. It b longs in solder and cable as basics the electronics and communications in dustries.

Control is the operative word in t mining, smelting and the application lead. Lead is a four letter word. So "safe". And where lead *belongs*, le can be made safe.

Lead alloy solder puts the "zip" in Zippo lighters

Small, wafer-thin lead alloy solder preforms have played a major role in helping George Blaisdell become successful and, at the same time, has helped a cigarette lighter achieve world-wide fame for lighting in wind, rain or snow; under guarantee of free repair.

George Blaisdell and his family own the Zippo Manufacturing Co., in Bradford, Pa. The company is known for the famous windproof Zippo lighter, the best-known product of its kind in the world. Presidents, kings, world statesmen, military men and women, corporate heads, and millions of others all over the world, own Zippo lighters.

The company produces 33 models of lighters, ranging from $4.75 in brushed chrome to $560 in 14K gold. Its basic line consists of two standard sizes: a slim model, that is about $1\frac{1}{4}$-in. wide and $2\frac{1}{4}$-in. high; and a standard model that is approximately $1\frac{5}{8}$-in. wide and $2\frac{1}{4}$-in. high.

According to Ray Uhler, Zippo's plant manager, tin lead solder plays one of the most critical roles in the efficient manufacture and operation of the faultless lighters. He says this is why the soldering operation includes very stringent quality control procedures.

Uhler explains that solder preforms literally help put the "zip" in Zippo lighters. The preform is used to solder-join and seal a plate to the inner case of the lighter. When this case is inserted into the outer shell of the lighter, the resulting envelope forms a sealed enclosure that contains the wick and the absorbent packing to hold the fluid used to fuel the lighter. Therefore, the soldered plate must form an airtight and leak-proof seal with the inner case. Otherwise rapid evaporation would waste the fuel and require too frequent refilling.

All solder preforms used in the joining process are 50/50 tin lead alloy. The preforms vary in length and width, depending on whether slim- or regular-size lighters are in production. Regular-size preforms are .015-in. thick, while the thin-size preform is .017-in. thick. The thickness variation is due to the difference in gauge of the stainless steel used for the two cases—.015-in. for the slim case and 0.018-in. for the regular case.

About 40% of Zippo's sales volume comes from more than 27,000 commercial accounts, comprising some of the biggest corporate names in industry. They regularly order Zippos in huge lots to serve as premiums, promotional handouts, employee awards and sales incentives. Many times the company emblem is soldered on the face of the lighter. "If you solder an emblem on, you know it's going to stay," says plant Manager Uhler. "If the emblems are epoxy-joined to the face of the lighter, you know that sooner or later, they will come off. We've tried other joining techniques, too, but we always come back to solder because it's the best and most economical joining method we've found."

He also points with pride to the fact that few of the thousands of lighters the Zippo repair section processes each day involve resoldering. Some bear the ravages of having been soaked in sea water, buried in snow or embedded in mud. Others have been mangled by washing machines, hydraulic presses and lawn mowers—and a few stopped bullets in World War II, Korea and Vietnam. Regardless of the reason for return, the lighters are enroute to their owners within 48 hours—included is a one-shot tube of Zippo lighter fluid and a couple of extra Zippo flints to boot.

Overall view of circular work station used to assemble lead alloy preform for Zippo lighter case.

Lead alloy preform (1) is used to solder top plate and tube for flint (2) to inner case (3) Zippo's standard model (left, open top) and slim design cigarette lighter.

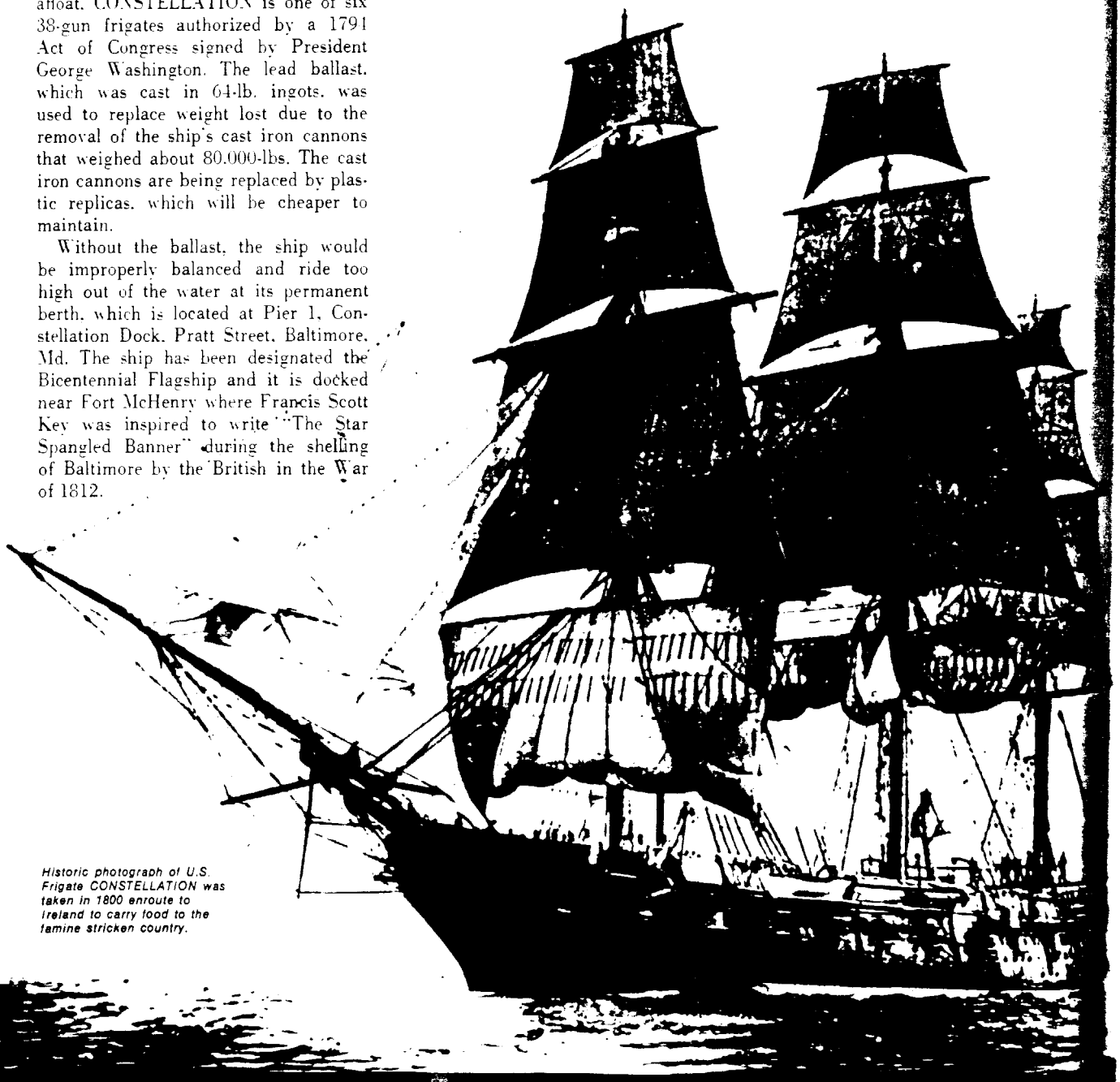
Recycled ballast helps keep historic warship on even keel

Recycled lead from an unusual source is helping to keep one of the nation's most historic warships on an even keel. Scrap from lead used to line the electrolytic refining tanks of an outdated Baltimore copper plant has been donated as ballast for the warship, the 158-year-old U.S. Frigate CONSTELLATION.

The oldest ship in the world still afloat, CONSTELLATION is one of six 38-gun frigates authorized by a 1794 Act of Congress signed by President George Washington. The lead ballast, which was cast in 64-lb. ingots, was used to replace weight lost due to the removal of the ship's cast iron cannons that weighed about 80,000-lbs. The cast iron cannons are being replaced by plastic replicas, which will be cheaper to maintain.

