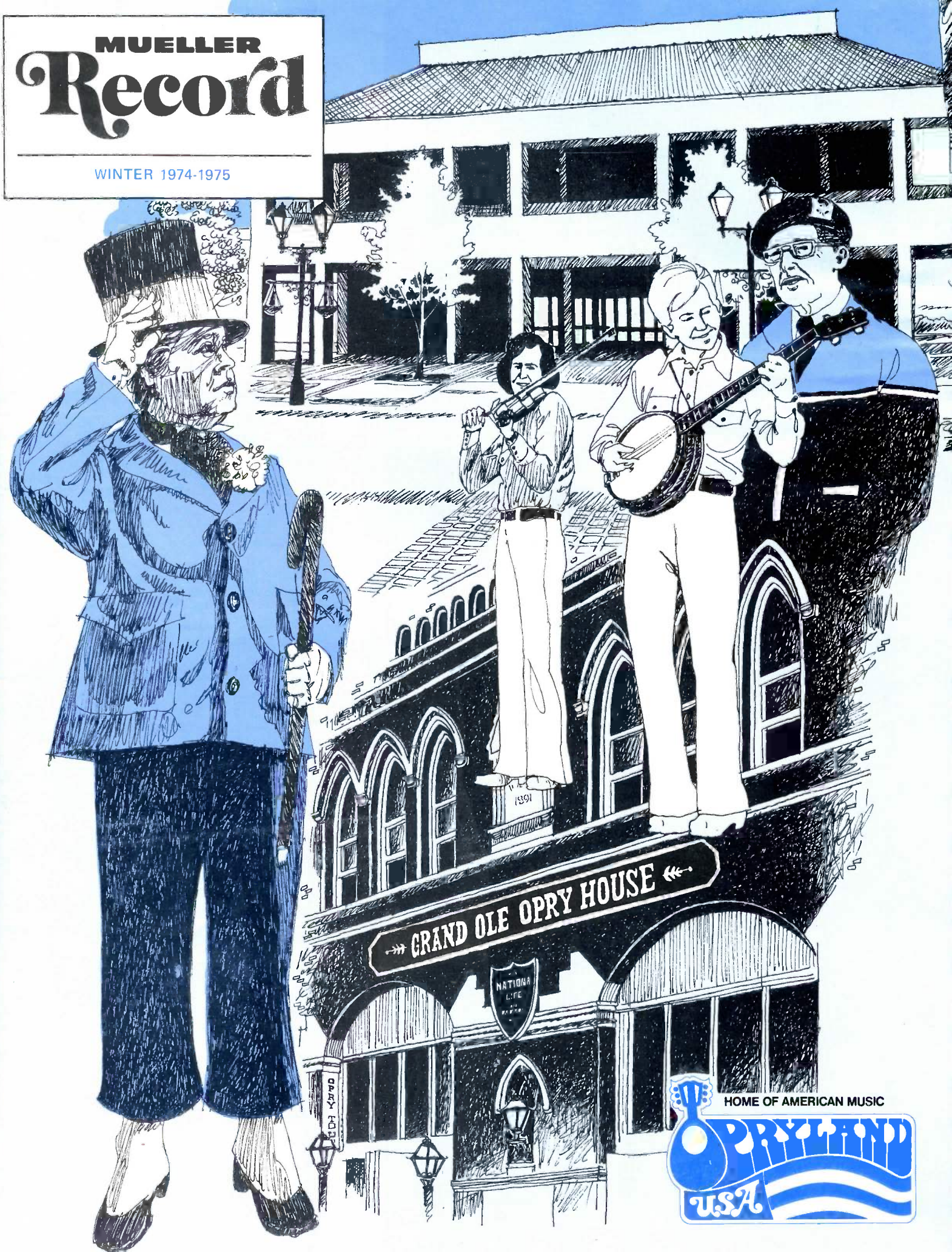
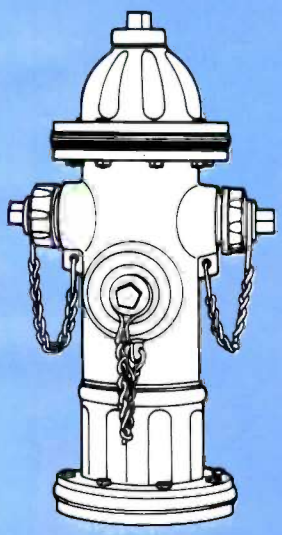
MUELLER Record

WINTER 1974-1975



One of the 5,000 Mueller fire hydrants in Nashville's water system.
See Story on page 8.



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About the Cover:

A montage of scenes from the new and old Grand Old Opry in Nashville, Tenn. See story starting on Page 3.

The New Grand Ole Opry

HOME OF AMERICAN MUSIC
OPRYLAND U.S.A.
NASHVILLE, TENNESSEE

Story material submitted by Charles Freeman, Mueller Sales Representative in Tennessee

Roy Acuff, the country music legend, sits in front of the new Grand Old Opry House, which blends Early American styling into the natural setting of Opryland, U.S.A., of which the Opry House is the featured attraction.

Mrs. Henry Cannon, better known to country music fans as Minnie Pearl, uses one of the new Stars dressing rooms in the new Opry House.

A long line of country music fans stands in front of the old Ryman Auditorium to purchase tickets for the final Grand Ole Opry performance in the old structure prior to moving to the new Opry House in early 1974. The Ryman was 51 years old when the Grand Old Opry moved out to the new modern facility in Opryland, U.S.A.

Minnie Pearl, veteran trouper and star of country slapstick, dissolved in tears when the audience gave her a standing ovation in mid-song. Bill Anderson became so nervous he forgot his lyrics. Jean Shepard confessed her "very mixed emotions" to the audience, fought tears through two numbers, then broke up completely and dashed offstage weeping, "I can't pretend it doesn't hurt to leave."

It was March 15, 1974, the last show at the Ryman Auditorium, home of the Grand Ole Opry for 31 years, and in spite of determined efforts, the cast couldn't conceal the emotional wrench of knowing the Grand Ole Opry would never again be performed on that stage.

Standing near the new Opry House are (left to right) Les Adams, Principal Civil Engineer, and W.A. Earheart, Water Maintenance Superintendent of the Nashville-Davidson County Metro Water Department and Paul Burke, Director of Construction of Maintenance for Opryland, U.S.A., discussing operation and maintenance of the Mueller Improved Fire Hydrants installed in the amusement park.

What kind of mystique prompted such fierce loyalty to an unprepossessing building?

When it became the home of the Opry, the Ryman was already 51 years old and had severe handicaps. The Ryman Auditorium was completed in 1892 and a balcony was added in 1897 (the same time construction was begun on Eighth Avenue Reservoir—see following story). Radio Station WSM changed the name to Grand Ole Opry House when it bought the building in 1963, but that didn't change the facts. The Ryman was cold in the winter and sweltered in the summer. Dressing rooms and storage facilities were woefully inadequate. The stage was shallow, and roof trusses reached their load limit with the advent of television equipment. Beyond the 12th row of orchestra seats, sight lines became progressively worse. The view from many seats was blocked by columns supporting the balcony, and those in the back rows could see only ten vertical feet of the stage because of the balcony overhang. Even the neighborhood was sadly deteriorated.

There were no discernible advantages, and the disadvantages were numerous. So why wasn't everyone happy to leave?

It all began with George D. Hay, Opry founder, who announced himself as the "solemn old judge" in 1925 (although he was only 30 years old) and launched the WSM Barn Dance in Nashville, Tennessee on November 28 of that year. Two years later he gave it the name "Grand Ole Opry."

In its early years the Opry was a stepchild, broadcasting from whatever makeshift theatre could be arranged. It was roundly disparaged, snubbed and scorned by critics. Still, people liked it--everyday people. It stayed on the air.

Despite its detractors, the Grand Ole Opry flourished, and its popularity grew through the years. Interest in seeing a live performance increased until it became necessary to present two Saturday evening shows to accommodate the crowds. A thirty minute interval was allowed between shows to empty the house and refill it for the second performance. But the institution of a second show provoked additional problems.

There was no way to provide a waiting area under shelter for those queued up for admission, and the lines on the sidewalk outside the building stretched a block or more in length. During summer months, fainting and heat exhaustion were so common that the company was forced to keep a nurse on duty to give emergency treatment.

