

**Little Change**

Not much change in temperature Friday. High, around 60. Low, Friday night around 40. ADDITIONAL WEATHER AND TEMPERATURE DETAILS ON PAGE 15A.

# St. Louis Globe-Democrat.

One Hundred and Thirteen Years of Public Service

Milestone  
For a Great City  
An Editorial, Page 14A

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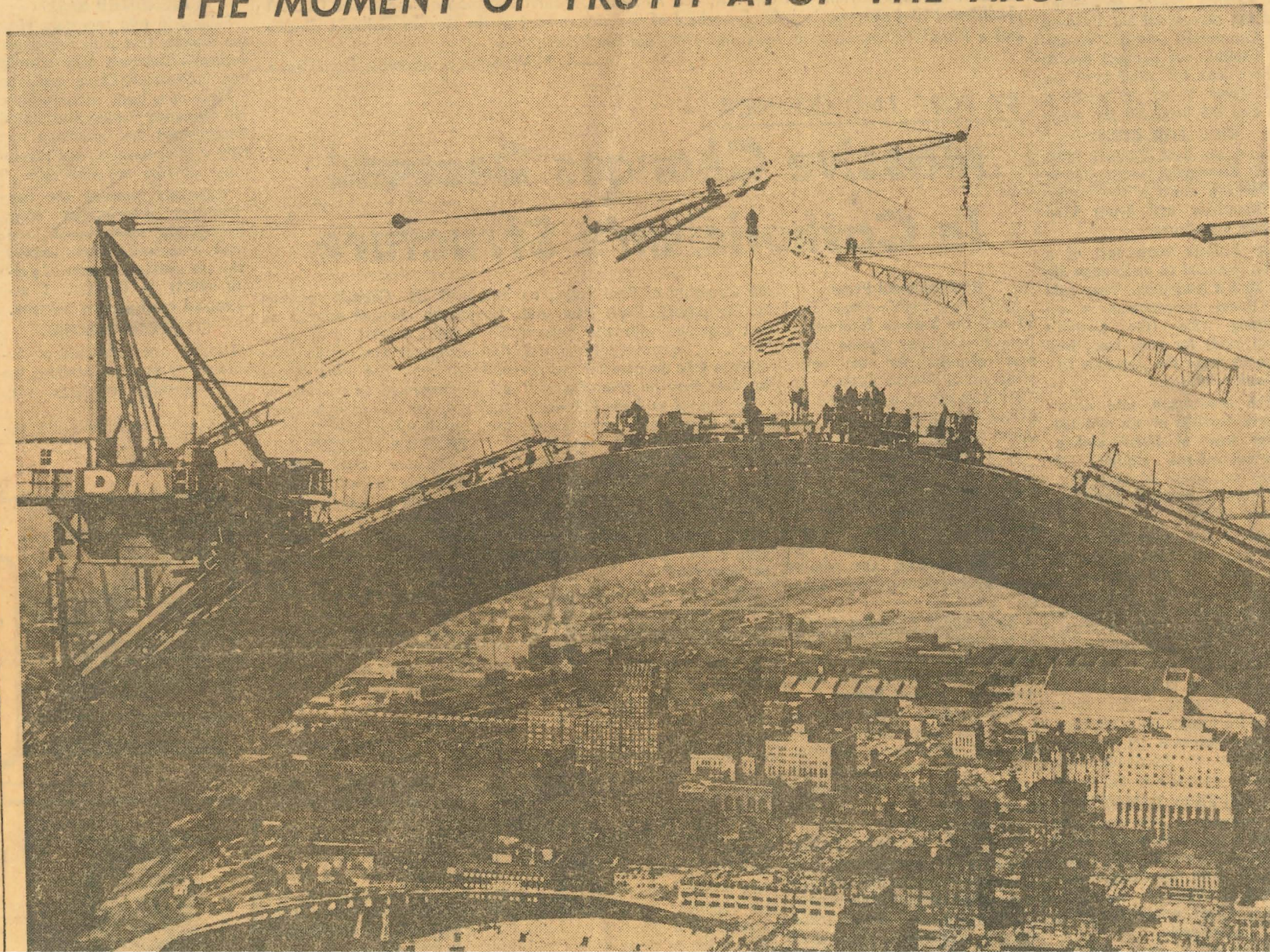
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S . C SEVEN CENTS IN GREATER ST. LOUIS