Without the ballast, the ship would be improperly balanced and ride too high out of the water at its permanent berth, which is located at Pier 1, Constellation Dock, Pratt Street, Baltimore, Md. The ship has been designated the Bicentennial Flagship and it is docked near Fort McHenry where Francis Scott Key was inspired to write "The Star Spangled Banner" during the shelling of Baltimore by the British in the War of 1812.

The ship's guns were removed as part of a long-range restoration program that has been underway since 1955 when the ship was brought to Baltimore from Boston by The Star Spangled Banner Flag House Association, A non-profit patriotic organization, the Association established the U.S.F. Constellation Foundation, Inc., to undertake restoration of the ship, which was being slowly destroyed by the cumulative ravages of time, coupled with a lack of federal funds to preserve the old ship. The restoration is being carried out in five phases: interior restoration; armament and fittings; primary hull and secondary hull repairs; replacement and repair of masts, spars and rigging; and installation of dock facilities that include a museum and reference library.



Historic photograph of U.S. Frigate CONSTELLATION was taken in 1800 enroute to Ireland to carry food to the famine stricken country.

ay Bicentennial role

Leaded bronze aids Revolutionary cannon reproduction

Authentically duplicated Revolutionary War cannons will be displayed and fired at historic sites in the 13 original states as part of next year's Bicentennial celebration of American Independence. Considerable time and effort is being devoted to the production and preparation of these field pieces to assure that they are exact replicas of the originals.

At Harpers Ferry, W. Va., 61 of these historic weapons are being painstakingly designed for reproduction by the U.S. National Park Service. One of the most important details of re-creation is the metal content of the guns. The bronze alloy, composed of copper, lead, zinc and tin, approximates the percentage of each metal used in their 200-year-old counterparts.

Small, fast-firing three-pounders; six-pounders emblazoned with the crest of King George III; stubby 24-lb. howitzers; and 24-lb. siege guns more than 12-ft. long are among the cannons being duplicated. Altogether, 15 different types of Revolutionary cannons will play a part in the ceremonial events marking our Bicentennial.

The cannons are being rough-cast by LaPan's Foundry of Hudson Falls, N.Y., and the Crown Non-ferrous Foundry in Chester, Pa. The intricate, artistic decorations found on the old guns are being copied exactly on the modern cannons by hand.

The rough castings are polished to a bright, golden color, distinguishing insignia are incised on the breech rings, and all the cannons are numbered or named. After proof firings with black powder, the guns will be mounted on carriages built out of solid oak in Glens Falls, N.Y., by Adirondack Machine Corp. Some of the carriages are heavier than the guns they carry.

Authentic even to the blue-gray paint that typified British Army weaponry of the period, the carriages were designed after exhaustive study of old paintings, drawings and other records. William E. Meuse, chief of historic ordnance of the National Park Service, is in charge of the project.

The original cannons were designed and manufactured in Europe. A few guns were cast for the patriots by foundries located primarily in the Philadelphia area. The most notable of these was one operated by J. Byers, who turned out pieces equal in every respect to the finest that England's Woolwich arsenal could produce. Mostly, however, the Continental Army relied on acquiring cannons from French or other European foundries, or on capturing British artillery.

Sound enclosure softens punch of press noise

Industry faces heavy pressure today to comply with the noise control regulations of the Occupational Safety & Health Act (OSHA). When it comes to generating excessive industrial plant noise, automatic punch presses are among the leading offenders. So when a company like Associated Spring realizes a 17 db reduction in such machinery noise, it can be credited with quite an accomplishment. It can roughly be compared to paring down the painfully loud noise of a riveting gun to the sounds of city traffic heard from within an automobile.

The company's Dayton, Ohio plant uses a number of huge presses to produce various type springs and custom metal parts. In an effort to meet OSHA's current 90 db industrial noise limit requirement, locally-based acoustic engineering consultants were brought in to study the noise problem.

After investigating production flow, equipment maintenance, and machine accessibility, the consultants recommended a sound enclosure system for one of the two 45-ton presses that proved to be the principal sources of excessive noise. The press produces metal washers from 26 gauge strip steel, 2½-in. wide.

Made by Singer Partitions of Chicago, the enclosure is constructed of lead/vinyl curtain material combined with 1-in. thick Mylar-covered acoustic foam panels applied to the inside curtain surface. With the Mylar covering, oil splash and metal trimmings cannot clog or destroy the foam. The lead-loaded vinyl sheet specified was 0.75-lb./sq. ft. This dense, limp material provides the necessary mass with flexibility and it is a highly efficient sound barrier.

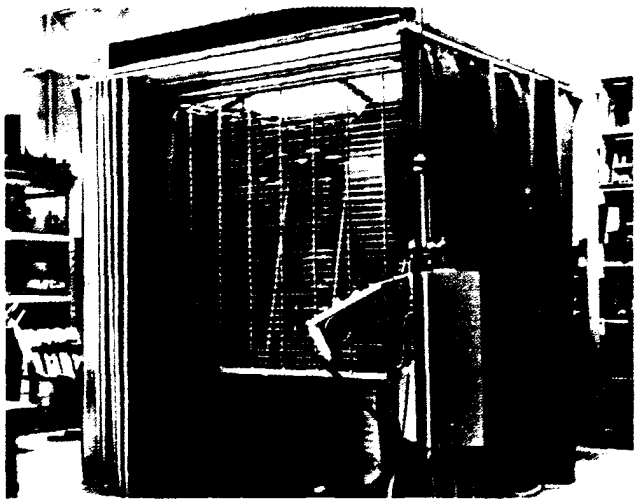
The enclosure measures 10-ft. x 10-ft. x 8-ft. Since one of the prime requirements was complete accessibility to the press, a Singer overhead track-and-roller system was fastened to the top of the 8-ft. high angle steel framework. This permits easy opening of the curtain panels for access to the machine.

Another consideration was to make the enclosure available to the in-flow/out-flow materials, while maintaining sound level control. This was solved with customized cutouts in the enclosure's side panel curtains. Viewing windows also were added.

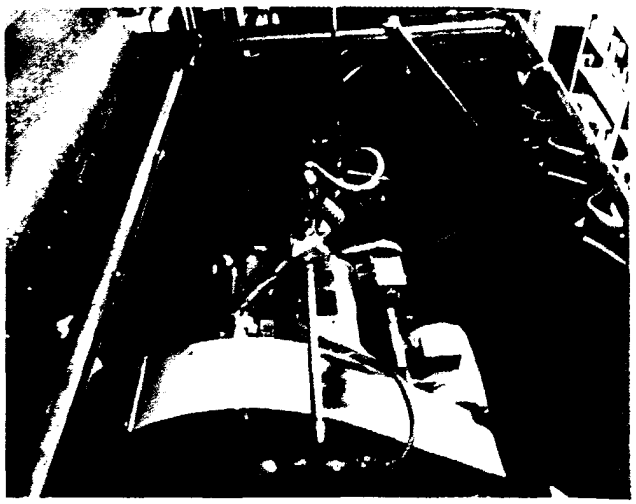
As a special safety feature, a hazard-guard fence was included in the enclosure design. The fence, a metal-lattice shield, was attached to the steel frame independent of the roller-curtain action. It remains stationary when the curtain is opened. When the guard is raised, a microswitch is activated which de-energizes the control circuit, rendering the press inoperative.

Before the sound enclosure installation, the noise level reading was 101.5 db, despite the installation of vibration isolators to decouple the press from the floor. This compares with a post-enclosure reading of 84.5 db. The 17 db attenuation achieved, without sacrifice in production capacity, convinced the company to install a similar enclosure for the second offending 45-ton press.

Tom Campbell, division manager, noted that the noise reduction exceeds present OSHA requirements. And should a currently contemplated lower standard of 85 db be put into effect, the company would still be within compliance limits. "We were especially pleased to note immediate workers' acceptance of this new system as an improvement to their environment and safety," Campbell said.



View of open lead/vinyl sound enclosure surrounding noisy punch press at Associated Spring, Dayton, Ohio. Use of leaded vinyl decreases sound 17 db, or the equivalent of reducing riveting gun noise to that heard from inside an automobile in heavy traffic.



View from top of leaded vinyl sound enclosure for punch press shows how accordian-pleated foam-lined material damps sound from sides of machine. Track and roller assembly that frames press facilitates movement of lead/vinyl curtain.