The Opry's continued growth and the steadily worsening

conditions of the old building had to be acknowledged. A study showed that costs of renovating and updating the Ryman would be astronomical. Finally, WSM commissioned the design of a new Opry House.

Requirements were specific. The new structure must have greater seating capacity. It must incorporate the most advanced standards of utility, safety and comfort and the ultimate in professional support—acoustics, electronics, staging, rehearsal rooms, lighting, dressing rooms and storage facilities. And it had to preserve the intimacy that binds the Opry's performing artists with the audience.

The intimacy factor was complicated by the requirement that the new Opry House seat more than 4,400 people, making it one of the largest auditoriums in the nation, and the largest radio and television broadcasting studio in the world. It had to be aesthetically pleasing, and it had to house the latest in audio-visual equipment in the most flexible and efficient manner possible. And something had to be done about those Saturday night crowds waiting for the second show.

Those were the requirements. They were not only met, but exceeded.

What emerged from months of research and planning was a 369 acre park, Opryland USA, with the new Opry House located on its own 12 acre site inside the park in 1974.

The Opry House is a large building with a warm, rustic appearance. The roof slopes downward in three directions, forming covered entrances at the front and two sides. Each entrance has two levels, allowing Opry goers to enter the balcony level by stairways directly from the outside, thereby avoiding congestion during the Saturday night half hour when 4,400 people are exiting and 4,400 more are entering.

Inside the 45,000 square foot, air-conditioned auditorium, seating is provided for 2,400 people in the balcony and 2,000 on the orchestra level. Seating in the old Ryman, left over from its days as a gospel tabernacle, was on hard, wooden pews, allowing whole families to sit together. Designers felt that seating in the new Opry House could be an important link between the old and the new, so specially designed wooden pew-type benches which seat up to 14 people comfortably were installed. Unlike the hard old benches, the new ones are covered in persimmon colored carpeting, with individual seats indicated by metal strips recessed into the covering.

The carpeting serves a dual purpose. In addition to softening the seats, it lends itself to the acoustics. Human bodies and hard surfaces have different sound reflective characteristics. With all seating covered in soft material, a partially filled house has the same acoustical characteristics as a full one.

All seats have perfect sight lines, and the audience is even closer to the Opry stars than in the old building because of the low thrust stage. There is more room at the front of the stage for enthusiasts who traditionally come to the front to snap pictures of their favorites.

The stage, measuring 110 feet wide and 68 feet deep, is big enough to accommodate four sets of square dancers. In center stage a six foot disc of oak flooring from the Old Ryman stage is set into the new.

An electronic system permits automated pre-set lighting, eliminating the necessity for manual setting and resetting of lighting. The system has 160 channels for memory-controlled lighting cues, and it can control a total of 2,000,000 watts of power for full color lighting.

Backstage facilities include 12 dressing rooms, a makeup room, a large band rehearsal room, and more than 12,000

(continued on next page)

Packed houses are routine during the regular country music shows in the ultra modern new Grand Old Opry House, which adds a new dimension to the performances with more comfort, better viewing and better acoustics than the old Ryman House.

square feet of storage space.

Everyone, cast and crew, management and public, is genuinely pleased with the Opry's luxurious new home in the suburbs on the outskirts of Nashville. But the Grand Ole Opry is more than a stage show, broadcast to an audience of millions.

In its early years the Opry gave exposure and respectability to the often ridiculed country music. Later, it was a catalyst for Nashville's emergence as the record industry center called Music City, USA, Home of American Music. It was also the springboard for such country greats as Johnny Cash, Patsy Cline, Roy Clark, Tammy Wynette, Chet Atkins, Loretta Lynn, Buck Owens and many, many others.

In its 31 years at the Ryman, the Opry took on the stature of a shrine. Many hard-working people saved for months and traveled hundreds of miles to see their favorite stars and to savor the memories and rags-to-riches dreams that lent a special aura to the generally predictable beat of country song. And the Ryman was a significant part of that aura.

Opry management waged an intense public relations campaign to overcome the sentimental attachment to the old Ryman, even refusing to make a special occasion of the last show. It was just a regular opry night at the Ryman. The stars cooperated by playing down their affection for the crumbling old building, but revealing flashes of emotion broke through in spite of their best intentions.

Most of the big names in country music appear at the Grand Ole Opry during a season. But the 1974 Country Music Awards Show brought all of the top performers together at one time--Cal Smith, Charlie Rich, Danny Davis, Pee Wee King, Owen Bradley, Loretta Lynn, Mel Tillis, Conway Twitty, Ronny Milsap, The Statler Brothers and many others.

The memories will endure, though. The Ryman, a landmark of Americana, will be torn down and rebuilt as a chapel at Opryland USA.

Included in the months of preparation for the March 16th opening night at the new Grand Ole Opry House were elaborate plans to accommodate the President and First Lady of the United States and their entourage. Only 900 everyday Opry fans could be seated. All others were invited guests, local and national dignitaries, friends of show members, politicians, and an army of press corps, including all three TV networks and 40 foreign press representatives and their wives from Austria, Germany, Japan, Russia, Brazil, Great Britian, Norway and Switzerland.

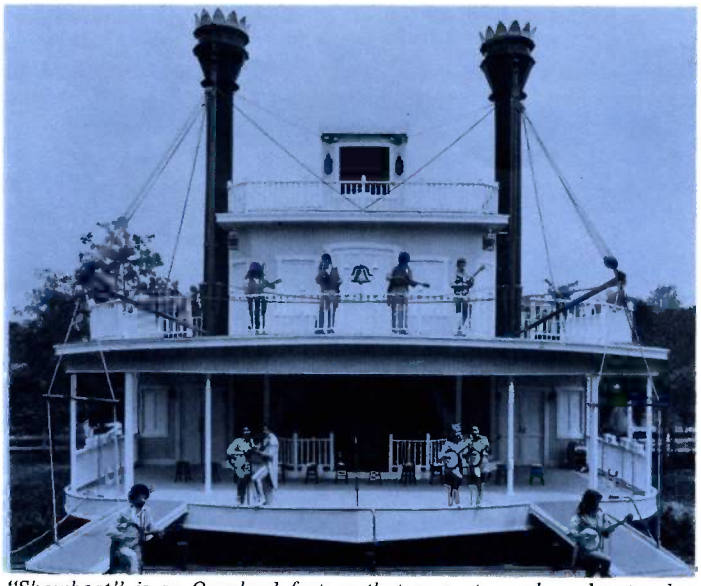
Former President Richard Nixon and his wife were among over 5,000 people at the dedication of the new Grand Ole Opry House in March, 1974. The President played several informal numbers on the piano during the ceremony. On the far right is Roy Clark, country music star.

Roy Acuff, the country music legend, his voice cracking with emotion, introduced "the very first President ever to visit the Grand Ole Opry." President and Mrs. Nixon walked onstage to the strains of a country version of "Hail to the Chief," played by the Grand Ole Opry band.

Acuff invited the President and First Lady to assist in unveiling the dedication plaque. After the brief unveiling, Nixon dedicated the new Grand Ole Opry by playing "God Bless America" on the piano as Opry fans sang along.

The show was different too. Of the 62 member cast, 54 participated in the show, although, because of the dedication ceremonies, they were confined to just one number each to keep the show within three hours.

Following its auspicious beginning, the Opry House will be used for many other purposes. Except for Fridays and Saturdays, which are reserved for the Grand Ole Opry itself, the auditorium can be used for musical and dramatic presentations, conventions and meetings of all kinds. The first of these was the March 28th



"Showboat" is an Opryland feature that presents modern day troubadours such as Mac Davis, Kris Kristofferson, Neil Diamond and others backed by a regular cast that adds the old-fashioned Showboat style to the performance.

Opryland presents "Folk Show" which features real, authentic Blue Grass Music offering plenty of banjo pickin', and fiddle playing plus a lot of foot stompin' music.

Lawrence Welk benefit for the Children's Hospital.

Opryland Park surrounds the Opry House. It is situated in wooded countryside along the Cumberland River, nine miles east of downtown Nashville. Unlike many other major theme parks, Opryland presents the authenticity and uniqueness of America, rather than its fantasy.

The park complex is divided into five major musical areas and a couple of general entertainment sections. Emphasis is on live entertainment and music. Scores of young musicians and singers, occasionally assisted by an Opry star, appear in shows or perform on the grounds.