# Arch Completed But Fight for Funds To Finish Memorial Still Goes On

THE MOMENT OF TRUTH ATOP THE ARCH



## Congress May Contest \$6 Million Needed, Rep. Sullivan Says

By SUE ANN WOOD  
Globe-Democrat Staff Writer

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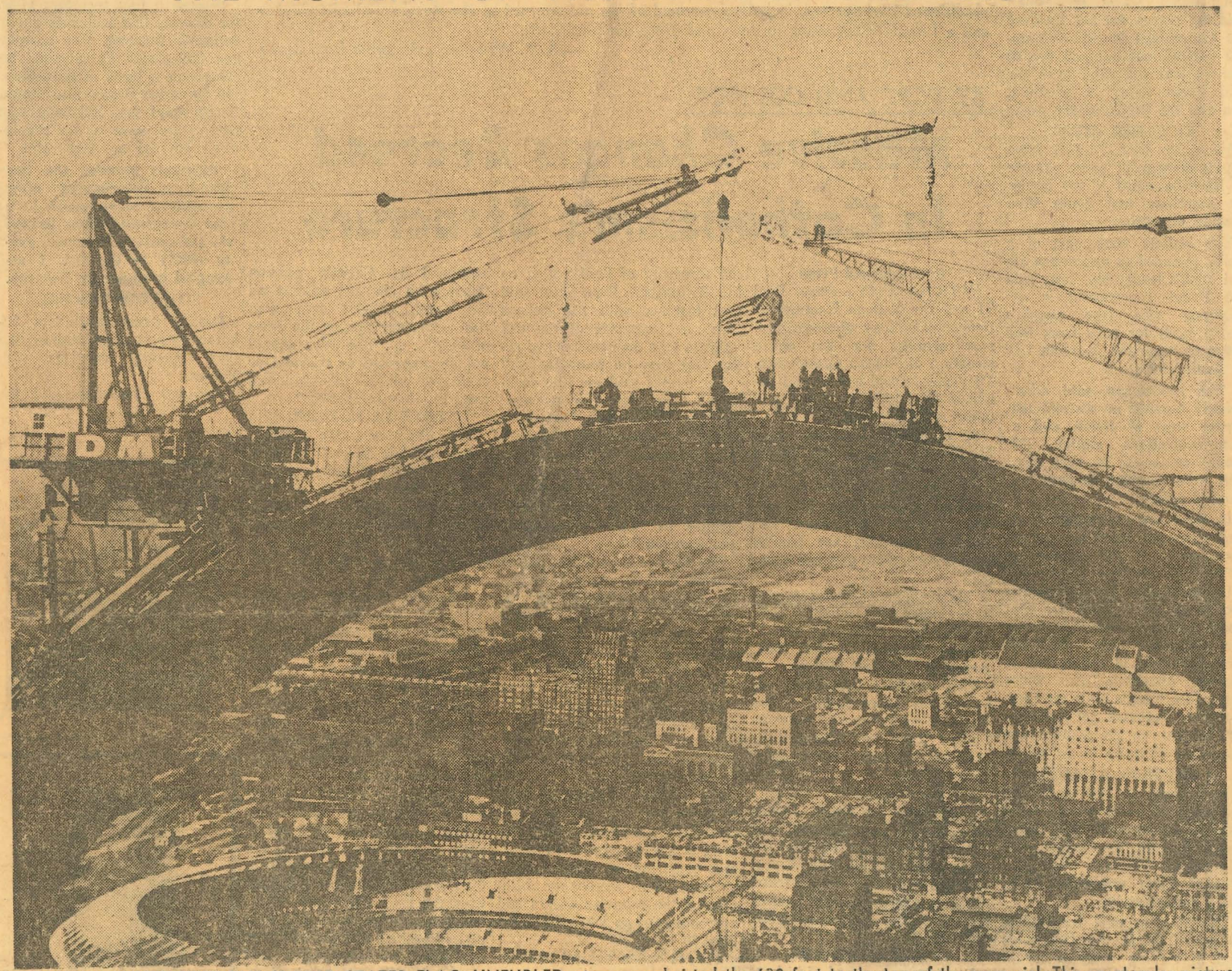
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# Completed But Fight for Funds Arch Memorial Still Goes On

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A STRONG BREEZE KEPT THE UNITED STATES FLAG UNFURLED atop the Gateway Arch Thursday but the wind failed to hamper workmen as the 10-ton keystone segment was put into place. Old Glory was attached to the leg-joining section on the ground and fluttered proudly as the final section was hoisted the 630 feet to the top of the memorial. This spectacular picture was taken from a helicopter by Globe-Democrat Staff Photographer Gary Clermont. The downtown sports stadium is at the lower left. —Globe-Democrat Photo

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Congress approved the spending of \$6,000,000 but has failed to appropriate the money. Mrs. Sullivan said she will renew the title for the funds, in the next congressional session.