Lead puts clout in the clubhead

Most people know that lead plays a vital role in the design of yachts —lead used as ballast in the keel keeps the yacht upright in the water. But few people know that lead is also playing an important role in the design of golf irons as well.

Why lead in a golf iron? Simply stated, it provides the concentrated weight that's needed in the newer, lightweight irons to give them extra driving power.

Although the use of lead in golf irons is not new, the traditional way to add concentrated weight for golf irons was to load the inside of the shaft with chunks of lead near the point where the head is attached to the shaft. This technique adds deadweight that has been reported to cause problems in achieving a smooth swing.

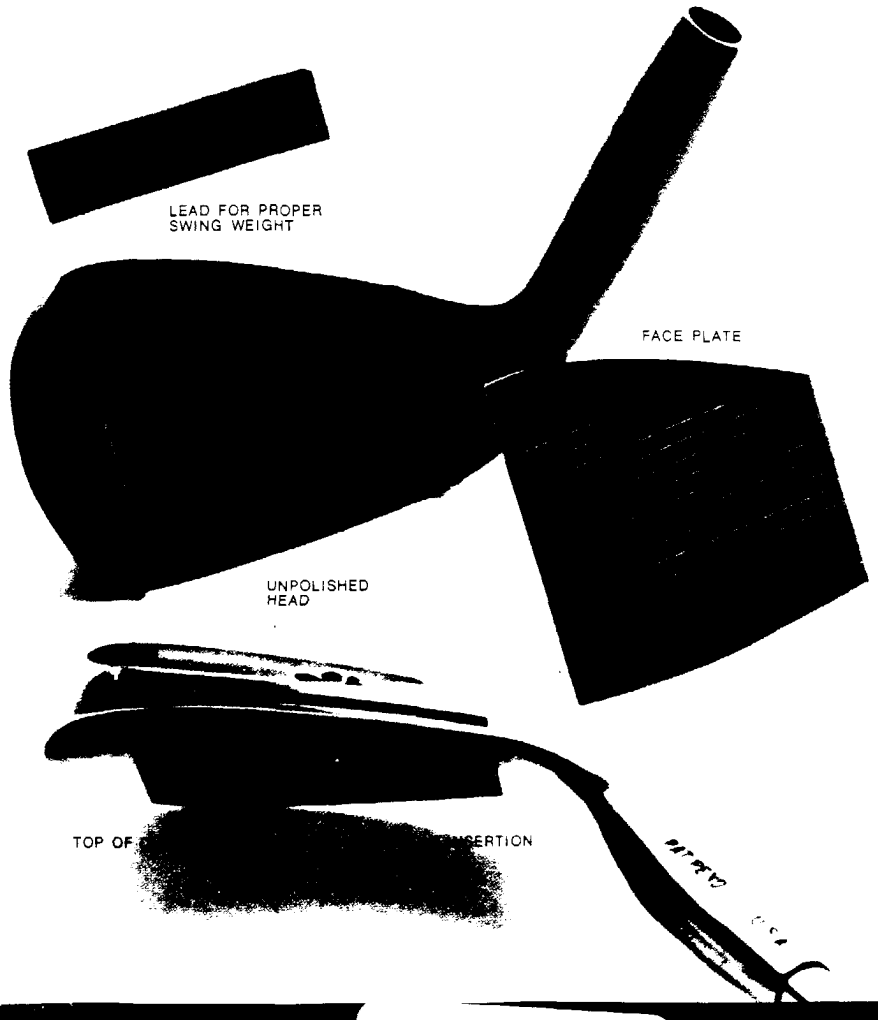
Shamrock Golf Co., Los Angeles, has taken an approach that it hopes will overcome the deadweight problem. Their solution is to move the lead weight from the base of the shaft to a special spot inside the clubhead. The concept is reported to not only work, but to improve the performance of the iron as well.

According to Shamrock, their method makes the overall weight of the iron less. Jack Nicklaus in a recent article in Golf Digest is quoted as saying: "Distance is a problem for both seniors and women, and I think there are two reasons. The first lies in equipment. I've increasingly favored 'light-swinging' clubs as I've got older, and I think I'll go more and more in that direction in the future. One reason is that clubhead velocity has twice the value of mass in terms of distance—the lighter the club, the easier it is to swing through the ball fast. Also, the lighter the club, the less it takes out of you physically to swing it. This can be a big factor as one tires towards the end of the round."

Called a Power Pocket, the lead weight lowers the center of gravity and places the heaviest part of the clubhead below the center of the ball. Shamrock says its long irons using the lead weight give the high, arching flight of a five wood, while short irons using it give more bite.

Shamrock reports the improved technique is more time consuming and expensive, but it results in a higher quality product with improved precision. The first step in producing the head is to cast the basic head of the golf club. The faceplate is then stamped from the same type of metal and it is joined to the clubhead by electron beam fusion, a process that fuses the two metals together to become one homogeneous piece of solid steel.

In the next step, the desired lead weight is dropped into the bottom of the cavity directly in back of the faceplate. The weight of the lead depends on the type of club being produced and the swing weight desired by the golfer. Swing weight is the relationship of the weight of the head to the length of the club. Shaped somewhat like a piece of chewing gum and ranging in weight from 2 grams to 23 grams, the lead weight is held in place with black epoxy.



Future sales of battery-powered industrial trucks and personnel carriers are likely to stem from three major factors:

- On-going improvements in electric vehicle batteries and power systems.
- OSHA regulations that limit the amount of exhaust pollutants within plants and warehouses.
- Steadily rising fuel prices.

Electric trucks offer performance improvements ranging from longer battery life to sophisticated controls, added reliability, greater economy and low maintenance costs. These advantages are reflected in the increased purchases of industrial electrics last year. Sales of rider-types went up more than 4,000 units in 1974, according to the Department of Commerce. Sales of electric hand trucks gained by almost 1,500 units. This compares with an increase of a little over 3,000 units in sales of IC trucks and tractors. And battery manufacturers report an increase of over $13 million in sales to the material handling market last year, with the total reaching $88.5 million.

Advancing technology also is playing an important role in the upswing in battery-powered truck sales.

Among the new developments are:

- High-voltage batteries— up to 72v— which make electrics more competitive for heavy-duty applications.
- Stepless speed controls to reduce current usage, increase battery and component life.
- Solid state chargers to maximize the amount of energy input when charging a battery, thereby decreasing charge cycle time.
- Battery re-designs to produce more power from the cube and make it possible to put a more powerful battery into the same or smaller equipment.

And to power electric vehicles there is a full line of lead-acid batteries from 12 to 48 volts, and some to 72v, with capacities to 680 ampere-hours for 48v, and up to 1700 ampere-hours for a 72v. Also, element protection and improved sealing of container and cover have reduced leakage to prolong battery operating life.

Other devices which are extending battery life include:

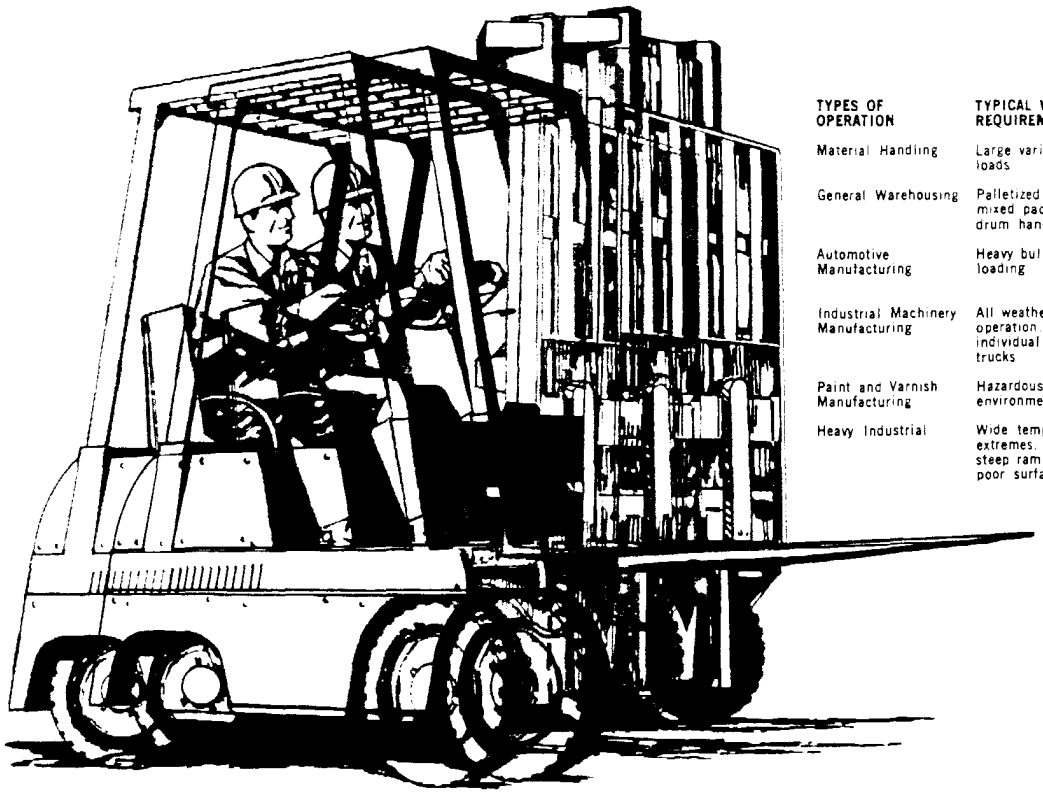
- Discharge controls that prevent battery abuse by warning the truck operator when voltage is approaching a danger level. If the warning is ignored, the control can actually shut down the truck.
- Safety cable connectors to eliminate the possibility of matching a battery to the wrong truck or charger.
- Quick disconnect devices which function as safety switches to cut off power in case of an emergency.
- Non-arcing connectors that minimize the problem of pitting and burning of connector contacts because of operator errors.

Some experts consider stepless speed controls—such as SCRs* or power transistors—the most significant recent development in battery-powered trucks. A major electrical manufacturer is now offering a new, improved SCR control that continuously monitors lift truck operations like a computer. Reported advantages include improved ratings, higher performance, greater reliability and ease of maintenance.

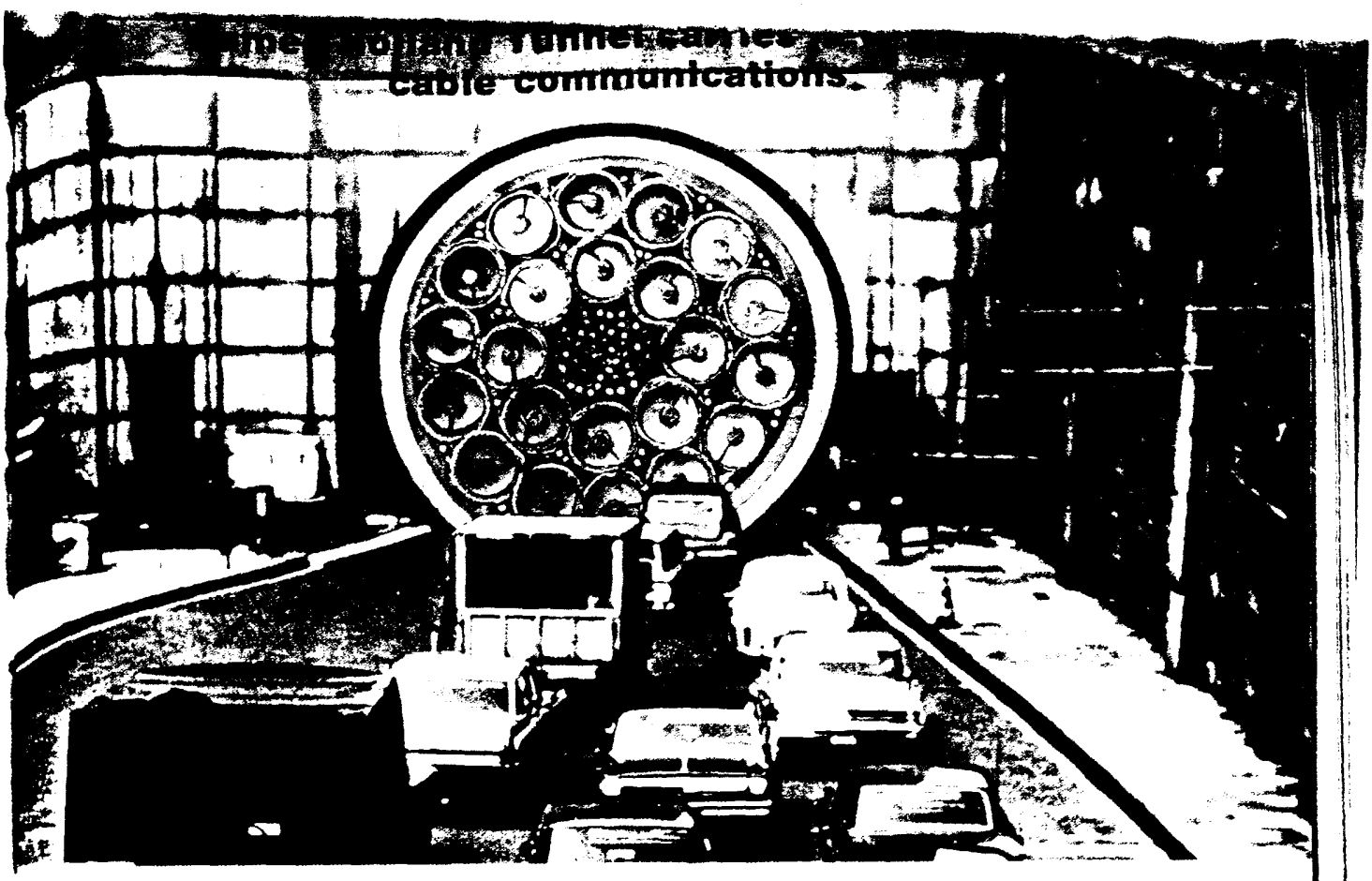
The same prominent manufacturer made a detailed study of six types of operations involving a variety of working requirements. The study documents a broad range of savings in energy, operating and maintenance costs, summarized in the following chart:

**silicone control rectifier*

Three reasons why electric trucks serve industry better



TYPES OF OPERATION	TYPICAL WORKING REQUIREMENTS	RESULTS
Material Handling	Large variation in loads	$1360 yearly savings per electric truck
General Warehousing	Palletized and mixed packages, drum handling	45% overall cost reduction by using electric trucks
Automotive Manufacturing	Heavy bulk, shock loading	70% savings in electric power vs. fuel and oil costs
Industrial Machinery Manufacturing	All weather, fleet operation, and individual specialized trucks	80% savings in maintenance costs
Paint and Varnish Manufacturing	Hazardous environment	75% savings in maintenance costs
Heavy Industrial	Wide temperature extremes, long runs, steep ramps, good to poor surfaces	$2300 in maintenance savings per year, per electric truck (first 2 years of operation)



cable communications.

The Holland Tunnel, which transports an average of 57,000 vehicles a day between New York and New Jersey, also carries the highest capacity short-haul digital transmission system in the United States. Called T1M, the system links Manhattan with Newark via a coaxial cable snugly encapsulated in a $\frac{1}{8}$-in. thick protective lead sheath. In all, the 17-mile cable is encased in approximately 82,070-lbs. of lead.

The T1M system proved its worth sooner than expected. Originally scheduled to start operating in April, 1975, it was pressed into service on February 27 when a disastrous fire hit one of New York Telephone's central offices and switching centers in Manhattan. The blaze knocked out 166 transmission lines, each carrying up to 24 voice circuits, between New York and New Jersey. The new system was used to bypass most of the affected lines and restore telephone capacity between the two states.

Developed by Bell Laboratories, T4M was manufactured by Western Electric, with overall coordination from AT&T. Western Electric has been making lead sheathed cable since 1881. Lead was originally selected as the protective material primarily because of its adaptability to extrusion and resistance to corrosion. These benefits hold true today. The lead barrier provides the T1M cable with the maximum water tight integrity and significantly lengthens its life expectancy.