Each musical area presents a show styled to its theme. These run the gamut from folk music to jazz and from Dixieland to contemporary.

Hill country birds sing along with the folk music show, held in a 425 seat woodland amphitheatre. Not far away is the New Orleans section where a jazz funeral procession plays bittersweet mourning music which soon turns into hand-clapping Dixieland at the Bandstand.

The story of America's expansion to the west is found in a "town" with a raucous free-wheeling atmosphere reminiscent of El Paso in the last century. But instead of desperadoes gunning each other down, there are singouts as marching bands and larger-than-life musical cartoon characters roam around entertaining with impromptu shows.

Such composers as Kris Kristofferson, Burt Bacharach and Neil Diamond are featured at the Showboat Theatre where their modern music is given a new twist by traditional Showboat showmanship. A 1,000 seat amphitheatre houses an exciting musical revue, "I Hear America Singing," a 50-minute Broadway style show of song and dance.

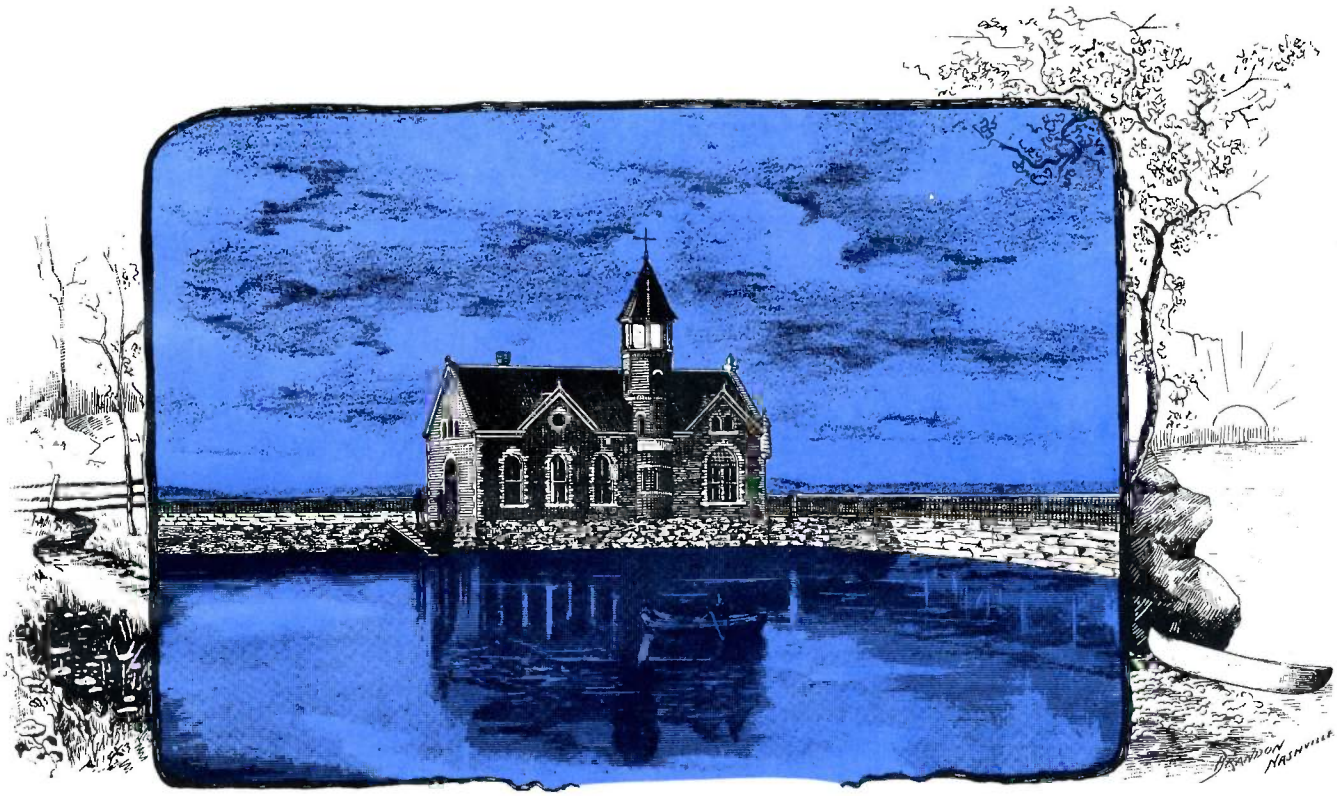
The Sounds of Today section reverberates to the melodies of Old Aunt Mary, an antique organ that plays like a 70-piece band. It is programmed to play more than 100 arrangements, from the "William Tell Overture" to "Aquarius."

In addition to individual shows, each musical area has a restaurant serving food appropriate to the locale and rides adapted to the theme. Of particular interest is the Carousel-on-the-Lake in the New Orleans section. It is reputed to be the oldest operating ride in the world, having been built in the 1880's in the Black Forest of Germany.

Opryland park contains a cross-section of other entertainment for all ages, including a puppet show, a skyride, petting zoos for children, a Tin Lizzie car ride, and a musical revue performed by barnyard animals. There are quiet entertainments in habitat areas where families can safely stroll along shaded paths among buffalo, elk, deer, cougar, bear and timber wolves in their natural environment. There are exciting rides like the Flume Zoom where passengers make a bouncing, splashing dash through water in logs propelled over a wild animal ravine and down a 90-foot heart-stopping plunge into a lake.

But there is always the music. Remembering that it all started with the Grand Ole Opry, the entire family can join in strutting, strumming and stomping for joy at Opryland, USA. □

The Great American Variety Troupe is still another Opryland feature that offers an abundance of humor and hilarity. Presented in La Cantina, Col. Harold R. Chirp (left), a W.C. Fields-type character, hosts the comedy based vaudeville show.



This is a reproduction of an engraving from the Annual Report of the City of Nashville for fiscal year ending October 1, 1890.

Nashville Water Supply System

Story material submitted by Charles Freeman, Mueller Sales Representative in Tennessee

Growth of the music industry in Nashville has encouraged the growth of everything else, including necessary enlargement of the water system. With the evolution in music, moving from hillbilly to Music of America, an evolution has come in the water distribution and storage system. But water distribution in Nashville began long before musical concerts of any kind. Nashville has one of the oldest reservoirs in the South. It dates back to reconstruction days, and is still being used today.

The site for the present City of Nashville was chosen originally because of its plentiful water supply. For Nashborough, which was erected at the foot of the present Church Street, enclosed one of the finest springs in the area. When hostile Indians disrupted the peaceful life of the settlement and it was unsafe to go outside the fort, there was still plenty of water.

From the beginning of the settlement, in April 1780 to 1804 all of the potable water was carried by hand from the springs in pails or by wagon in 25 gallon barrels. In hot weather the barrels were wrapped in heavy wet sacking to keep the water cool. Two barrels of water, 50 gallons, sold for 25¢.

Every cabin had a wooden peg by the front door from which hung a bucket with the owner's name painted on it. When a fire alarm was called, every able-bodied man grabbed the bucket from his front door and ran to join the fire brigade, a long line of men, starting at the river and ending at the fire, passing buckets of water from hand to hand. After the fire each man collected his own bucket and returned it to the wooden peg by his cabin door, ready for the next emergency. This is a far cry from the present fire protection system with its nearly 10,000 fire hydrants, over 5,000 of which are made by Mueller and which have been installed during the last ten years.

By 1804 the need for larger quantities of water prompted the digging of two cisterns on the Public Square. These were filled with rainwater from the Market House roof and held a total of 20,000 gallons of water. The cisterns ended the hand brigades as a fire department. Volunteer companies performed all municipal fire services for some years. Rivalry between the volunteer companies was enthusiastic and entered into the social life of the community.

Nashville's first attempt to establish a public water supply was not successful. In 1823 a contract was given to Samuel Stacker to build a pumping plant at his saw and grist mill at the Fort Nashborough spring. Water mains of bored locust were laid to the reservoir which the city had erected at the rear of the Masonic Lodge. The supply line extended from this storage point to the Public Square. (Sections of wooden water pipe installed in the 1820's were unearthed by recent excavations by construction contractors engaged in installing new utilities in the Downtown Urban Renewal area.)

