



STACK TALK

October 2007

The official newsletter of the Adobe Western Railroad,
Phoenix, Arizona, operated by the Maricopa Live Steamers
Railroad Heritage Preservation Society.

www.maricopalivesteamers.com

© 2007 Maricopa Live Steamers Railroad Heritage Preservation Society

News from the President



Jim Manley

It's just a couple of weeks until our Fall Meet. There is a lot of work to be done. If you haven't signed up to help at the meet please contact Joe Schnyder and let him know where you can help. He has been busy fixing track so we can enjoy it. Please consider helping him in return.

AMRS and ABTO will be having a joint breakfast on November 17th. We would like to have a train crew (or two) available to give rides. If you can help please contact John Draftz and let him know. Also, we will have a school group visiting us on Friday, October 26th. Bud Waterworth has volunteered but we need more people for that as well. As you can see this club operates well when you support it.

So far, we have had 102 people register for the meet. We have folks coming from California, Nevada, Utah, Wisconsin, Wyoming, Minnesota, Illinois, Canada, and of course the Grand Canyon State.

We will be holding a safety meeting after the business meeting this month for engineers and conductors pulling the public. I hope to see you all at the meet!

Jim

Decline and Fall of the Titans of Fire

When steam gave way to diesel



"Iron Horses of the Santa Fe Trail"

Double-heading Santa Fe motive power scorches the sky in hustling a 13-car "Centennial State Express" at 55 mph uphill near middleton, Colo. in 1951.

By MLS member Mack Sheesley

Resourced from "Iron Horses of the Santa Fe Trail" by E.D. Worley and "Boiler Explosions on the Milwaukee" by R.S. Podas, Summer 2005 NRHS Bulletin.

Motive Power Evolution

America's eastern and western geographical frontiers gradually merged. Vast areas of land settlement encountering extremes of terrain and climates clamored for a more cohesive national transportation system. Increasing demands of nationwide production and consumption began growing rapidly.

Railroads expanded throughout these new territories and enabled their development, then nourished the resulting condition of supply and demand, called interstate commerce. America was evolving from a rural into an industrial centered nation.

However, around the turn into the 20th century, railroad's conventional locomotive power, adequate for the 1800s, found itself less capable of meeting this new, burgeoning

commercial and industrial advancement. Railroad freight loading grew heavier. Train lengths grew longer. Passenger timetables required improvement. Trains began falling behind their ability to serve the burgeoning business they had created.

The traditional 4-6-0 locomotive had reached its maximum ability to fulfill the requirements of the past, and motive power needed improvement to meet projected demand. Locomotive cylinders had been made as big as could be supplied by existing boiler designs. The fire box, which determines steaming capacity, had grown as large as possible within the confines allowed by the last supporting pair of driving wheels. Freight hogs of the 2-8-0 design were similarly suffering from constricted firebox capacity, and easily overextended themselves in trying to supply the progressively greedy demand for more steam.

Simply put, railroads needed both

Continued on page 3

The Vice President's Corner



Bill Myers

Welcome to fall weather, finally. We are off to a great start; all lines are in operation, with the exception of Farflung. We have work in progress on that line. *Do not use this track.* We have had to remove sections to replace damage from the storm.

The track crew thanks everyone for their patience and understanding while we have fixed problem areas. By the time the meet begins, all switches will have been looked at, lubricated, and reflector tape installed. Keep reporting problem areas. We found several wide gauge spots this weekend thanks to Bill Unglabe unfortunately finding them with his locomotive. We got them fixed and on to the next venture.

We will have a safety meeting right after the business meeting for all the train crews.

I have noticed the crews are running at a nice safe speed. I can't stand trying to pry a winter visitor from the seat when fear has held her like a magnet to the car. Please remember your first ride at the park, and remember your passengers have no idea if you had a bad night's sleep, or you are a nut case out trying to break the land speed record for miniature railroads. Besides, it scares the rabbits!

I'm sure you're aware that switches are the leading cause of derailments. The engineer or conductor handling the switch is responsible for the position of the switch in use. The engineer or conductor must not allow movement to foul an adjacent track until the

hand operated switch is properly lined. Do not operate a switch that is tagged. If the switch is spiked, or screwed shut, do not remove the spike or screw unless authorized by the same crew or group that placed it there.