Modern coaxial cables employ a number of coaxial conductors consisting of a small copper tube, $\frac{9}{32}$-in. in diameter, with a copper wire running lengthwise through the center. The design is called "coaxial" because the tube and wire have the same center axis.

The T1M line and its multiplexing equipment operate over coaxial cable to provide high capacity voice and data service for densely populated metropolitan areas. It carries 10,320 voice channels over cable containing 22 coaxial tubes. Information is encoded into short pulses (bits) transmitted at high rates, and decoded at the receiving end. Its large circuit carrying capacity leads to low cost, highly efficient use of underground ducts, and improved maintenance.

Regenerators along the New York/New Jersey cable route are located in manholes at intervals up to 5,700-ft. to reconstitute the digital signals being transmitted. Multiplexers at each end of the line combine a number of lower speed digital inputs into the high speed signal suitable for transmission on the T4M line.

The new system will serve as a high capacity artery for the extensive T1 networks now in use in almost all metropolitan areas. T1 lines, which carry 1.5 million bits per second, will serve as the capillaries feeding these arteries. The T1M cable will fit into the 4-in. ducts now used for the T1 cables, increasing the capacity of these ducts by almost a factor of four.

Technicians from Bell Laboratories and New Jersey Bell Telephone Co. connect sections of T4M telephone transmission system under the Holland Tunnel. The new system between New York City and Newark, N.J., is the highest capacity, short-haul digital transmission system in the United States.

Reloading: A quick, simple and economical way to get more shots for the money

Thousands of people involved in sports such as skeet and trap shooting are finding that "packing their own" can save a great deal of money . . . in this case, money that would be spent for new ammunition. With special equipment that's readily available, it's a comparatively simple task to reload shells with complete safety and reliability providing that recognized reloading precautions are taken.

It is particularly important to follow the instructions contained in any one of the various reloading manuals available at any hunting or sporting goods store. Particular care should be taken to start with the lowest recommended charges listed for each load in such manuals.

There are literally dozens of shotshell reloading tools on the market. They range in price from a $9.95 pocket-type outfit that reloads a box of shells in an hour to semi-automatic equipment that can produce nearly 500 shells per hour. The average shooter's needs can be adequately met by tools in the $45 to $85 price range. All of them are self-contained units that can load three or four boxes (75 to 100 shells) per hour.

The first step in reloading of a shotgun shell is to select a clean, fired case in good condition. The cases must be stored by make—Remington, Winchester, Federal, etc.—and type—12, 16 and 20 gauge, because of reloading requirements.

Both plastic and paper shells are abundant, but care must be taken to adjust tools to handle them. For example, target loads contain light charges of shot and powder and are loaded in "high-base, permanent-wad" cases. Hunting loads, on the other hand, use heavy charges and are assembled in "low-base, permanent-wad" cases of greater internal capacity.

Before loading, check to make sure that all cases are carefully inspected. Cases that have been mashed flat, seriously deformed, or torn, should be set aside.

Basic components needed for reloading begin with standard domestic "battery cup" shotshell primers that are available in several makes. All makes are good and all currently produced 12 gauge shells take No. 209 size. The best wads are the one-piece plastic wad column shot-cup type. Different cases have different height wads and all dealers have charts telling which is correct for a particular case. The lead shot is the same no matter who makes it. Size No. 9 is usually chosen for target loads.

Safety precautions are of critical importance in reloading. Some of the precautions are obvious—one should always wear safety glasses, never load in haste, and *never* smoke in the area. Primers should be carefully handled since they are the most hazardous of all components used for smokeless powder loads.

It is also vitally important to keep powder and primers away from heat, sparks and open flames. Powders should never be mixed and all shells must be carefully examined to insure they are in good condition before using.

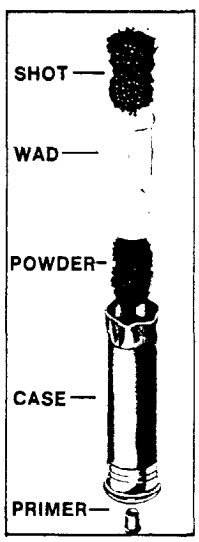
Though it must be accomplished with utmost care, reloading is simple. In the first step of a typical operation, the shotshell case is placed in a tube. At the bottom is a de-capping punch which pushes out the old primer. A downward movement of the tube seats the new primer. After it is seated, a carefully-selected amount of powder is passed into the case via a hollow tube. A wad is then inserted in the case atop the powder and lead shot is next passed into the case and seated in a similar manner. A pressure gauge at the base of the device shows the exact wad pressure. A cap-like die device with grooves inside is then placed over the case and, when the device is turned, the resulting action folds creases in the shell.

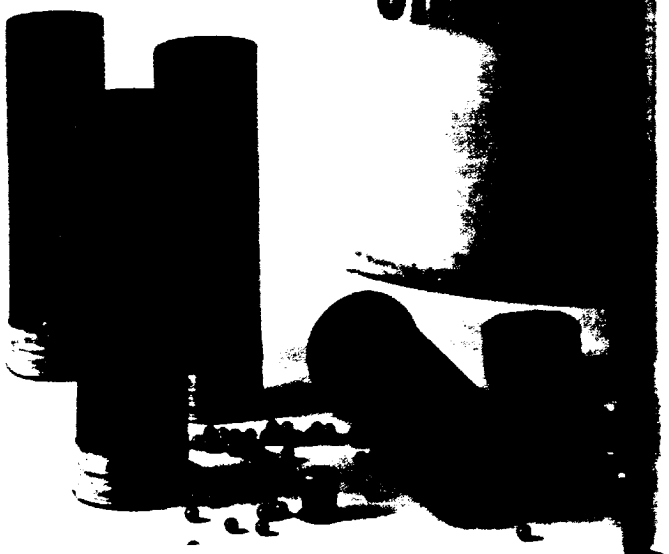
In the finished shell, the crimps, or folds, should be tight and smooth, with no noticeable springback, and with almost a very small hole at the center where the folds meet. Neither should there be any overlap or crumpling of the folds at the center. The latter indicates too much case above the shot, the former too little. Adjustment of either wad column height or shot charge weight is the proper corrective action.

The center of the crimp should be recessed nearly 1/16-in. below the rim. This is necessary to avoid having the crimp loosen under recoil forces. The walls of the shell case also should be checked to see if they have buckled due to too much crimping force.

Occasional minor crimp imperfections cannot be avoided. Such shells should be fired first.

Thousands of amateur skeet and trap shooters who burn up several hundred shells each week, are using "pack your own" reloading techniques to add dimension to their sport and—most importantly—to make it as economical as possible.





LIA26750

Lead enhances organ sound at New York's Lincoln Center

Lead alloy plays a vital role in the performance of one of the nation's newest concert hall organs. Installed in Alice Tully Hall at New York's famed Lincoln Center for the Performing Arts, the organ has 4,192 pipes. Many of the pipes, which range from ¾-in. to 16-ft. in length, are made from various combinations of lead alloy to provide the wide variety of musical notes required of the instrument.

Alloy for the pipes ranges from 20 to 75 per cent lead content. The ratio is proportioned according to the desired tonal quality. Lower tones emanate from alloy pipes containing a greater amount of lead. Pipes for the organ facade have a higher tin content and have been burnished to a magnificent silver luster.

The pipes of the organ, which was built by Theodore Kuhn Co., in Mannedorf, Switzerland, are arranged in 85 ranks, distributed among 61 speaking stops. The console has four different independent manual keyboards with direct mechanical linkage from the keys to the pipes. The skill that went into designing the lead alloy pipes and the patience that went into construction of the organ have been rewarded in the rich, brilliant tones that are produced. These were also achieved by subtle adjustment of pipe scale and voicing, according to Lawrence Phelps, who served as Lincoln Center's consultant for the project.