#### EXCITING CLIMAX

Few of the more than 10,000 who watched the exciting climax of the two-year Arch construction Thursday thought about the lack of money for the rest of the Verfront memorial. Most were thinking of the more immediate future, when they can ride to the top of the 630-foot-high structure and gaze out the windows on either side of an interior observation deck.

That may be some time next summer. Much interior work remains to be finished, not only on the transportation system in each leg but in the underground Visitor Center where passengers will board capsule trains for the trip to the top. Contracts for air-conditioning and other finishing work have yet to be signed.

The creeper cranes that have crawled up each leg for more than a year now will begin the long climb down. Spokesmen for MacDonald Construction Company, prime contractor, and Pittsburgh-Des Moines Steel Company, sub-contractor, said workers will dismantle the tracks for the creeper cranes as they go down and will patch the bolt holes with stainless steel. It may be several months before the cranes reach the ground, they said.

Friday, workers will begin welding the final section that links the two legs of the Arch. It was the 142nd stainless steel section to be placed and the final section of the north leg.

#### 'WENT BEAUTIFULLY'

LeRoy R. Brown, superintendent of the Jefferson National Expansion Memorial, summed up the feeling of every official and contractor connected with the Arch project when he said the keystone setting Thursday "went beautifully."

PDM spokesmen had cautiously predicted the placement of the final section might take six to eight hours. Instead, it was only five hours after the section was lifted off the ground that it was snugly fitted in place between the two legs.

The lift-off started 35 minutes sooner than was scheduled because the sun's heat was causing the south leg to expand and move out of line. Three Fire Department pumpers sprayed cooling water on the south leg to prevent further expansion and the crane on the north leg began lifting the keystone section at 9:27 a. m., instead of 10:02 as originally planned.

#### GIVEN BLESSING

Informed of the change in schedule, four Boy Scouts hurried out to raise an American flag on a pole fastened atop the final section just before lift-off and two clergymen pronounced a blessing. Then, the Scott Air Force Base Band struck up the National Anthem as PDM workers gave the signal to the crane operator to begin the lift.

The stainless steel sides of the triangular section glistened in the sunlight as it glided slowly upward, steadied by two cables held on the ground by four workmen. It rose west of the Arch and slightly to the north of the 8½-foot gap between the two legs.

When it had been maneuvered just below the gap and hoisted about a third of the way into place, it was held while adjustments were made in preparation

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## Topping-Out Almost Canceled Because of Sun

By TED SCHAFERS

Globe-Democrat Staff Writer

The thrilling topping-out ceremony of the Gateway Arch was in danger of being canceled in an emergency secret meeting called at 2 a.m. Thursday by engineers worried over the "drooping" effect of the sun's rays on the south leg. The Globe-Democrat learned.

However, cooler heads among the experts and the cooling water supplied by the St. Louis Fire Department, alerted before dawn, kept the schedule within one hour of the announced 10 a.m. starting time.

An official who attended the conference asked that his name not be disclosed, "because we all agreed to keep this secret." He said:

"Some of the engineers got worried when they saw the temperature readings taken Wednesday of the effect of the sun's heat on the south leg.

The leg is only 1⅞ inches below the north leg at sun-up, but when the heat expands it, it sags as much as 8 to 10 inches. They were worried the variance might be so great as to prevent closure if the sun came up strong."

#### SPRAY WATER

It was finally decided to begin. Three pumpers began spraying cool water on the sunlit south leg at the 530-foot level about 8:30 a.m. However, it was not until 9:27 a.m. the final 10-ton stainless steel section started toward the top as worried engineers chaffed at the delays caused by ground ceremonies.

But everything went without a hitch. The delicate job of inserting the final section and securing it into place was completed by 2:30 p.m., well within the predicted time-table.

The reason that everything went smoothly Thursday was no accident. Almost every phase in the three-year construction of this engineering masterpiece has been marked by crises—some public, others not. But they were solved by hard-working contractors, architects and engineers.