Stacker worked for more than two years and succeeded in throwing water into the reservoir, but only on an experimental basis. The city finally rescinded his contract and purchased the unfinished works for $2500. The firm of Avery and Ward took up where Stacker had left off and finished the project on August 19, 1826. When the plant was placed in operation, the event was hailed as a great triumph. But its success was limited to filling the cisterns for firefighting. The pumping plant burned down after little more than three years of service.

The Second Water System

Albert Stein, a German engineer who had proved his skill in Eastern cities, was commissioned to build a new waterworks system. A $50,000 bond issue, the first ever issued by the City of Nashville, was authorized to finance the construction. Bonds were sold in Philadelphia and delivered in person by members of the committee.

Stein erected his waterworks system on the ground of the present General Hospital. Cast iron mains were installed to the city. When the system was completed on October 31, 1833, a grand celebration was held with speeches, parades and booming cannon.

The plant functioned satisfactorily for many years, into the 1880's. The chief problem was muddy water from the river, which could only be settled out in the reservoir. To overcome this difficulty, Superintendent James Wyatt devised a system of using naturally filtered water. Some time in 1878 he installed a cast iron cage, 152 feet long, 6 feet high and 10 feet wide, in the natural gravel beds of Upper Island. River water seeped through beds of sand and gravel into the collecting cage and was clarified in the process. Approximately 12,000 feet of 36 inch pipe was laid along the river bank to the pumping station. This system, with a new pumping plant which was constructed later in the decade, worked very well and served the city for 20 years, until about 1900.

The George Reyer Pumping Station was completed in 1889. At the same time, a new 50 million gallon capacity reservoir was built on Kirkpatrick's Hill at a cost of $364,525.21. It was constructed on the site of Fort Casino, which was one of the strong points in the defense line of Federal forces occupying the city during the Civil War. Four miles of 36 inch cast iron mains were laid, extending from the station to the reservoir and from the reservoir to Eighth and Broad, the center of town.

The reservoir has been in continuous use since its erection. Constructed of cut limestone masonry, quarried in the vicinity, it is elliptical in shape with inside major axis 603 feet and inside minor axis 463.4 feet. The main wall is 9 feet thick at the top and 22.9 feet thick at the base; the outside wall is 33.75 feet high and maximum water depth is 31 feet. The structure is divided into two compartments, each having a capacity of 25.5 million gallons.

The elevation of the overflow is 676.46 feet and the base 645.46 feet. Height of base above low water level of the Cumberland River is 277 feet.

A rupture in the wall of the east basin occurred at 12:10 a.m. on November 5, 1912. Considerable damage resulted from the sudden flooding of houses in the vicinity, but no lives were lost. The reservoir wall failed because of seepage which had softened the footing. Cost of repairing the damaged wall was approximately $100,000.

In 1920 J.N. Chester of Pittsburgh was employed as a consulting engineer to prepare plans and specifications to waterproof the interior of the reservoir. The treatment consisted of placing a layer of membrane water-proofing over the entire floor of each basin, and over this a concrete floor. A layer of gunite was shot on the walls, followed by a layer of membrane. A second coat of gunite was shot over this membrane with wire fabric being used to reinforce the walls. This

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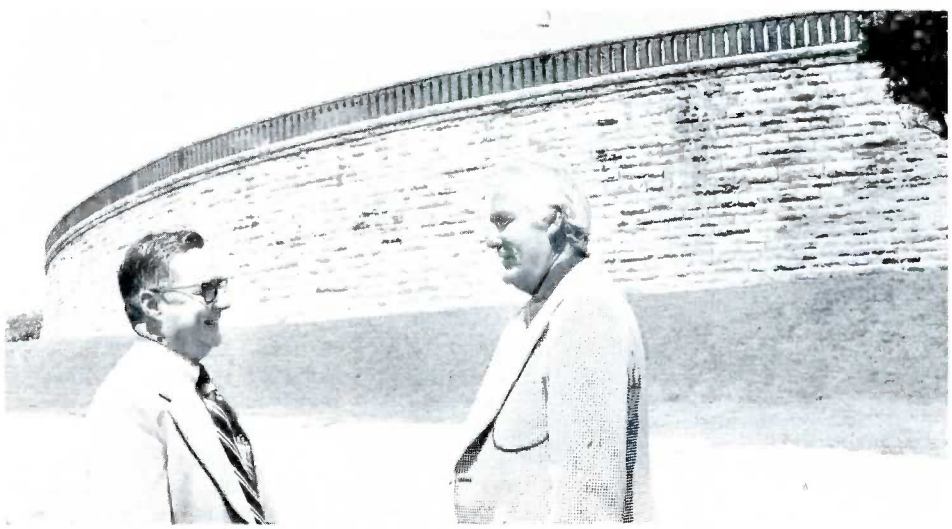


Bill Brock (left), Assistant Director of the Metro Water and Sewer Department, shows Mueller Sales Representative, Charles Freeman, the area where the wall of the Eighth Street Reservoir broke in 1912. The estimated damage from the resultant flood was nearly $100,000. The reservoir, which has been in continuous use since 1889, was repaired and is still a vital part of the Metro Water System.

Nashville Mayor Beverly Briley (right) and Ray Harrington, director of the Metro Water and Sewer Department, look pleased after returning from New York with a multi-million dollar bond issue which is being used to modernize and expand the Nashville water system.

treatment was completed in 1921 and has proven its effectiveness through the years. Only a negligible amount of seepage has been observed since that date. But, as a further precaution, levels are run along the walls each year to check for possible settlement.

When the reservoir was first constructed, the city had no filtration plant, and as water consumption increased year by year, the old filtering beds of Upper Island became less efficient due to clogging of the collector pipes with mud and silt. At the turn of the century, it became necessary to pump raw, muddy river water directly into the reservoir, using the west compartment as a settling basin and the east basin for storage.

Because of the mud and silt which settled out in the west basin, periodic cleaning was necessary. Usually, the basin was cleaned when the mud accumulated to a depth of eight feet at the entrance pipe and feathered out to nothing at the opposite end of the compartment.

At this time the pumping station equipment consisted of three 10-million gallon pumps, six 110-horse power and two 400-horse power steam boilers, requiring 57 tons of coal per day to operate. The system had 110 miles of water mains and the reservoir. The sole supply main was one 36-inch main from the pumping station to the reservoir and from there to Eighth and Broad. With only one force main extending from the station, pumping capacity was limited to 20 million gallons per day.

Beginning in 1908, alum was used as an agent to settle out the mud, and sterilization of the water was begun, using hypochlorite of lime. Even at this early date, contamination was found in the river, attributed in part to pollution from Mill Creek. The prevalence of typhoid fever was also attributed to a contaminated water supply. Liquid chlorine replaced the hypochlorite of lime in 1920.

The First Water Filtration Plant

Progress in improving the water system came slowly in the early years. In 1921 a grit chamber was installed near the pumping station. In 1929 the first filtration plant was placed into service with a capacity of 28 million gallons per day. For the first time since the reservoir had been built 40 years before, it could be used for the storage of clean sterilized water.

An addition was made to the filtration plant in 1932, raising its capacity to 42 million gallons per day. In 1953, the third expansion was made, including an additional aerator, grit chamber, mixing basins and two additional clarifiers.

The final improvement program was completed in 1963, raising the total capacity of the plant to a nominal capacity of 90 million gallons per day. However, this 90 million gallon capacity can be maintained for only a short period of time since it is necessary to shut down a filter basin for backwashing when it becomes clogged with silt and mud.

The program of 1963 also included conversion of two existing sedimentation basins to vertical rise clarification units, the addition of 10 filter units, a caustic storage and feed system, liquid alum storage and feed system, an activated carbon slurry feed system, a new 200,000 gallon washwater tank, liquid chlorine handling facilities and many other improvements in structure, piping and equipment.

Basically, the plant of today consists of two aerators, two grit chambers, eleven pairs of mixing basins, three vertical flow clarifiers, 30 filtering units, two washwater storage tanks, and chemical storage and feeding equipment.

Similar improvements to the adjacent pumping station have been made through the years. In 1953 the station was modernized by removing the coal-fired steam boilers and steam

turbines and converting the entire station to electric-powered equipment. In 1963 the older and obsolete units were replaced with new equipment.