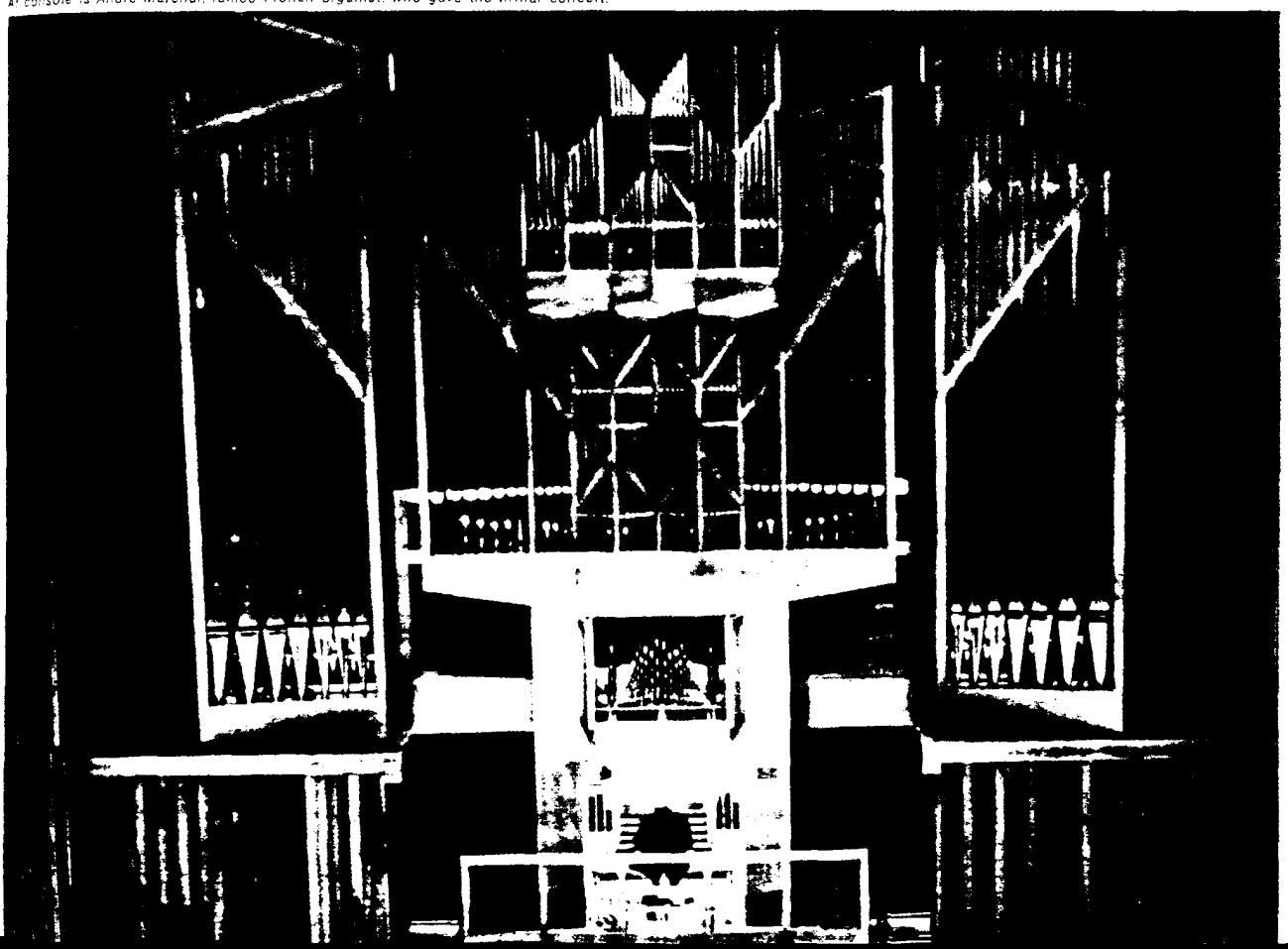
Phelps helped plan the tonal design and voicing, and the stop-control and combination systems were created by his Erie, Pa. company. "I feel that this is the finest instrument of its kind in New York, and among the top dozen in the United States," he stated. "It's the result of 100 years of deep insistence on craft."

Although the organ is a product of traditional construction, modern techniques were not ignored. A solid state electronic memory system, when preset by the performer, instantly activates or deactivates any number of stops with the push of a button. Since the Kuhn Company is not experienced in such electronic technology, the system was built by Mr. Phelps' firm.

The tracker-type organ relies upon mechanical, rather than electrical linkage between keys and pipes. This gives the performer direct and intimate control of the phrasing, rhythm and accent. It was designed and constructed both as a virtuoso instrument and as an instrument capable of blending with chamber or full orchestra ensembles.

The organ arrived in New York in thousands of pieces, carefully packed in 10-ft. crates. A crew of six from the Swiss factory spent two months assembling the instrument. Final tone finishing was done by Kurt Baumann of the Kuhn Company. Although the organ's cost has not been revealed, experts estimate it at well over a quarter of a million dollars.

Full view of magnificent new organ in Alice Tully Hall at New York's Lincoln Center for the Performing Arts shows scores of pipes made from lead alloy. At console is Andre Marchal, famed French organist, who gave the initial concert.



High-rise hospital reflected in lead-lined pool

Still water in a pool can exert a strong tranquilizing effect on the viewer. Architects therefore consider this benefit along with aesthetic values when specifying the inclusion of a reflecting pool for apartment buildings, office towers, museums and. most appropriately, hospitals.

For example. a huge 50-ft. x 100-ft. reflecting pool is now nearing completion at Nassau County Community Medical Center on Long Island. The Medical Center. which serves one of the most densely populated areas surrounding metropolitan New York City, has constantly expanded in recent years to keep up with a continuing increase in patient load. Along with the expansion is the need to take advantage of all available space for both administrative and patient care. A combination of these two factors are the primary reason why the new reflecting pool at the Community Medical Center was lined with lead.

The reflecting pool is incorporated in the design for a raised plaza that connects the main building at the Center, a19-story tower, and buildings housing other facilities. The area beneath the large plaza is designed to house offices and medical lab facilities. The plaza therefore had to be made waterproof since it serves as the roof of the structure.

Landscaping plans for the plaza called for installation of a large reflecting pool that would be a peaceful setting for hospital employees as well as patients and visitors. Lead was selected to line the reflecting pool because it will insure the watertight integrity of the roof.

The lead liner for the reflecting pool was installed by John F. Abernethy & Co., Brooklyn. Company president Frank Kiernan reports the reflecting lead lining created no unusual problems. "Being pliable, lead is simple to work with and install," he says. "It can be easily fitted around and over through-roof joints, piping and other obstructions and, most importantly, lead can be easily joined. The fact that lead is compatible with most construction materials and is among the most corrosion-resistant waterproofing materials adds to its advantage as a reflective pool liner."

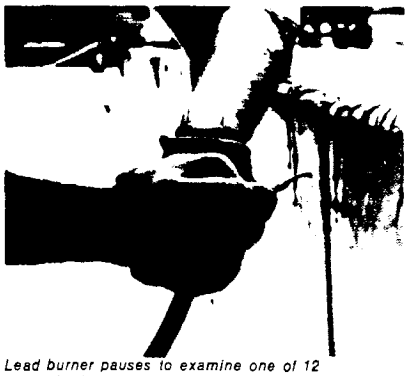
The reflecting pool at the Medical Center will hold approximately 4,500-cubic ft. of water. About 16-in. deep, the pool was first lined with an asphalt primer. A styrofoam composition within layers of tar board was then applied and the top surface was tarred to provide a foundation for the lead lining.

The lead contains 4 per cent antimony and 0.10 per cent arsenic to provide increased corrosion-resistance and decrease thermal expansion. The project required a total of about 17 tons of lead. It was installed in 16 strips averaging a ton each, plus about one ton of lead to burn the joints. Seventeen of the joints were 50-ft. long and there were three 100-ft. long joints in addition to 12 upright joints.

The lead lining was homogeneously bonded to all through-roof penetrations such as electrical. plumbing. drain and other surfaces.