Persons handling switches must ensure that:

- The switches are properly lined for the intended route.
- The points fit properly and the target (or switch handle), corresponds with the switches position.
- When operating lever is equipped with a latch, do not step on the latch to release the lever except when throwing the switch.
- Engineers are responsible for making sure the switches are properly lined.
- Do not run thru switches, other than spring switches, or variable switches. If a rigid type switch is run thru, it is unsafe and must be protected by spiking or screwing the switch.
- This is very important: An engine or car that partially runs thru a switch *must* continue movement over the switch. The engine or car must not change direction over a damaged switch until it has been spiked or screwed down, or repaired.

Now that all this has been said, just common sense tells you if you see a problem, don't think there will not be a problem in your near future. I see so many people derail at a switch, and think they can reverse the problem by backing up. You will damage the switch points, first. Then, a rail can bend, or gouge the rail so bad, someone else will start to have problems at the switch. Help! Where is the track crew? The other thing that happens, someone will be watching you do this. It's hard to say you planned to derail on purpose!

Did everyone do preventive maintenance this summer on their rolling stock? Check for loose bolts, cotter keys, (or the lack of), oil, worn couplers, fire extinguisher filled, new flashlight battery's, radio work-

ing,

Remember, we're pullin' for ya
We're all in this together,

Bill

Treasurer's Notes



Bob Douglas

October is "Renew Your Membership" month. Dues are beginning to pour in. Last year your membership dues paid for only 80% of MLS's fixed operating and maintenance costs.

MLS membership instituted an annual club rolling stock use fee of \$25 to defray the cost of rolling stock maintenance. Any member who pays this annual fee is permitted to use club locomotives or riding cars for his or her personal use.

All park improvements and railroad expansion projects are being funded solely by public and member contributions.

Please use the 2008 MLS Membership Dues form that is included in this month's Stack Talk and, if possible, include a contribution to support your favorite project. Please send your check to me as early as possible.

Many members got an early start on getting the park ready for the Fall Meet. The "Ballast Boys," Bill Myers, Joe Schnyder, Jim Reasoner, Frank Behrle, Bob Alkire, and others have most of the summer getting the track in shape for the fall running season. You will notice the addition of many box culverts under the track. We hope they will solve the monsoon season flooding problems.

Our public train rides resumed on the Sunday after Labor Day.

Continued on the next page

Titans of Fire

Continued from page 1

faster engines with more power to keep up the traffic that was developing.

The Firebox Draft Problem

Both locomotive wheel-types, the 4-8-0 and the 2-6-0, proved to be great wasters of steam. To keep firebox temperatures hot enough to meet an increased steam demand, would need a greater draft through the grates, fire box, and flues, "...a draft of wind nearly that which must pass through the Gates of Hell".

Draft is created by the force of exhaust steam through a nozzle in the smoke box aimed up the stack, which creates a venturii effect that correspondingly vacuums fire gas flow out of the firebox and through the flue system. To create the adequate vacuum to increase this volume, the nozzle size would have to be reduced, thus directing a faster

stream of exhaust steam up the stack.

But any decrease in nozzle size would correspondingly create back pressure against the free breathing of the cylinders, so producing a "drag" against the next power stroke of the cylinder. Also, the faster the locomotive is run, the greater this back pressure builds, whatever the nozzle size. But the greater the back pressure, the greater the resistance against power and speed: the locomotive design now beginning to work against itself bringing upon it a diminishing return of efficiency. A "Catch 22" condition is created.

Titanic Blow-ups!

Some mention of a somewhat non-related problem should be included here. The gods of fire and boiling water occasionally went berserk, raging explosively out of control by showing their power with displays of horrendous "boiler explosions."

Actually it wasn't a true explosion of the whole boiler, but of only one critical part of the boiler. The most sensitive spot in boiler construction is the flat sheet of steel lying above the firebox known as the "crown sheet".

Management of the water level in the boiler is a balancing act of sustaining a proper level of water to protect this crown sheet from ever, for even a minute, becoming dry, for that is the moment that sets up for an explosion. But also too deep a flood of water in a boiler made it difficult to "steam up" a boiler. It was a managed "balancing act" to sustain the proper water level.