The 2 a.m. meeting is an ex-

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# Topping-Out Almost Canceled

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ample. Despite the hour, R. E. MacDonald, president of the St. Louis firm holding the general contract; W. R. Jackson, president of Pittsburgh-Des Moines Steel Company, in charge of the steel erection; Johannes E. N. Jensen, chief of construction for the National Park Service, met with the engineers, who included Dr. Hans Bandel of Severud & Associates, who played a key role in translating Eero Saarinen's architectural masterpiece into structural reality; Bruce Dittmer of Saarinen & Associates and James Morehouse, of Richardson, Gordon and Associates, consultants for PDM. Top men involved in on-site operations also attended.

There was some questions of getting the fire department but this was solved when Edwynne Murphy, head of the Topping-Out Committee, got Acting Fire Chief Robert Olsen out of bed at 6:30 a.m.

Asked about the emergency meeting Mr. MacDonald smilingly declined to comment.

### 'WONDERFUL DAY'

"Let's just think about this wonderful day," he said, as he watched the final section slip into place.

"This is the day I throw away the aspirin bottle," he added.

Pittsburgh-Des Moines Steel Company was getting a major portion of the publicity Thursday—and, deservedly so because the steel erection was their handiwork.

However, it took courage for Mr. MacDonald and his company to tackle the big construction project.

### DAILY COST \$250

As general contractor, the MacDonald firm is held responsible by the National Park Service for the monument and currently is being charged \$250 a day for the delays in its completion since June. This penalty will remain until the Arch is finally accepted sometime in February—barring any severe weather or other problems.

Asked about the main problems overcome, Mr. MacDonald said:

"We've had new ones almost every day, but they have been solved. It's been like living with a time-bomb and never knowing when it was going to explode."

Discussions with engineers, however, disclosed that the most serious obstacles overcome include:

**ONE:** Foundations which go down as much as 135 feet deep and contain over 16,000 tons of concrete anchoring each leg of the Arch.

**TWO:** The tensioning crisis, when work had to be halted to determine why the rods in the south leg were not functioning properly. This was solved by adding more tension rods higher than the 300-foot level where concrete grout was filled into the inside layers.

**THREE:** Wrinkles in the stainless steel skin developed when a bracing bar failed in the one section. It is impossible to roll huge sections of stainless steel without some distortion but PDM experts solved that problem.

From the very beginning a giant electronic computer at McDonnell Aircraft Corp. played a key role in setting up a program so that the contractors would know at every stage how much men and material would be needed.

What isn't generally known is that the very design by Saarinen was challenged by some consulting engineers concerned about stiffening of the

Arch beyond the 300-foot level. The debate on this point went on for months before being resolved.

"We found ourselves in disagreement many times but worked out the problems. We had no guidelines—everything was a new challenge," said one PDM engineer.

"Only an engineer can appreciate the problem. Our computations fill approximately 500 pages," he added.

### VARY CONTINUOUSLY

There are no plane surfaces, no straight horizontal or vertical lines in the surfaces of the Arch. Even the curvature and cross-sectional area of the arch-ribs vary continuously from base to crown.

Not only did its unique design present challenges for engineers, but every craft union worker on the Arch was confronted with solving new day-to-day work techniques.

Mr. MacDonald said "the cooperation and dedication of the union construction workers is the best our firm had seen in

its 50 years of existence."

"We had no serious disputes, except for the stoppage Tuesday and I really believe that was due to a misunderstanding," he said.

He referred to officials of the Ironworkers Union here ordering their men not to work atop the Arch, contending a newspaper story indicated it was unsafe.

This was bitterly denounced by the union's own workmen who said they had never worked for firms more safety conscious than PDM and MacDonald.

The Arch stands as the greatest single use of stainless steel—nearly four acres of the shining metal.

### NEW TECHNIQUES

New welding machines and techniques had to be developed and the work checked by special X-ray camera equipment.

Use of 60-ton "crawler derricks" which lifted themselves up the outside of the Arch legs was another unique construction development engineered by PDM.

At the 540-foot level, a 265-foot-long steel truss, weighing 60 tons, was hoisted into posi-

tion to help stabilize the two legs of the Arch. Originally Mr. Saarinen had recommended that steel cables, anchored to 20 tons of concrete into the ground be used.

Finally, the last critical engineering feat was the use of hydraulic power-driven jacks to insert the final keystone section. Because only two feet separated the two legs they had to be pried apart another six and one half feet to allow room for the 8-foot final section. This re-

quired a jacking force of 900,000 pounds.