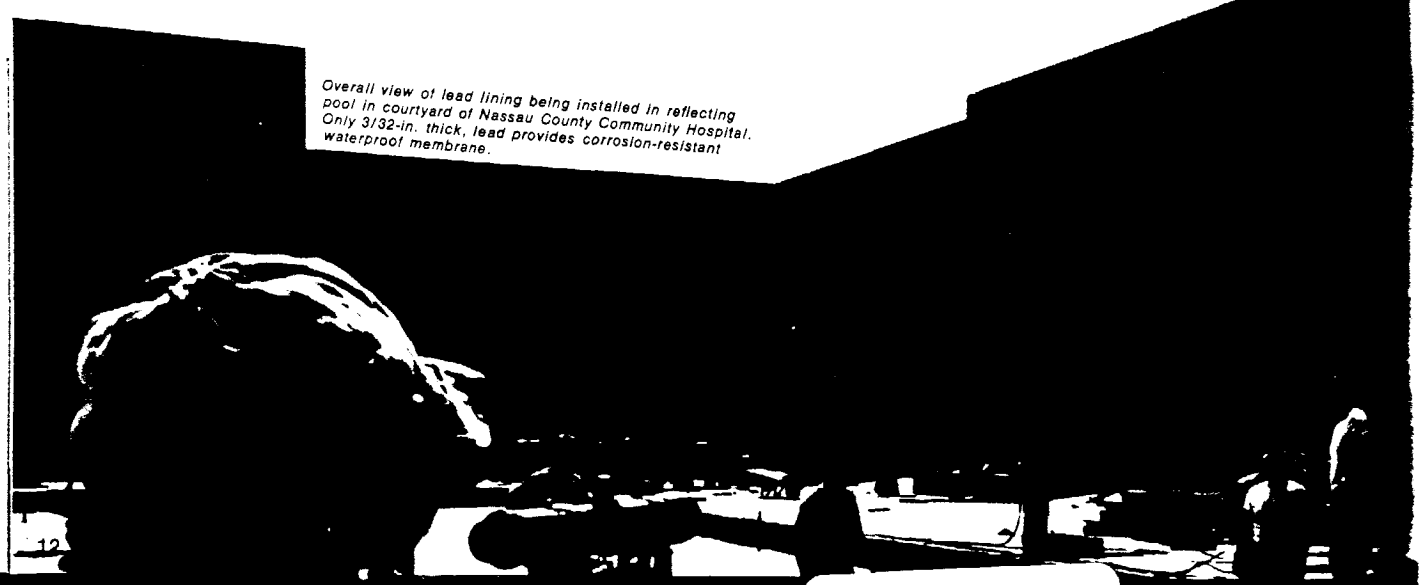
Eight skimmers will help maintain water level in the pool and keep it clean. There are eight outlets around the pool edges to keep the water moving through the recirculating system.

Close-up of lead burner at work installing lead membrane for reflecting pool of Nassau County Community Hospital courtyard shows how lead sections can be used to wrap around through-roof obstruction.



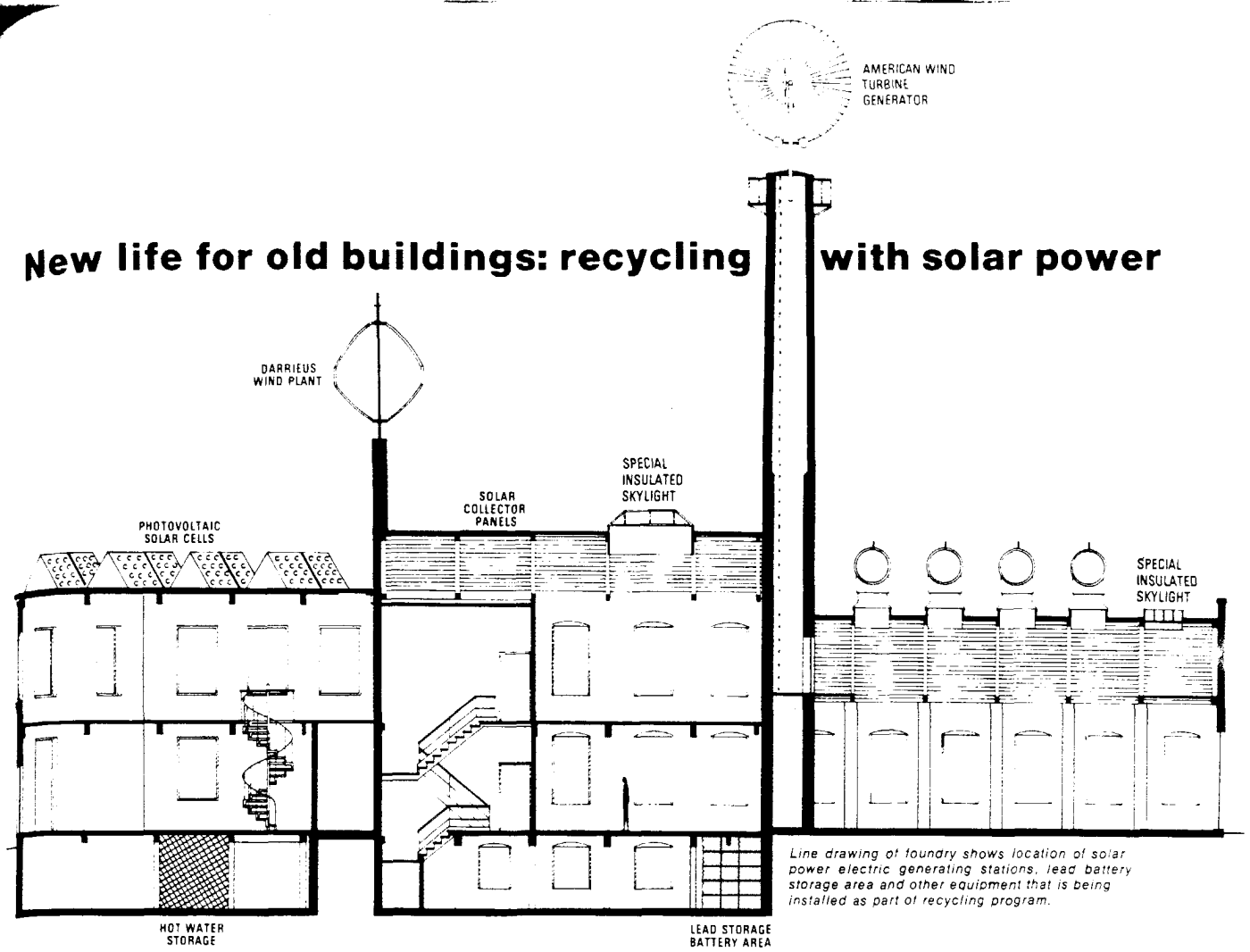
Lead burner pauses to examine one of 12 vertical joints used to form sides of reflecting pool. Vertical and horizontal joints required about one ton of lead.

Lead burner at work on one of the three 100-foot long horizontal joints used to form waterproof lead membrane over hospital reflecting pool.



Overall view of lead lining being installed in reflecting pool in courtyard of Nassau County Community Hospital. Only 3/32-in. thick, lead provides corrosion-resistant waterproof membrane.

New life for old buildings: recycling with solar power



Line drawing of foundry shows location of solar power electric generating stations, lead battery storage area and other equipment that is being installed as part of recycling program.

Increasing energy costs are a major factor in the design of new buildings, or the renovation and modernization of existing structures. Without economical energy to provide electricity and heating, buildings become uneconomical to own and operate unless the added expense for energy is absorbed in higher prices for manufactured products, and increased rentals for office space and housing.

One solution for supplementary electric energy needs is solar power from on-site sources. Incorporated into the total design or redesign of buildings, it is being stored in lead batteries from two solar sources—sun and wind. Such energy sources, when combined with these batteries, can provide much of the electrical energy required for tomorrow's buildings. A look at developments underway today shows how this might be accomplished.

An excellent example of how such solar power sources can be combined is a project now underway at the Research and Development Institute (REDE) in Providence, R.I. REDE is the prime mover in establishing the Rhode Island Energy Conservation Station (RIECS), which is to be housed in a recycled brass factory building originally built in the 1840's. REDE is assembling a wind and sun solar energy package that will provide for most of the building's heating, hot water and electrical needs. In addition, a miniature hydro-electric power plant to be installed in a small river that runs alongside the building will provide some electrical energy for the renovated structure.

