JEWELRY MAKING

GEMS

AND MINERALS

JUNE 1976
SEVENTY CENTS
E UNITED KINGDOM 35p

OFFICIAL PROGRAM ISSUE

"SPIRIT OF '76"

San Francisco, California GEM and MINERAL SHOW July 2, 3, 4, 1976

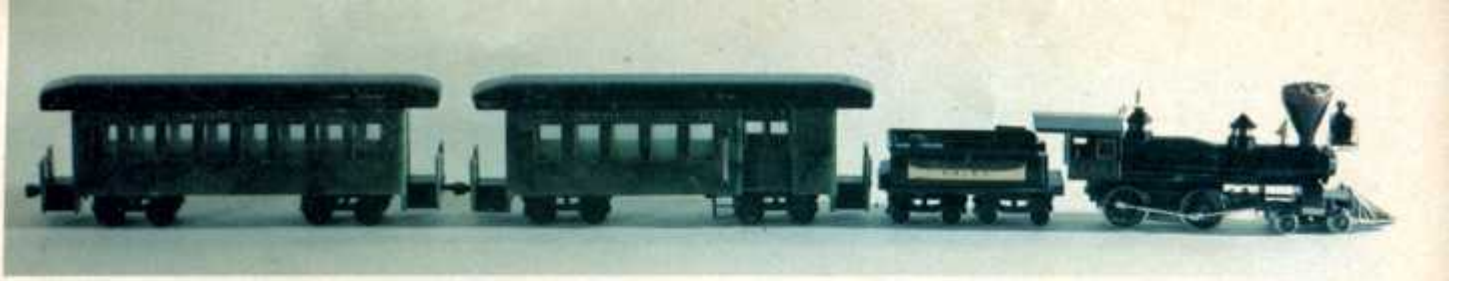
Handbook Of Jewelry Craft

A Train Carved In Jade
See It Run At The San Francisco Show

Create A Still Life In Gemstone

Gold Collecting In California

THE MAGAZINE THAT SHOWS YOU HOW



Our Cover . .

The Jade Train

By Faith E. Riesen

President, San Francisco Gem and Mineral Society
Publicity Coordinator, Spirit of '76

A year and a half ago one man, Richard Dierx, presented the challenge of an idea to members of the San Francisco Gem and Mineral Society, Inc., and he and his Co-Chairman of the project, Les La Berge, gathered around them a number of skilled and creative lapidary craftsmen. The problem presented to the group lay in the construction of a train of jade to run electrically and to be a feature attraction of *The Spirit of '76*, the California Federation of Mineralogical Societies 37th annual convention and show, July 2, 3 and 4, 1976.

Cover Photo
By Ralph Elliot
Ramell, Inc., San Francisco, California

Photos for Article
By Richard Dierx
Show Chairman, Spirit of '76

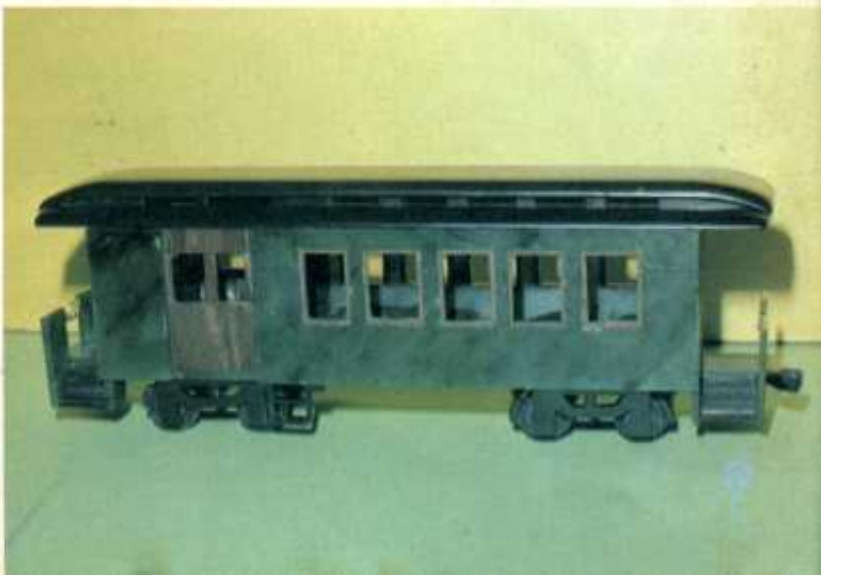
The scale of the engine, tender and two cars is model railroader's O gauge, which measures ¼" to the foot. This unique train is modeled after the century old steam engines of the Virginia and Truckee Railroad, so active in the California and Nevada bonanza days. Henry Campbell was the inventor of the swivel four-wheel leading truck, creating the 4-4-0 wheel arrangement used by Baldwin and Cooke in their American Standard coaches. The design of the Genoa was always thought to be one of the most beautiful of the old locomotives, and so this particular engine was selected as the model for the project.