### ENGINEERING MARVEL

Making this difficult maneuver work was an engineering marvel in itself.

Welding of the final section will take several days before the pressure is released on the two legs. When this is done, engineers say "it will become the strongest monument ever built, capable of withstanding wind forces of exceeding 150 miles an hour."

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# Arch Is Completed, Fight for Funds Starts

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for the next stage of the operation.

During the pause, ceremonies that had been scheduled to begin at 9:30 a.m. were started, with a drill by the mounted Moolah Temple Lancers and motorcycle patrol before the speakers' platform west of the Arch.

Edwynne P. Murphy, chairman of the Topping Out Committee and vice president of the St. Louis Ambassadors, introduced Mr. Brown, who acted as master of ceremonies.

## 2.3 MILLION VISITORS

Noting the large crowd gathered for the topping out, Mr. Brown said more than 2,300,000 persons already have visited the memorial site this year. The National Park Service has revised its estimate of the number of visitors expected at the memorial, from 3,000,000 formerly predicted to 6,000,000 now expected during the first full year of operation, he said.

One of the speakers introduced by Mr. Brown was Mrs. Aline Saarinen, widow of Eero Saarinen, architect who designed the memorial with the great Arch as its focal point. In a voice that broke several times, Mrs. Saarinen said, "I suppose all I really can say is that I wish Eero could be here."

He would have been both proud and humble, she said, to see his vision reach fruition in this "most exciting moment."

## BITTERSWEET MOMENT

"For me," Mrs. Saarinen admitted, "this is a very bitter-sweet moment."

Praising the memorial as a "monument to man's imagination and spirit," she closed her remarks by saying: "Now I'm going to watch again." She quickly returned to her seat but remained standing, gazing up at the top of the Arch.

Other speakers, who talked briefly and hailed the occasion as a momentous one for the city and the nation, were Mayor Alfonso J. Cervantes, Representative Sullivan, former mayor Bernard F. Dickmann, former mayor Aloys P. Kaufmann, St. Louis County Supervisor Lawrence K. Roos, J. H. Lyons, president of the International Ironworkers Union; Luther Ely Smith Jr., president of the Jefferson National Expansion Memorial Association and son of the late civic leader who originated the idea of a riverfront memorial; Morton D. May, former JNEM president; Nathaniel Sweet, St. Louis newspaper editor, and Undersecretary of Interior John Carver.

Mr. Carver said the Arch is "not just an engineering marvel or an architectural 'great'" but it reflects "the impulse of the age it memorializes — westward expansion as our manifest destiny."

## TUCKER ABSENT

Former Mayor Raymond R. Tucker, who was a leader in breaking the railroad relocation deadlock that had hampered the project for many years, was in Europe and could not attend the ceremony.

The ceremony ended with presentation of some of the medallions prepared for workers and civic leaders who played a major part in building the Gateway Arch.

It was nearly 11 a.m. when the crowd noticed that the keystone section was being inched into the space between the two legs, moving upward until its top was in line with the curving top of the Arch, at 11:05 a.m. There was a loud cheer and applause from the watching thousands.

A PDM spokesman reported later that the jacks had been re-

leased and the two legs were thrust tightly against the keystone by 2:30 p.m.

Kenneth J. Kolkmeier, PDM project manager, and Ralph Aberle, MacDonald project manager, leaned across the top of the keystone and shook hands to symbolize the closing of the Arch, when it had been hoisted into place. Soon workers were moving back and forth between the two legs. The watchers on the ground slowly dispersed, satisfied they had seen one of the proudest moments in the city's history.

## SCOUTS RAISED FLAG

The Boy Scouts who raised the flag on the keystone section were: Cornell Harvey, 4842 Maffitt ave., of Troop 263, All Saints Episcopal Church; Dennis Hart, 1037 Glenway dr., Glendale; Brad Nelson, 645 Norfolk dr., Kirkwood, and John Isley, 815 Queen Anne pl., Glendale, all of Troop 360.

Msgr. James E. Hoflich, pastor of the Old Cathedral, and Rabbi Benson Skoff, of Brith Sholom Kneseth Israel Congregation, blessed the keystone section and said prayers before the lift-off.

Top officials of the National Park Service, Eero Saarinen and Associates, architects, and Severud Associates, consulting engineers, were among the happy onlookers at the topping out.

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