A disastrous condition occurs when the crown sheet is not covered with water because the heat of the fire softens this thick piece of steel, allowing it to melt, split, or give way at its connections to the main structure, resulting in the emptying of boiler steam and water down into the firebox.

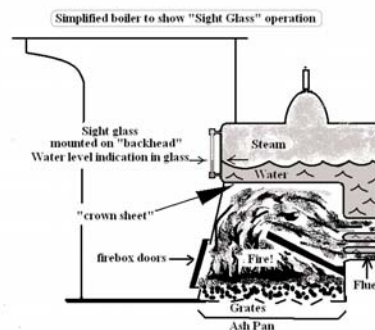
The downward blast is terrific, allowing steam and boiling water already at 150 psi (often greater) to rush against red hot metal, causing a sudden additional increase in volume of steam and pressure to roar away into the firebox.

Firebox butterfly doors as heavy as manhole covers blow off, the boiler structure itself ruptures, often sending the boiler shell tearing loose and rocketing upward, high into the air and falling at a distance of 300 feet from the remaining locomotive chassis. If the explosion doesn't tear off the smokebox structure, the boiler disgorges its

internal flues, leaving them still attached and looking like limp spaghetti on the locomotive chassis that remains.

The cab often is crushed against the tender, and God help the cab crew who if not mercifully instantly killed, lie scalded at no great distance to spend days of painful recovery or eventual demise in a hospital. It is a horrifyingly desperate situation.

There could be a number of causes. crew inattentiveness to water level, clogged water feed lines, inoperative feed water injectors or broken control valving, and damaged sight glasses which had been shut off to prevent leaking, being the most common causes to allow low water problems.



Boiler (crown sheet) failures are surprisingly numerous in the annals of railroading history. In 1911, the U.S. Congress passed the Locomotive Boiler Inspection law. Prior to that, explosions were just considered horrific events the prevention of which relied upon the individual railroad operators for maintaining their own "inspection standards". One major railway recorded 32 boiler explosions in the 37 year span following the enactment of the 1911 boiler law. The last explosion being recorded as late as 1948, just before most steam locomotives were replaced by diesels.

"Unexplainable" Boiler Explosions

But some explosions went for a time "unexplainable". Engineers assured inspectors in deliriums from their hospital beds that, "There was water showing in the glass when she blew!" However of those few crewmen in the cab who survived, the disasters were so sudden and confusion was so great, that it took some time to discover the details leading up to these catastrophes.

A vertical sight glass piped into the rear of the boiler, the "backhead", indicates the level of water that covered above the crown sheet in the boiler. "Water in the glass" was assumed to have indicated there was water atop and covering the crown sheet.

Treasurer's Notes

Continued from page 2

During the month, MLS train crews made 31 trips carrying 484 passengers.

The public rail fans appreciate the effort of the dedicated station and train crews. Ridership is greater than in the same period last year.

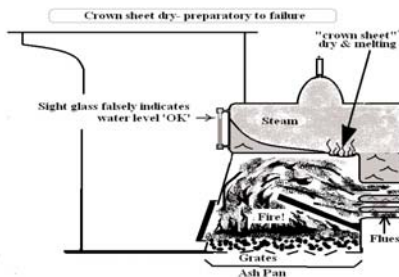
Saturday, September 29th, was Railroading Day at Adobe Dam Railroad Park for Cub Scouts in the Grand Canyon Council. Six trains made a total of 30 trips carrying 413 happy passengers. Thanks to the following MLS members who made this a day to remember for one and all: Jim Ashcroft, Frank Behrle, Cliff Fought, Hank Gallo, Perry McCall, Larry Messing, Jim Salo, Marty Simon, Bill Unglaube, Dick Wieboldt, Ed Willekins and Station Master Bud (Count Off) Waterworth.

Many guests also took alternative transportation to the Sahuaro Central Museum while weeds were being removed from the right of way on the Pottsville Subdivision.

I will place an order for rail after the October meeting. Members who want to order rail should contact me immediately.