Today the station is equipped with seven high-lift pumping units, electrically-powered, which give a total pumping capacity of 146 million gallons per day, and seven low-lift units with a total capacity of 160 million gallons per day. The installation of other large distribution and transmission mains have added immeasurably to the system.

In September of 1973 construction of the Stone's River Water Treatment Facility was begun. This facility will be a 60 million gallon per day capacity plant to supplement the existing 90 million gallon per day water treatment plant. Funds were made available to push forward with this construction through the special efforts of Mayor Beverly Briley and the Metropolitan Council.

The plant will incorporate the use of twelve mixed media filters with turbidity control. Clear wells are located underground from which the high service pumps take their suction directly and pump by way of single 60 inch concrete pressure transmission main approximately five miles to tie into the existing distribution system.

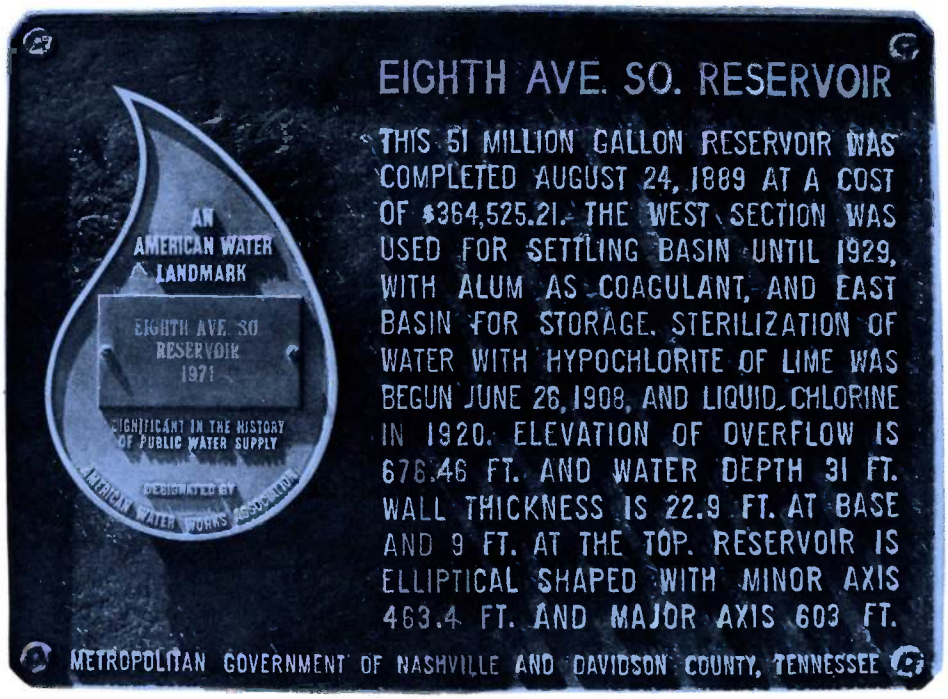
Design is underway for a sludge-handling facility for drying alum sludge and other plant wastes to prevent any pollution returning to the river.

When the reservoir was constructed in 1889, air pollution was practically unheard of. Even today, Nashville is less contaminated than many industrial cities. However, the Federal Environmental Protection Agency and the State Health Department require covering of water storage facilities to prevent fall-out from rain, snow and air. To meet this requirement, the city ordered installation of a floating cover of nylon reinforced Hypalon membrane. The east basin installation was completed in May of 1974, and the west basin installation began in the fall of 1974.

The reservoir is located on one of Nashville's main arterial streets, U.S. Highway 31 South. It is in prominent view from many other points in the city, including Interstate 65 which passes one block east of the site. Today, modest residences and small commercial establishments surround the reservoir. A Federal Renewal Program is underway in the neighborhood and has already made a substantial improvement on the overall appearance of the area.

In its 140 years of continuous service in the City of Nashville, the Waterworks Department has set the pace for the growth and development of the entire community. And in its entire history of service since 1833, it has never been necessary to ration the use of water. Raw supplies from the Cumberland River have always been adequate, and pumping and distribution facilities have been expanded as needed to supply the requirements of the city.

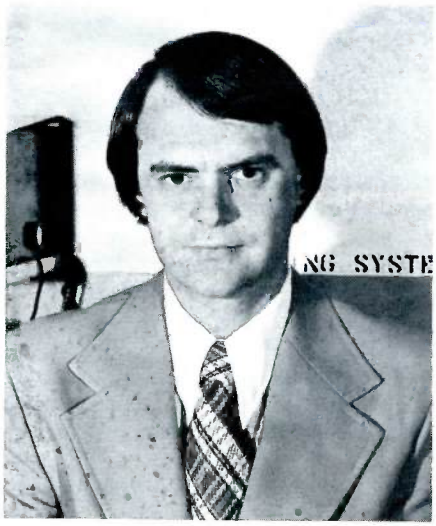
The Eighth Avenue South Reservoir is not the least of the Waterworks Department's achievements. It has a long and honorable history and has received national recognition, becoming the thirteenth public water supply facility to be thus honored. In August of 1971, the Eighth Avenue South Reservoir became an American Water Landmark. The bronze plaque which was awarded to the Department reads: "An American Water Landmark - Eighth Avenue South Reservoir - 1971 - Significant in the History of Public Water Supply - Designated by American Water Works Association." □



This is the bronze plaque placed on Nashville's Eighth Avenue South Reservoir in August, 1971 to signify that this structure had been designated as an A.W.W.A. American Water Landmark. At the time, this was the 13th public water supply facility to be thus honored.

Engineering Report

Mueller (Adams®) Single Section and Xtra Range® Full Seal® Repair Clamps



Joe Daghe, Group Leader - Senior Project Engineer and Author of this report.

MUELLER (Adams) SINGLE SECTION FULL SEAL REPAIR CLAMP

MUELLER (Adams) XTRA RANGE FULL SEAL REPAIR CLAMP

When you choose a Mueller repair clamp for a pipe repair, you are choosing a pressure rated repair clamp. And bringing this pressure rating to your pipe repair clamp is only one of the performance benefits you introduce when you use a Mueller Clamp. We felt the story behind the development of pressure rated clamps might be of interest.

A year ago Mueller introduced the first pressure rated pipe repair clamps. The innovation was part of Mueller's effort to up-date and enrich the Adams Company line of band repair clamps which Mueller acquired ten years before. Through the research and development efforts of the Mueller Engineering Division, the latest series of repair clamps Mueller now provides for you are not only uniquely pressure rated, but they have an expanded range of sizes, and they offer improvements in sealing, corrosion protection, adaptability and ease of installation.

With a Mueller repair clamp you know just what to expect once the clamp is installed, because it is pressure rated. You no longer have to repair a leak in a piping system that is made of all pressure rated parts with a clamp that isn't. Mueller wanted to be able to offer you a maximum pressure rating rather than simply a short term sealing capability. We felt that you need to know what pressure the clamp will seal over an extended period of time, because we know you want your repairs to last. Countless tests, design changes, prototypes plus a lot of time and a great deal of expense and effort were required to produce a clamp with an actual maximum working pressure rating. Now, with the product actually being marketed and used, we're satisfied we've produced a high-quality product with something extra. . .in fact, xtra is part of the name we gave one of the new clamps.

The Mueller (Adams®) Single Section & Xtra Range® Full Seal® Repair Clamps were an extension and improvement of a basic line of repair clamps that had their beginnings some thirty years ago. The first "pipe saver" clamp for spot repair was made in the 1940's out of copper and brass, and it was the forerunner of the Adams stainless steel repair clamp developed in 1948 by Neal Adams. Until these clamps were developed the only alternative to repairing an underground pipe with a crack or even a pinhole corrosion leak was the application of a heavy and bulky cast iron sleeve with gaskets for a seal.

When Adams Mfg. Company was acquired by Mueller in 1963 the line consisted of 3 types of repair clamps. The Pipe Saver stopped the leakage of a pinhole corrosion spot or small hole. The Full Seal sealed the entire circumference of the pipe. The Servi-Seal was an adaptation of the Full Seal with the addition of a tapped outlet that provides a service connection from the clamp. This was used most often where a Corporation Stop had been pulled out of a main--the clamp was placed over the hole and a new service connection was made via the tapped outlet.