It turned out to be a difficult and very time-consuming job, requiring hundreds of man-hours on the part of sixteen men and became increasingly difficult at the death of Jim Norton, the draftsman and coordinator of the project, and the hospitalization of three other committee members.

A model kit of the Genoa was purchased at a hobby shop. Some of the parts, such as electrical components, were used while the major share of the train was reproduced in jade. Some drawings accompanied the plastic kit parts, and other sketches and plans were made by Jim Norton as the project developed.

One of the problems encountered was the probability that the jade would weigh 20 to 25 pounds more than the usual model train and that the size of the motor might have to be adapted accordingly. It was decided that a double reduction gear motor would be needed for the engine. This problem still has to be faced on a general test run around the track. However, a second motor, if needed, can be placed in the coal car (engines in tandem). It was decided to use the metal wheels that came with the original model, since they have slightly tapered rims and will be more effective on the electrified track. The weight that was present in the

Continued on page 46



Jade Train . . .

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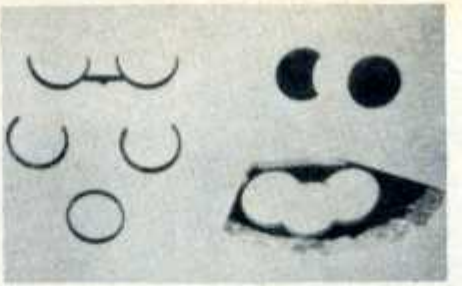
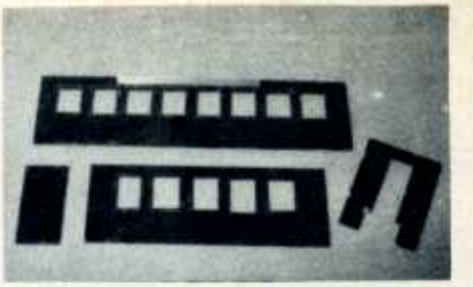


Wheel fenders were cut from the black jade slab with core drills.



British Columbia jade was used for the sides and ends of the train cars.

plastic model of the Genoa, used for traction, will, of course, NOT be necessary in the stone model. The plastic model was held together with screws, nuts and bolts, but in the jade train, epoxy cement was used as the bonding agent.

Generous donations were made by many friends of the San Francisco Gem and Mineral society as well as by members of Porterville jade, Edwards black Wyoming jade, Mariposa jade, Clear Creek jade, British Columbia jade, Storm Mountain jade and Burmese jadeite. Also, another donation of slabs of clear Brazilian quartz for windows was received.

The equipment used during the construction of the engine consisted of conventional lapidary machines: saws, grinders, sanders — and specialized equipment such as, mechanic's lathe, drill presses for coring, flexible shaft machines for the close fitting of parts, faceting head for use in the preparation of the headlight, as well as homemade equipment, particularly in the coring of cylinders, when the usual machines could not do the job. In reality, the locomotive can be considered a three-dimensional intarsia, and the Train Committee was indeed fortunate to have Andre Pancheco, with considerable prior experience in intarsia, in charge of the coordination of the project, following the sudden and untimely death of Jim Norton. All cementing of the engine parts, except for minor parts, was done by Andre.

All of the stone parts for the engine were made of black Wyoming jade, with the exception of the window frames in the cab and the top rim of the smoke stack, which are California red jasper. Since not all kinds of jade used would take the high mirror polish of the Wyoming black, it was decided that all surfaces would be ground and "high sanded, 600 worn," resembling iron or steel that had been painted black.

The roof, made in two parts, and the main structure of the cab consist of 33 individual pieces. After cementing together all these separate parts, (the Epoxy 300 cures in one hour), the entire cab had to be lapped so that all surfaces became flat and even. Bevels were made on each corner. The tiny pieces of red jasper, fitted in as window trims, presented quite a challenge, in order to avoid breakage while working. In fact, Andre reported this as probably the most difficult piece of lapidary work that he had ever done! The epoxy was colored black by mixing it with ground graphite from a lead pencil.