Bob

But details finally emerged to explain the “unexplainable”. Some engines just prior to the explosion had been working a heavy throttle with their reverse levers hooked up about half stroke. A strong forward lurching of the engine was discovered to cause the water on the crown sheet to slosh to the rear, piling up against the backhead. This condition resulted in a false sight glass reading, since the water that rushed to the rear filled the sight glass to a “safe” level, all the while momentarily allowing the front of the crown sheet to become “dry”.



Dry crown sheets quickly overheat to a failing point on a hot, working engine. When the water that had piled up against the backhead eventually returned forward over the red hot crown sheet, a superabundant burst of steam and pressure resulted, blowing out an already weakened crown sheet. Kaboom!....

The solution was to extend the sight glass piping forward into the main body of the boiler water, thus showing a true level far forward from the backhead, and eliminating this false reading caused by the “slosh”. Nevertheless, prudence on the part of the engineer and fireman was still required to keep water level “balanced” at a safe and sane level.

The Cylinder Valving Problem

Piston-type valving was new, greatly improving cylinder breathing over the old slide-type valve arrangement, which had difficult maintenance procedures and inadequate lubrication.

Stevenson valve gearing needed excessively large driving eccentrics on locomotive axles for proper valve throw. At high speed, this increased the velocity of the rubbing surfaces which in turn tended to overheat. The only remedy was larger drivers that reduced the velocity of valve gearing; but the consequence of doing that caused a higher center of gravity for the locomotive: another undesirable result. The extremes of existing locomotive designs were reaching

physical limits.

Anticipated Valve Solutions

A number of railroad engineers were working on improved valve mechanisms: Young, Baker, Southern, and Walshaert. By reducing the springing and “bending” of valve levering, new efficiencies would benefit the problem of valve adjustment losses.

Rotary and poppet valves forecast a solution to these present problems, but unfortunately they would come on the scene too late.

The Locomotive Size and Weight Problem

Additionally, any greater size and weight of locomotive systems, resulted in a correspondingly greater thrashing of larger counterweights, side rods, valve gearing, and overall locomotive weight that pounded destructively on rails and roadbed. The machine’s shimmy, wiggle, and bounce became a condition working against lubrication, wear, and longevity of the locomotive’s framework.

This plethora of cross-acting movement plays havoc with bearings and valve adjustment. It speeds up the metal fatigue timetable. Main frames, cylinder castings, spring hangers, the fit of piston-to-cylinder, and even cab and boiler structure suffers from these accumulating, counter productive forces.

So, locomotive structures were made stronger, which in turn became heavier, and correspondingly more self-destructive. This cascading effect was creating a muscle-bound monster, and the “Catch 22” condition became worse.

More Fuel Capacity, More Water For Steam

In addition to heavier locomotives, tenders contained such increasing volumes of water that weight of motive power increased to the limit of roadbed capacity. The Mallets could weigh out at 200 tons! Tender water capacity reached 10,000 gallons.

Modern lightweight materials and roller bearing axles help lighten locomotive equipment weights and eased their rolling friction, but water and fuel still weigh the same. Things were becoming too big, too heavy, too costly, too unwieldy.

Compound-Cylinder Solutions

In an attempt to more efficiently utilize instead of waste steam, designers tried various types of cylinder compounding. Through the use of high pressure cylinders

that released their partially spent steam power into secondary low pressure cylinders, every bit of energy could be squeezed from available steam. Their hope was to use steam “twice” before releasing it to the atmosphere,

However, the grand idea of compounding had finished by the 1930s, after it was discovered that compounding became equally “complicated” in the valving process across greater speed ranges. Most engines were converted back to “simple” cylinder arrangements.

“Hotter” Steam Solution

A clever and successful engineering step in boiler improvement devised “superheated” steam. By running the steam one last pass through the boiler flues before admitting it to the throttle valve and cylinders, a “hotter” grade of very dry steam could be obtained.

It was said, with much truth, that a Santa Fe’s Mallet (2-6-6-2 wheel design) could, after its frame and cylinder castings had been strengthened, pull everything a yardmaster could put behind it, but no faster than 30 mph. Again, the back pressure and “muscle bound” problem had become an obstacle..