Having acquired this line of repair clamps, Mueller started with a market research program to find out what the most important area for improvement was in the eyes of the user. The results showed that a clamp with a true pressure rating was asked for more often than anything else. This was the basis of Mueller originating a developemnt program.

Over the period that Mueller was developing this new line, each component of each clamp assembly was analyzed, re-designed, tested, and retested. These years of effort resulted in many helpful and creative achievements in the repair clamp field, in addition to a pressure rated clamp, and that's what Mueller was after.

Positive Sealing

With the new clamps, positive sealing is achieved by a specially compounded Neoprene gasket, resistant to water and not affected by weather or long-term storage. Several types of materials were tested under compressive loading to determine a relationship between rubber compression versus gasket loading. We also investigated different grid sizes, configurations, and gasket thicknesses in order to select final specifications.

The resilient "Leak Lock" grid pattern of the gasket design adopted allows it to be compressed into pipe surface irregularities. This reduces the possibility of a continuous leak path that surface imperfections could cause. The gasket is cemented to the band so that it isn't necessary to do fitting or positioning during installation. Rubber cold flow is restricted as well, and the lap-type tapered end assures full 360° sealing.

Testing gasket material and grid configuration to determine pressure sealing capability and optimum gasket loading.

Specially designed 3/4" steel alloy bolts and nuts are torqued to develop a load which is transferred through the lugs to a flexible steel band. The band reacts to any pipe irregularities and creates the uniform gasket loading necessary for the required rubber sealing pressure.

Corrosion Protection

Mueller clamps use corrosion resistant materials and blend them into a unit which can balance the corrosive action which does occur. A "gap bridge" of heavy stainless steel is cemented to the Neoprene gasket which is in turn cemented to a stainless steel band. Corrosion resistant alloyed steel bolts and nuts are used and the lugs which attach to the band are made of ductile iron coated with a rust inhibitor.

The corrosion resistant balance is enhanced with the use of the bolt and nut's special alloy because the bolt becomes slightly cathodic to the ductile iron lugs. The longevity of the clamp is increased since the flow of the current is now toward the bolt, not away. This balance actually makes the potentially weakest link (the bolts) stronger from a corrosion standpoint, but it doesn't significantly reduce the corrosive endurance of the other matierals.

Insight, research, and then field performance have placed the Mueller clamp in the superior class as far as corrosion protection is concerned.

Size and Adaptability

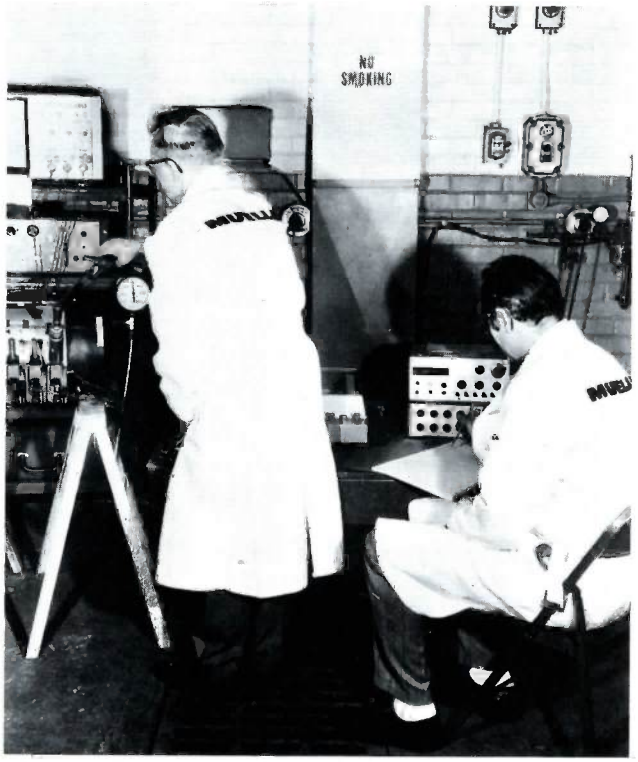
Water pipe variations created a need for a wide range of repair clamp variations too. Mueller engineers have developed a unique lug design for flexibility. In combination with the other clamp components, uniform transmission of constant bolt loading is present throughout these pipe ranges: .38" or .42" O.D. variance in 4" through 12" pipe (Single Section Full Seal® Repair Clamp) and .80" O.D. variance in 4" pipe, up to a 1.20" O.D. variance in 12" pipe (Xtra Range® Full Seal® Repair Clamp.)

Mueller engineers studied torque/load relationships in order to evaluate the transmission of the clamps' bolt loading, and to determine the bolt size needed for the gasket loading to provide good sealing characteristics. This led to the question of how the lugs should be designed to best transmit the load through the various clamp components to the gasket.

The lugs have to be capable of transferring the loads uniformly, and the transfer must be constant over a wide variation

(continued on next page)

Testing of clamp bolts to determine load developed by bolts at various torque levels.



Testing the transfer of bolt load through the lugs and band by using strain gage techniques.

of pipe diameters and range extremes. Because of all this, the fingers on the lugs and the lug material are very important. Mueller encountered troubling, but common, problems with these castings and eventually was forced to develop a unique casting process for the ductile iron lugs that for the first time produced the exact type of lug castings Mueller desired for a top quality repair clamp.

The controlled "rocking action" of the lugs was developed and tested as carefully as the casting process. "Rocking action" increases sealing pressure by making the band end portions pivot away from the pipe, thus causing the flexible band around the pipe to be taken up faster than the nut travels on the bolt. This happens while the bending strains in the bolt are reduced, so higher torques are possible for a particular size bolt permitting the use of smaller bolts. Another plus with the rocking feature is that it eliminates the tendency of the band ends to dig into the gap bridge, because the band ends pull away from the pipe when they're drawn together.

The rocking feature occurs because each finger of one lug has a convexly curved inner surface that contacts the convexly curved outer surface of its mate. Thus, the lugs rock in opposite directions; this causes the fingers to move away from the pipe. Reduced bending loads on the bolts are the result of this design, when the bearing surfaces of the lugs that mate with the bolt head and nut are convexly curved, to allow them to slide relative to their rocking lugs. Strain gauges on the lugs and bolts and thorough observations confirm that the lug performance Mueller engineers want has been achieved. Tensile bar tests confirmed the same thing about the desired mechanical strength properties.

When the time came to assemble the components that had been individually established as we have described, even the band material had been tested for its strength and elongation properties. Those who assembled the working unit had as a primary goal for the Mueller repair clamps a target of sealing pressures for the various clamp sizes. Tests on various size mandrels were conducted and once the primary sealing goals were reached, additional testing was done to determine how each component was affected when considered collectively instead of individually. These tests were similar to those used to evaluate the lugs, but included the application of strain gauges to the stainless steel band to trace the transfer of loading from the bolts through the lugs and band to the gasket. Tests of this type gave Mueller Engineers confirming data on bolt torque and gasket rubber pressure.

Ease of Installation

One of the final considerations – and one of the most important – was how easy it would be to install the repair clamp onto the pipe, the time it would take, and what the results would be. The Mueller clamps provide ease and speed by allowing attachment to the pipe without removing bolts, and also without other special pre-assembly of parts or special procedures. Once the clamps are in place, "Spin Fit" bolt threads allow for quick take-up of slack between the bolts, nuts, and lugs, to the position where a tool is necessary for final tightening.