The engine boiler consists of four separate pieces which were core drilled inside and outside by Henry Reinecke (a member of the San Francisco Gem and Mineral Society since 1950, who also worked many years ago on the Jade Clock, which will be exhibited at *The Spirit of '76*). Special core drills were made for the project. According to Henry, synthetic is not as good as natural diamond for core drills. Copper tubes were sized by splitting and silver-soldering them to specifications. No. 90 grease held the 100 mesh diamond on a hardened steel block. The tube was rolled on the block, and the diamonds were pressed in. Outside measurements at the thickest part of the boiler are 1¼" and 1$\frac{1}{16}$" at the thinnest. The thickness of the wall itself is $\frac{3}{16}$".

Copper and brass sleeves had to be cut on a metal lathe to fit inside the boiler sections so that they could successfully be cemented end to end. Two of the cylinders seemed a bit off center, and the metal fittings act as an inside brace. A slot was cut in the bottom of the boiler for the placement of the motor.

In addition to the cab parts, the rest of the engine totals another 20-30 separate pieces, all individually worked to scale. The bottom curves of the black Wyoming jade sand and steam domes were rough ground on a silicon carbide wheel and were later finished on aluminum cylinders charged wth 100 mesh diamond grit. The bolster, which supports the boiler, also was made of black jade, and the front truck of the engine was actually bolted to the boiler through the bolster; two holes had to be drilled in the boiler for this fitting.

The two running boards along the sides of the engine were also constructed of black jade and consist of three pieces cemented together, one atop the other, in $\frac{1}{8}$" thicknesses. They are each about 5" long, ½" at the widest spot and $\frac{5}{16}$" in the narrowest. The required holes were cored out and later made square so that the engineer's cab floor seat could be placed therein. The bevel on the running board is 45° all the way around. The bands that fit the grooves around the boiler and attach to the running boards, are gold wire.

The black jade wheel fenders for the train were actually made by using core drills; observe the resultant half-moon rims. The material selected for the smoke stack was also black jade, with red jasper for the top rim. It was decided to core it, to have it hollow to keep down the weight of the engine. The inside diameter of the stack is 1¼". It fits into proper position on the boiler by setting on a pin. The cast sterling silver spark catcher on top was not gold plated, so as to simulate a natural smoke-staining.

In the design of the back of the boiler, or fire box door, a decision was made to use a small diamond drill to make holes simulating rivet heads. The depth was set for the drill press at $\frac{1}{16}$" and water for the drilling process itself was applied with an eye dropper. It was felt that there was sufficient contrast between the sanded and unsanded surfaces so that paint in the area of the "rivet" holes was unnecessary.

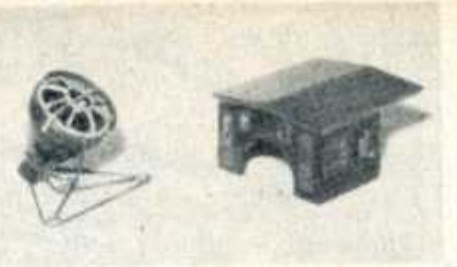
Burmese jadeite was used in the making of the main drive rods of the engine's big wheels. The brake shoes were made of Wyoming black jade.

The design of the engine's headlight itself was pure genius! Rather than use a tiny bulb within the Wyoming black jade small cored frame with apertures, George Cross decided to try a completely new approach. He planned to facet a stone from a spectacular piece of Uruguayan quartz. When completed successfully, it was placed in the center opening of the headlight frame, mounted in a gold plated bezel. The diameter of the finished stone is 11.25 mm on the girdle, and the table is 7.5 mm. A basic brilliant cut has been used, generally speaking, but it was modified with the crown and girdle facets to a certain degree, so as to emulate the lens of a headlight. The back aperture of the jade frame remains open for proper light penetration through the stone and is very effective as the locomotive moves around the track.

The silver cowcatcher of the engine was fitted down over the plastic model. Pins were then soldered into the cowcatcher and also into the framework of the engine.

Franz Roth's basic approach to the construction of the tender was to carve a box the same width as the locomotive itself. Quarter-inch thick slabs of black Wyoming jade were ground down to $\frac{1}{32}$" in thickness and the sides were cemented together. However, since the coal car is really *not* a box, Franz found that he was actually working upside down. The car had to be made demountable, so that the truck could be attached underneath with a cross bar of jade. The cover was made to slip in and out. One of the problems encountered in this construction was that of a *double corner* (two curves) on the back,

Parts for the boiler and the tools used for coring them.



The smoke stack and the finished cab.