Business Complexities

Not only design engineers were concerned with steam demands. Top management, heeding its comptrollers, accountants, and personnel departments, was similarly becoming conscious of the costs required by fine-tuned fast and powerful steam, and the vast army of employees needed to maintain and operate such labor intensive machinery.

Unionized “brotherhoods” of tradesmen, considering their futures secure, frequently struck for ever increasing wages, benefits, and perks. Increasing labor demands caused tremendous expense to the operating company. The brotherhoods, too, became a part of the railroad’s increasingly muscle-bound financial predicament.

In general, operating costs-versus-income ratios, as well as the complexities of the steam locomotive itself, were reaching a self-defeating point.

Forewarning!

Obvious to many was that steam locomotives were nearing their end. Abraham Lincoln had expressed this idea long ago in one of his historic speeches: “...the dogmas of the quiet past are inadequate for the stormy present... the occasion is piled high with difficulty... so the occasion is new, we

must think anew... and act anew. We must disenfranchise ourselves."

Disenfranchise themselves with external combustion, they did. Thinking anew brought forth internal combustion, as the railroads began to turn toward the internal combustion diesels.

Within a period of about 10 years, Santa Fe's magnificent stable of steam locomotives was nearly all replaced by diesels. The nobility of steam had crumbled; the icon of fire and smoke and boiling water fell to second place.

The diesel revolution for Santa Fe began in 1936 with an experimental switch engine delivered from the Electro-Motive Corporation. Soon, the spirit of change infected its well established steam fleet, and the changeover to diesel swept through Santa Fe roundhouses like the Black Plague across Europe.

New Opportunity

The large railroads were first to follow the trend from ungainly steam to modernized diesel. Engineering problems that were strangling steam motive power quickly disappeared. Shop repair spaces freed up,

labor-intensive maintenance programs cheapened, roadbed damage decreased, motive power on the head-end lightened in weight, even the ability to "gang" diesel locomotives with only a single operating hand at the throttle of the lead engine simplified train handling.

Surplus personnel were dismissed as job skills required by diesels changed, with many jobs even eliminated. The once-important position of being a "firemen" drastically changed, to eventually be eliminated.

The maxim of Victor Hugo came to pass: "*No army can withstand the strength of an idea whose time has come.*"

The splendid age of steam railroading had seen its day. The brilliant visual evidence that there exists a god of fire in clouds of billowing steam, pillars of dark smoke, blazing fire boxes, and aura's of radiant heat, was disappearing. The fire god had been encased under cast-iron cylinder heads of the internal combustion engine. The genie had been stuffed back into his high compression bottle.

The god of mechanical dynamics too

would be encased. His realm of flashing connecting rods and thrashing eccentric levers was likewise concealed under tin rocker covers, hidden within crankcases, or mysteriously performed within electro-magnetic motor cases.

Even the sound of the era, "choo-choo", was silenced. The new voice of railroading was subdued to a deep grumble and growl of the diesel-electric, the whine of its cooling fans, and a juggernaut of multiple engines pulling endlessly long trains just rolling along, "clickity-clack", with hardly a trace of muscle and dynamism.

Ah, the fallen magnificence! The Titans of Fire, the Mechanics of Steam, and the siren Voices of Railroading wafting across the meadows and valleys were imprisoned, muzzled, and muffled, losing all their splendor and spectacle of ostentatious vitality.

For railroads the steam problem had been solved by the growling diesel rolled along powerfully, but only monotonously emitted an unromantic "blatt-blatt" of air horns. Railroaders had to adapt themselves to loving this new "...idea whose time had come."



Northbound "Hassayampa Chief," pausing in Glendale, Ariz. in 1953 behind two "Geeps" is gearing up for the mountainous 3-percent curvy trip up the "Peavine Route" to connect with Santa Fe's mainline at Ashfork, up in the "Rim Country." Soon it will be "First Call to Dinner." Our train No. 42 is expected to reach Ashfork on schedule at 11:15 p.m.



2008 MLS Membership Renewal Form

Please submit promptly

Please complete this application and mail it with your check to:

Maricopa Live Steamers

Attn: Bob Douglas

17017 N. 12th Street, Apt. 1045

Phoenix AZ 85022-2809

If you fail to pay by December 31, 2007, your membership may be terminated.