Working Pressure

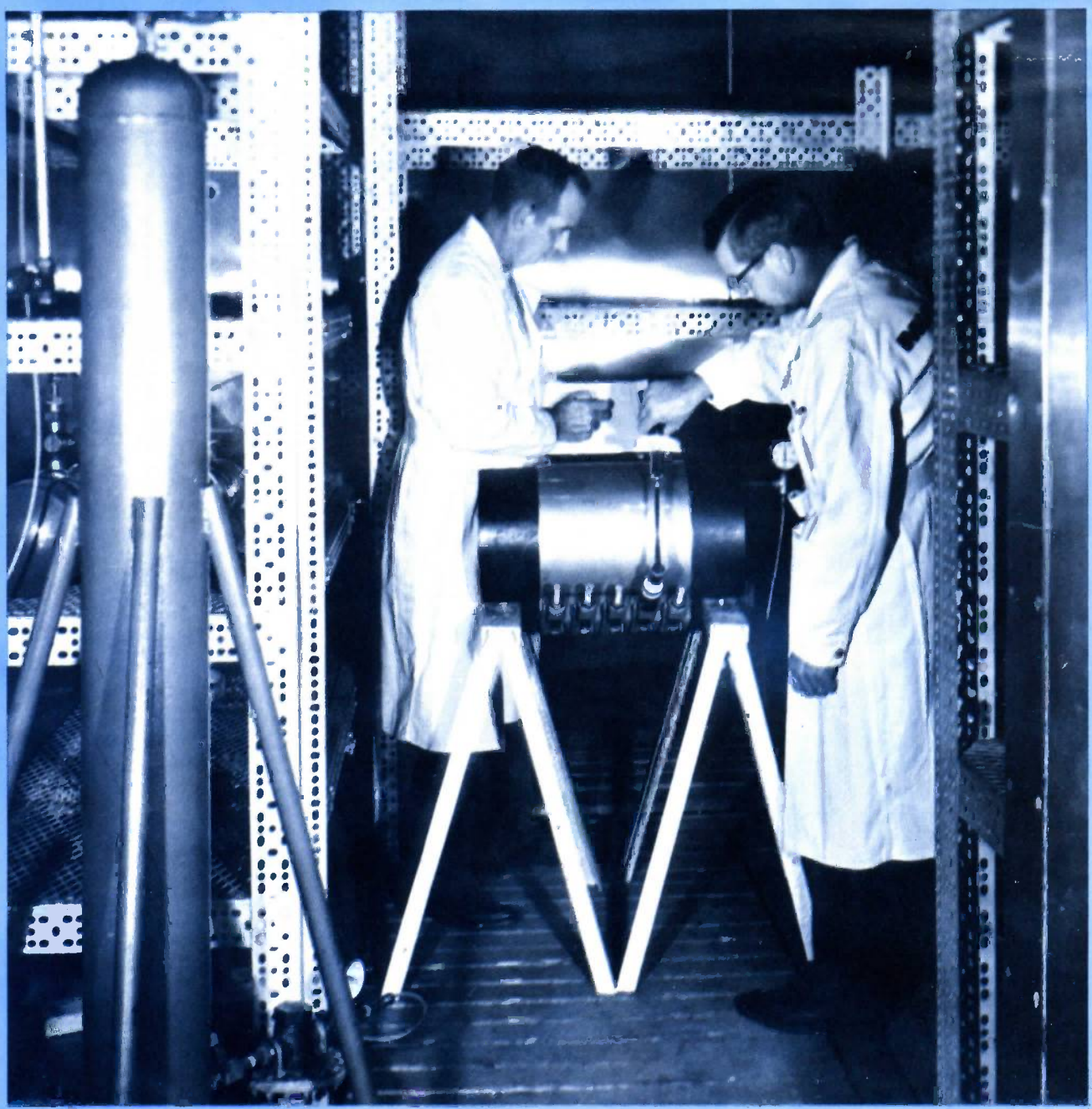
So that you, the user, will know what to expect from a Mueller clamp, they are rated on a working pressure basis. This is the feature of which Mueller is most proud.

With the information received from pressure reading tests made possible by our previous torque/gasket research, and the experience we gained from long-term testing of other Mueller products using rubber sealing, we developed a test that simulated long-term working conditions for our clamps. The results of these tests gave these repair clamps the industry's first maximum pressure ratings for band repair clamps.

The testing was conducted using test mandrels with a 360° circumferential groove 1/8" to 1/4" deep and 1/4" to 1/2" wide, over which we placed the clamps. Water pressure was introduced through a pipe nipple on the interior of the mandrel and a controlled aging-simulation was imposed. This test represented the most severe pipe failure that a clamp would be required to seal -- a circumferential fracture without end loading.

Our Achievement

You can see that we have put forth an all-out effort to provide you, the user, with the highest quality repair clamps possible with maximum pressure ratings. From our purchase of the pioneer Adams Company, through years of research and development, and now through our intense information and distribution efforts, we at Mueller Co. continue our efforts to bring you the best.□



Testing short and long term sealing capabilities to establish actual maximum working pressure ratings.

In Memoriam

Albert G. Webber, Jr.

John F. Thurston

With deepest regret we report that two former Mueller Co. presidents died this fall within just a few weeks of each other. Albert G. Webber Jr. died in Decatur on September 25 after a brief illness. He was retired president and chairman of the board. John Thurston died suddenly on October 15. He had retired in January of 1973 from his position as Mueller's president and chief executive officer.

Mr. Webber was a senior partner in the Decatur law firm of Webber, Welsh, Kehart and Shafter. He graduated from the Universiy of Illinois College of Law in 1917 and was admitted to the bar that year. Mr. Webber practiced law in Decatur since 1919.

He became general counsel for Mueller Co. in 1936. He was the firm's president and chief executive officer from 1947 to 1963 and chairman of the board of directors from 1963 to 1971. In addition, he was a director of Mueller Ltd., in Sarnia, Ontario for many years.

Mr. Webber served in the Navy in World War I and was chairman of the Advisory Council on Naval Affairs in Decatur. He was a director of Decatur Memorial Hospital from 1956 to 1965, and was a member of many business, professional, and social organizations, including the Illinios State and American Bar Association, and Delta Sigma Phi fraternity.

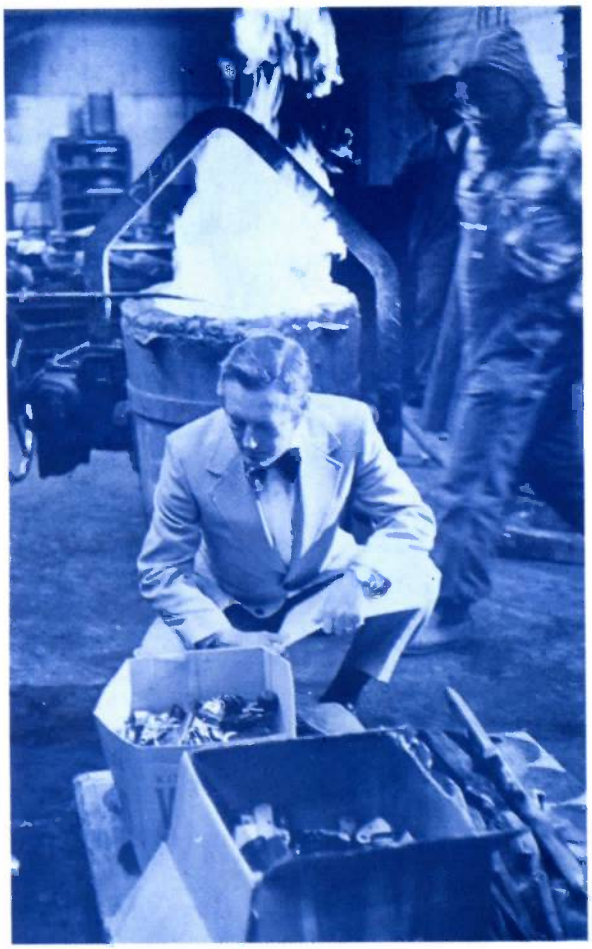
John Thurston came to Decatur and Mueller Co. as president and chief executive officer on May 1, 1963, succeeding Mr. Webber. Prior to his coming to Mueller he was senior vice president of General Dynamics Corporation, and president of the Liquid Carbonic Division of that company. He joined General Dynamics in 1955, was appointed a corporate vice president in 1957 and became vice-president - special projects in 1960. Prior to his association with General Dynamics, he was a merchandising manager at Thompson Products (now TRW, Inc.) in Cleveland, Ohio.

Mr. Thurston served as a civilian consultant to the Secretary of the Army on military parts supply problems in the U.S., Japan and Korea in the 1950's for which he was awarded the Army's Exceptional Civilian Service decoration. In World War II he served in the Air Force and was discharged as major.

He was born in Denver, Colorado and graduated from Colorado College in Colorado Springs in 1931.

Mr. Thurston served as a member and as chairman of the board of trustees of Millikin University in Decatur, and as a consultant to Millikin in various capacities. He was a former member of the advisory board of St. Mary's Hospital in Decatur. Other community services he performed included work with the Decatur Memorial Hospital's expansion fund drive and membership of the board of the Decatur Chamber of Commerce. He was an elder of the Westminster Presbyterian Church and an active alumni member of Kappa Sigma fraternity.