The headlight, its base, and parts of the engine cab. All were done in black jade. The trim around the cab windows is red jasper.

Multiple parts for the engine — the cab and its roof, small components, running boards, a core drilling for part of the boiler, and the smoke stack.

The undercarriage of the engine, cast silver cowcatcher, partially assembled engine and small parts.

where the flanges lean out at an angle.

Black jade was also used for the tool boxes. A flat plate was mounted on top of the springs under the tender so that it could swivel easily. Holes were drilled in the base of the coal car — two of 2mm diameter and two of 3 mm. A 3/32" rod goes in these holes to carry the connectors.

Black jade was used for the connector between the coal car and the engine. The coupler was put on permanently with screws, in front of the tender, and a draw pin was used on the back of the engine. A special nut and bolt to hold the coupler also had to be constructed.

Frank Gemmell, a member with much experience in carving, as well as intarsia, and in charge of the construction of the two cars, started his work with a high degree of optimism which was, however, quickly quenched. The approach originally considered — that the cars were only boxes with a few appurtenances attached — was soon changed as many problems began to arise. The necessity of adopting machine shop practices to lapidary work required the design of a multitude of jigs and fixtures, many of which were used for only a few minutes but were, nevertheless, necessary for the required precision. Many drilling and cementing fixtures were needed. Few parts could be done in advance; mostly, it was a process of making and cementing two or three pieces at a time before the next one could be designed with any degree of accuracy. Many were the parts made and later discarded because the jade proved to be inferior or unsuitable, or because that well-known last minute fracture occurred. One of the biggest problems encountered was working with slabs of British Columbian jade, where the white "feathers" caused periodic chippings out - of 1/8" thickness and even occassionally less than 1/16". Material of the highest quality and special techniques lapidary work were required.

The passenger coach is comprised of 168 separate parts, and the second car — a combination passenger and baggage coach — has 132 parts, all of which had to be fitted together with a high degree of precision. Together, they took approximately 1500 man hours of work. The pieces were assembled in demountable sections to allow for disassembly in the event that repairs might later be necessary. Most of the material used for the sides and ends of the cars is British Columbian jade, with California red jasper trim around all windows. The roofs are black, with carved out areas for ventilators. Petrified wood was used for the baggage car door. The floors were made of Clear Creek jade slabs.

The trucks under the coaches, tender and engine are of the finest Wyoming black jade to be found, but the wheels and axles were taken from the original model itself. It was deemed impractical to cut in jade all the critical angles and spacings needed. Jim Norton also worked on specific metal parts needed for the trucks.

Jack Zari rounded the roof sides, which were placed in position under the ventilators. The bodies of the cars measured 9", with 1½" overhang to the roofs. Cement used for the cars was Alpha Cyanic Acrylic. The overall length of the entire train setup is about 36".

Gold plating and silverwork for the train was mainly done by Mike Schisler. The main exception is the spark catcher atop the smoke stack, cast by Paul Jacobson. Cast items include identification plates, the train bell, the hand brake - or spinner, the handles for the sand dome and certain letters for the train. Silver wire work forms the cowcatcher. The metal name plates for the cars were engraved by Al Sims, then antiqued so that the letters would stand out. Gold plating was done on the following items (and some had to be copper plated first, if not already made of silver): the bracket holding the headlight, the grab bar and chain on the baggage car, the handles for the sand dome, the rings for the sand and steam domes, the button at the end of the boiler, and the two cylinders driving the piston.

A timer will be used to start and stop the Jade Train. There will be a space for the electric controls underneath the 8' by 4' oval track layout board.

Members and some of the projects on which they worked are: George Cross, light and front of the boiler; Jack Zari, journal boxes for trucks, sand and steam domes, brakes shoes; Al Clayhold, smoke stack, bolster; Dick Dierx, drive rods; Evan Robinson, running boards; Henry Reinecke, all coring and drilling; Andre Pancheco, cab and boiler; Mike Schisler, gold plating and casting; Paul Jacobson, casting of some metal parts; Frank Gemmell, cars and some trucks; Al Sims, name plates; Charles Hoffman, seats, fire box cover; Lee Guth, flat lapping and work on cars; Paul Manon, track layout; Walter Koniuk, steps for the coal car and watertower; Cecil Westman, protective shield for entire display.

Come and see the jade train running. (It's the firts of its kind, we believe) at the *Spirit of '76*, the 37th annual California Federation of Mineralogical Societies show, on the big Fourth of July weekend at the Cow Palace in San Francisco, California. For more information, refer to the official show program and other articles in this issue.