Notice: There is a new optional annual charge of \$25 for the personal use of club locomotives or rolling stock. This is needed to offset the maintenance cost of club equipment.

Your annual dues pay for club operation and facility maintenance only. All club improvements and railroad expansion are supported by public and club-member contributions which are tax deductible. The major projects for this year are Adobe Station Sidewalk, West Yard Turntable and Far Flung Flats subdivision. Your generous support is greatly appreciated.

Initiation Fee (New members only)	\$50
Regular Membership	\$75
Non-resident Membership	\$30
Spousal Membership (Please list name below)	\$10
Junior Membership (Younger than 18 years)	\$10
Club Locomotive Fee (First year only)	\$100
Annual Locomotive or Rolling Stock Usage Fee	\$25
Additional contributions to support club projects:	
New Club Locomotive	_____
West Yard Turntable	_____
Far Flung Flats Subdivision	_____
Other (Please describe)	_____

The following information will be used to produce a membership roster. It is not made public and is distributed only to MLS members:

Member Name: _____

Spouse's Name: _____

Junior Member Name: _____

Is the information is the 2007 Roster correct? Yes No

If not, please make corrections below:

Email address _____

Address: _____

City, State, ZIP: _____

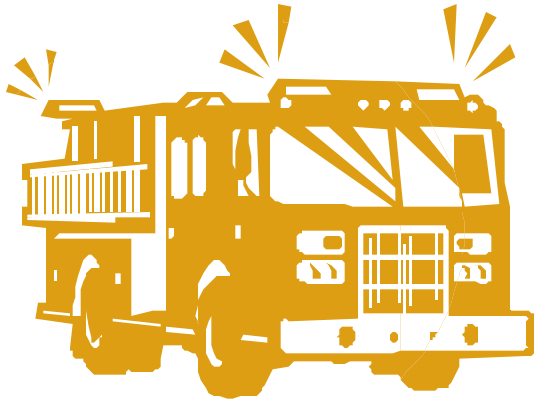
Home Phone (Optional): _____

Cell Phone (Optional): _____

Work Phone (Optional): _____

Do you have equipment stored on MLS property? Yes No

TOYS TOYS TOYS
WE NEED TOYS



&



Local 493

Maricopa Live Steamers
ANNUAL TOY DRIVE



Saturday, December 8 & Sunday December 9, 2007
12:00 Noon to 5:00 PM
PLEASE BRING TOYS TO THE CLUB HOUSE
BEGINNING OCTOBER 22, 2007
OR MAKE A DONATION FOR THE PURCHASE OF BICYCLES
Contact: Betty Moore, 623-687-7395
OUR 2007 GOAL: 75 BICYCLES

News from the Toy Drive Chairman



The 2007 MLS Toy Drive will be held Saturday and Sunday, December 8th and 9th, from noon to 5:00 p.m. We need volunteers to run the public on both days. We also need Toys. Again, I am counting on your help.

We are currently collecting donations for the 2007 Fall Meet Saturday Night Raffle. Please bring your donations to the clubhouse. There is a table set up to receive your items.

On October 22 after the meet we will begin collecting toys for the Toy Drive. A table will be set up in the Clubhouse with special signage for the collection.

We are also collecting funds to purchase bicycles. We donated 58 bikes last year. Our goal for 2007 is 75 bicycles. Please give your donations to me. I will give the treasurer a list of the donors and amounts donated.

Such a deal! Just \$35.00 will buy one bike, \$175 will buy five. Please be generous. Christmas is all about the children, and so are we.

Big kids (that's us) having fun, helping each other, and keeping the smiles on little kids' faces.

Happy rails to you, until we meet again,

Betty Moore

STACK TALK

is the official newsletter of the
Maricopa Live Steamers
Railroad Heritage
Preservation Society
Editor: Charles Downs
3142 N 62nd Street
Scottsdale AZ 85251
602-326-4867
cmdowns@cox.net

We welcome your comments,
suggestions and submissions.

MLS CALENDAR

Saturday, October 13

9 a.m.: Board Meeting

10 a.m.: Membership Meeting

Sunday, October 14

Noon to 5 p.m.: Public Rides

Thursday - Sunday

October 18 - 21

2007 Fall Meet