Mueller Ripples



WATCH THE FIRE HYDRANT IT USED TO BE A GUN

The firearms pictured above and scores of others which were confiscated by Hamilton County, Tennessee, law enforcement agencies were rightfully destroyed on Wednesday, March 27th, by Sheriff H. Q. Evatt, Jr. under court order. The guns were dumped into one of Mueller Co.'s sixty ton electric furnaces.

It is ironic, indeed, that this horrible mass of destructive devices will eventually end up on the street corners of America in the form of shiny Mueller fire hydrants which will serve as guardians of safety for the American public.

WATCH FOR. . .
A report on the F.H.A.P. Society in the next issue of the MUELLER RECORD.

LORIN E. GROSBOLL

On October 22 Lorin E. Grosboll retired from his position as a Sales Representative for MUELLER CO. in the state of North Carolina. Lorin completed almost 38 years of service with MUELLER CO. From 1948 until 1970 he was our Sales Representative in both North and South Carolina.
On behalf of Lorin, we would like to express his appreciation for your loyalty and friendship during these years, and we are sure you will join us in wishing him a full measure of good health and happiness.

C. ROBERT FISHER

C. Robert Fisher has been appointed a Sales Representative for MUELLER CO. in the state of North Carolina. He succeeds Lorin E. Grosboll.
In 1969, Bob joined MUELLER CO. as a Sales Trainee. After completing an intensive sales training program in 1970, he was appointed a Sales Representative in our Southeastern Sales District. He has served in that capacity for the past three and one half years working with both the water and gas industries in South Carolina.
His headquarters will be Charlotte, North Carolina.

ROBERT F. MAXWELL

Robert F. Maxwell has been appointed Sales Representative for MUELLER CO. in the state of South Carolina. He succeeds C. Robert Fisher who has been transferred to North Carolina.
A native of Decatur, Illinois, Bob joined MUELLER CO. in 1961. Since that time, he has worked in the factory, Decatur Sales Office, Advertising and Sales Promotion Department, and in Sales Headquarters. After being selected as a Sales Trainee, Bob has completed an intensive sales training program. This program, combined with his previous experience, has given him a thorough knowledge of products for both the water and gas industries.
His headquarters will be Lexington, South Carolina.

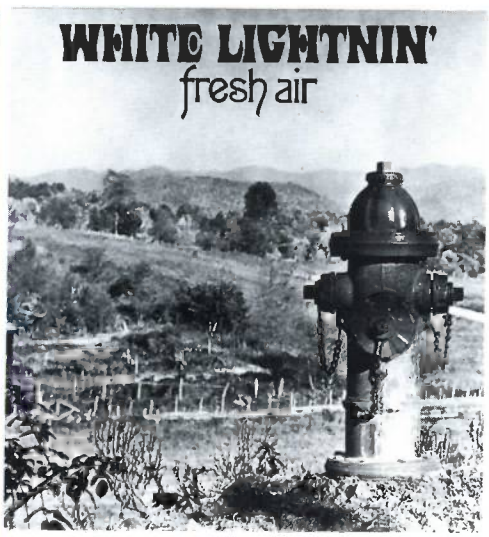
Here's a real fire 'plug' [the one on the left]

This picture of the 'plug' tied to a Mueller Fire Hydrant in Milford, Nebr. leaves several unanswered questions. First, does the steed belong to the fire chief and is just standing by to carry the chief to the next fire? Is the horse waiting for a drink? (You can lead a horse to water. . .etc.) Where is a policeman in Milford? (Try and park your car this close to a fire hydrant or try to lock your bicycle to one and the police make an immediate appearance). One thing is certain and that is the City of Milford has used extremely good judgment in its purchasing of fire hydrants.

First the movies and now a record!

Many of our readers have seen our movies, "Water Where and When you Want It" or "Who Cares"--Mueller® Fire Hydrants are shown in both of these movies.

We've always known that Mueller Fire Hydrants were all time favorites among the Water Industry but we never expected to see a Mueller hydrant on the cover of a record album. Mueller Sales Representative Bill Koester found this country music album for us in Pittsburgh. The album is entitled "White Lightnin'," was produced by PolyDor Records--we've written the producer but have not received an explanation as yet of why they chose a photo of our fire hydrant for a record album cover. We do, however, admire their good judgment. If they were going to show a fire hydrant, they couldn't have selected a better one.



Off the Record

An engineer is said to be a man who knows a great deal about very little and goes along knowing more and more about less and less until, finally, he knows practically everything about nothing.

A salesman, on the other hand, knows very little about everything and keeps on knowing less and less about more and more until he knows practically nothing about everything.

The purchasing agent starts out knowing practically everything about everything but ends up knowing nothing about anything - due to years of association with engineers and salesmen.

More than one pessimist got that way by financing an optimist.

Love of learning is seldom unrequited.

A college boy wrote his father, "I can't understand why you call yourself a kind parent when you haven't sent me a check in two months. What sort of kindness is that?" The father replied, "Son, that's unremitting kindness."

Signs of the times in this crazy mixed up world - Copyright is what takes away the right to copy.

You are doing your best only when you're trying to improve what you're doing.

It's too bad mankind isn't, freeways aren't and diehards don't.

A talk show host is the guy who gabs until he gives you a headache and then tries to sell you something for it.

A third grade homework assignment to write a "poem" produced the following laconic verse from a nine year old boy:

MY WISH

I wish that I could have a horse.
He would eat the grass, of course.
He'd keep it short and crop it low,
And then I wouldn't have to mow.

What happens when you don't pay your exorcist? You're repossessed.

Sign in cocktail bar: We install and service hangovers.

Weather forecasting has been speeded up, but it's still several hours behind arthritis.

An old Portugese monastery is perched high on a 300 foot cliff. To reach it, visitors are strapped into a big basket and pulled to the top with a ragged old rope.

Halfway up, a passenger nervously inquired, "How often do you change the rope?"

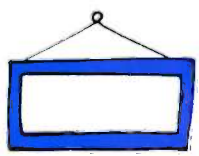
The monk in charge replied, "Whenever the old one breaks."

Door-to-door salesman to housewife: "You should have seen what I saw at your neighbor's! May I step in and tell you about it?"

When a certain Southern politician announced he was "a favorite son," one of his enemies roared, "That's the greatest unfinished sentence in the history of the Southland!"

Poetic Justice - Two high school students pooled their efforts on the sly to write a test. Their teacher made no effort to stop them until their papers were graded, showing a mark of 90. Then he explained to them that, since it required two of them to achieve the 90, he would split it and record a grade of 45 for each.

One reason it's hard to get men to go to church is that they don't care what other men are wearing.



No Smoking sign at a mind reader's convention.

Bigamy is having one spouse too many; monogamy is the same.

Born Loser—The Wall Street Journal reported this about a bank robbery in Southern California. The man pulled a gun which the teller noticed had water dripping from the barrel. He handed her a note which said: "Milk, Bread, Catsup, Laundry." She sounded the alarm and the man raced for his car only to discover it wouldn't start.

MUELLER CO., DECATUR, ILLINOIS

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Which of these repair clamps gives you the best assurance of positive, long term repairs?

Most pipe repair clamps will seal satisfactorily at high pressures *for short periods of time*—two minutes, a day, a week. The shorter the test period, the higher the test pressure rating a clamp can "earn."

A much more meaningful rating from your standpoint is Actual Working Pressure—how much pressure a repair clamp can withstand for long periods of time under the kinds of conditions you encounter in the field.

That's why all MUELLER® (ADAMS®) Single Section and XTRA RANGE® FULL-SEAL® Repair Clamps carry *Actual Working Pressure* ratings* that are established beyond question by long term pressure testing under conditions that equal or exceed the most severe service conditions.

The choice is yours—you can buy unrated repair clamps and *establish the Actual Working Pressure yourself,* or you can buy MUELLER clamps with proven working pressure ratings that give you the best assurance of positive, long-term pipe repairs.

Get all the facts from your Mueller Representative. Call him today.

**For water, 300 psi for 4" and 6" sizes, 250 psi for 8" sizes and 200 psi for 10" and 12" sizes.*

MUELLER CO. / DECATUR, ILL.

FACTORIES AT: DECATUR, CHATTANOOGA, BREA (LOS ANGELES), MUELLER, LTD., SARNIA, CANADA

W-503

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