REDE's basic concept is to generate electricity from the wind and sun sources and store it in a large bank of lead acid batteries. The batteries are a key element to the REDE concept. REDE will utilize solar cell semi-conductor devices which convert light directly into electricity. The best known of these devices is the silicon solar cell. Solar cells themselves have no storage capability. They generate only while exposed to light. Since the power is usually required continuously, lead storage batteries will be used to store power that can be used during the time the solar array is in darkness. During the daylight, the array charges the batteries and handles the electrical load requirements. A multiple battery storage facility will be installed in the basement level of the RIECS building to store electrical energy. The lead batteries will be installed in such a manner that they can be vented through a basement level window on the river side of the building. Present plans call for installing approximately 50 batteries to collect energy from all three electric generation sources scheduled for installation. Additional batteries can be installed as needed. It is significant to note that the combined solar cells and wind generators will help to insure that the batteries are constantly being charged.

Two wind generating devices will also be installed in the RIECS building. One is a Darrieus wind plant that looks much like a giant egg beater, while the other is an improved version of the Western-type windmill that is commonly found on farms

Antique belt buckles created by improved metalcasting process

When miners needed a serviceable material for pants to wear prospecting during the gold rush of 1849 in California, an enterprising man named Levi Strauss took a material called dungaree and created what has become a world-famous fashion. That fashion look has generated a new industry to supply the material that looks most like the original Levi fabric. Called denim, it has spawned yet another industry, the "western look" and with it the need for large, ornate buckles of the type that were popular in the mid-1800's.

For example, Lewis Buckle Co. has established a successful business that specializes in reproduction of belt buckles that look as though they could have been worn by gold miners in 1849. In addition, the company has designed buckles based on well-known commercial labels, firearms, trademarks, cars and comic-strip characters. A key to the success of the company's operations is the high lead content casting alloy used to produce the buckles. Lead gives the ability to create the intricate designs in the belt buckles and permits the metal to be antique finished or polished, whichever the design calls for.

The Palatine, Ill., company currently produces 35,000 buckles per week. It supplies a nationwide chain of denim and jeans stores in addition to specialty stores like Marshall Fields in Chicago. In addition, the company has about 100 corporate accounts whose logos are reproduced on buckles for various promotions, premiums, design incentive awards and give-aways.

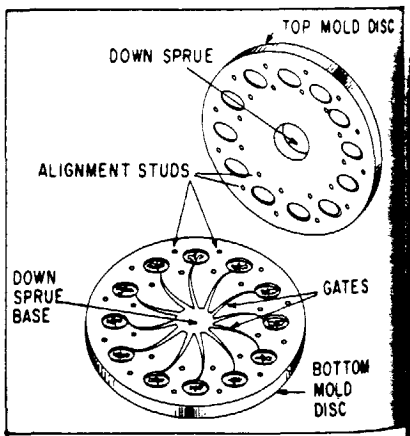
Company president John M. Lewis reports his company is currently producing a large number of buckles containing up to 90 per cent of lead. According to Lewis, "One of the major factors in selling to companies is the 'feel' and weight of the buckles that is achieved through the use of a high lead content. Lead provides the hefty, man-sized feel and appearance of the buckle."

The Lewis Buckle line includes over 200 standard pieces that depict such diverse personalities as Sitting Bull, Popeye, and Santa Claus. Other subjects for buckles include Women's Lib, the Model T Ford, Coca Cola, Schlitz and Rolls Royce.

Buckles are produced by a process called spincasting. It provides for fast, economical casting of most castable metals and plastics. Developed by Romanoff International, New York City, the spincasting process involves the use of precision casting equipment, silicone rubber molds and centrifugal force. Unlike other casting methods which may involve expensive dies and machinery, spincasting utilizes equipment suitable for prototype work or limited production runs.

After the model patterns for the buckles are produced, they are placed in the lower half of a two-part, 12-in. diameter silicone rubber mold which has the consistency of modeling clay. The upper silicone disc is then placed on top creating a sandwich effect. The mold is then vulcanized at 350° for about one and a half hours, after which the model buckles are removed. Gates and runners are then cut into the pattern connecting the die cavity to a central downsprue and vents and runners are then cut in, connecting die cavities to the perimeter. At this point the actual casting begins.

Two halves of vulcanized mold are reassembled and placed in the spincasting machine. Molten lead alloy preheated to 600°F. is hand ladled through the central downsprue and into the spinning mold. Centrifugal force shoots the pewter-like metal through the curved runners and into the mold cavity, where it quickly solidifies. The cast buckles are removed, allowed to cool and then are sent to the next stage where they are polished, buffed and made ready for shipment.



Two-part silicone rubber mold is used in spincasting process to produce ornate lead alloy belt buckles.

LIA26754

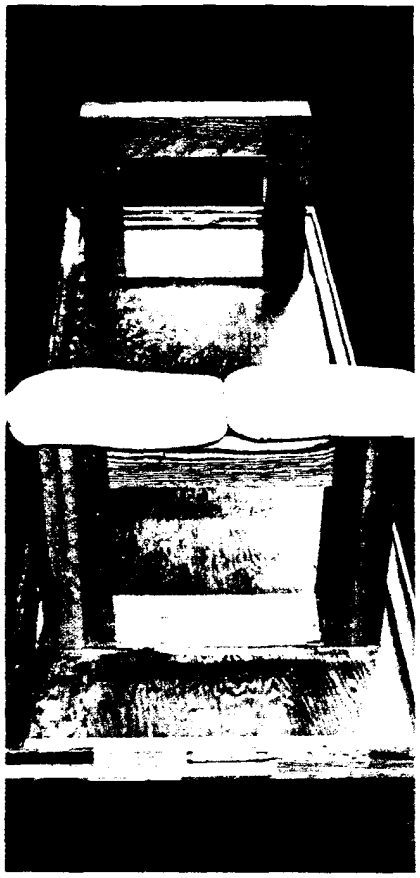
Lead carries weight in furniture joining

An increasing number of people today are engaged in furniture making projects. This interest stems from a desire for the crafted look in the home, plus the high cost of purchasing such quality furnishings.

Whether constructed from ready-made kits or one's own design, a troublesome part of assembling such furniture is joining certain parts with an adhesive. This step requires a reliable means of exerting pressure on the parts until the bonding process has been completed. The pressure can be applied with a variety of clamps, but sometimes the furniture design calls for adhesive-bonded components that are too big to accommodate clamping. Possible damage to the surface of the parts involved is another consideration.

A resourceful upstate New Yorker faced this problem when constructing a coffee table of his own design. He resorted to a product used for another hobby, skeet shooting, to apply the pressure normally supplied by furniture clamps. Simply stated, he "took the lead out" of skeet shooting to hold the table components in position until the bonding agent cured.

The table was designed with an oak inlay top, over a plywood base, with two sets of 4-in. thick oak legs. The 3-ft. x 2-ft. top was covered with 400 oak tiles, approximately $\frac{3}{4}$-in. x 3-in., all carefully organized and glued in an intricate pattern. As a result, there was no suitable clamping surface to hold the legs against the underside of the table during the gluing process. The use of wood or metal type clamps would mar the highly polished surface of the tiles and oak legs.



Underside of coffee table with oak legs secured by lead shot. These "clamps" were also used to hold trim around the edge of the table while it was being glued in position.

It was at this point that the furniture maker decided to try lead shot, a product of his skeet shooting hobby. These pellets, packaged in cloth bags of 25-lbs. each, are used to reload shotshells. Here was an excellent source of concentrated weight in a soft flexible form that would not damage the wood surfaces. With two 25-lb. bags of lead shot positioned on each of the table legs, the gluing job was accomplished without mishap.

The lead shot has since been used for filling 12-gauge shells for the skeet shooting and hunting season. However, additional bags are always on hand to provide lead shot "clamping" for future gluing jobs.

Handmade furniture designers who are not hunting enthusiasts will find bags of lead shot readily available at most sporting goods stores. A one-time investment in lead shot can solve many "sticky" gluing problems similar to those encountered by the New York hunter furniture builder.

lead

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Description of techniques used to lower machinery noise levels with lead and lead composites. Lists machines that normally exceed noise level allowed by Walsh-Healey Public Contracts Act. Two pages. **J-9**

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