

Southern Pacific Bulletin

FEBRUARY 1922



SACRAMENTO GENERAL SHOPS NUMBER

From Bolts to Walking-Beams at Sacramento

Wide Range of Activities Found at Our General Shops. Came Into Existence with Pioneer Road and Grew with Southern Pacific Lines

By A. D. WILLIAMS

Superintendent Motive Power Northern Division

WHENEVER one pauses to consider the history of the organization and growth of the Southern Pacific Company, the Sacramento General Shops should be remembered, for they sprang into existence with the parent organization, the Central Pacific Company, in 1863 and have kept pace with the growth of the Southern Pacific Lines.

In 1863 these shops employed about 15 men in the Car Department and about the same number in the Locomotive Department. The first permanent buildings were erected in the years 1868 and 1869 and formed the nucleus of the present plant. The shops now cover an area of approximately 145 acres and employ a normal force of 3100 men, this growth spreading over a period of over half a century.

Since the beginning repair work on locomotives and cars has been taken care of and the production of new equipment followed up at the same time. The first locomotives to be built at these shops were 10 freight locomotives and two passenger locomotives in the years 1872 and 1873. From then to 1888 a large number were built, the most of them being "Monkey Motions." These did away with the "Stephenson" or link motion, and were quite similar to the "Walschaert" motion of today. During the world war the difficulty of obtaining rolling stock and the high price of the same made it imperative that we help ourselves and from 1917 to the present time 53 locomotives have been constructed in these shops.

First "Twelve Wheeler"

In 1882 a "Twelve Wheeler" was built which was at that time the heaviest locomotive owned by this company. It weighed 69 tons and had a tractive power of 29,140 lbs. Today we have single engines weighing 193 tons with a tractive power of 75,150 lbs. and Mallet or articulated engines weighing 219 tons with a tractive power of 94880 lbs.

The first passenger cars operated by this company were shipped around Cape Horn in sections as were the locomotives and put together at Sacramento. These cars were 42 ft. long, little larger than a box car, with flat roofs and wooden seats of the plainest character. Since then constant improvements have been made. In 1847 twenty first class passenger coaches were built which were acknowledged at that time for design and workmanship to be the best and neatest in America. Many cars have



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been built since but none have given better service or longer life. Several of these cars are still in existence in our Maintenance of Way service.

The first private car was built about this time for Supt. A. N. Towne. In 1876 a number of short street cars were built for use in San Francisco as there were no car builders on the coast at that time. In 1883 the car "Stanford" was built for the sole use of the late Governor Stanford. This car when received at Washington was acknowledged by all eastern car builders to be the finest and best built car in America. Every convenience which could be thought of at that time was installed in this car. The interior was finished with choice woods. The frame work was of white oak and the workmanship of the best. In 1906 this company built its first all steel passenger car. This car is No. 1806 and is still in service. The next year we built an all steel postal car, C. P. 4097 besides having an all steel body and underframe the inside lining was of fireproof construction and an electric lighting system was also applied. This car is still in service and no material changes have been made in it.

A very large number of freight and non-revenue cars have been constructed in the last 40 years. In the last four years about 3000 have been constructed.

Steamer Machinery

While a good many of the steamers which this company uses in the

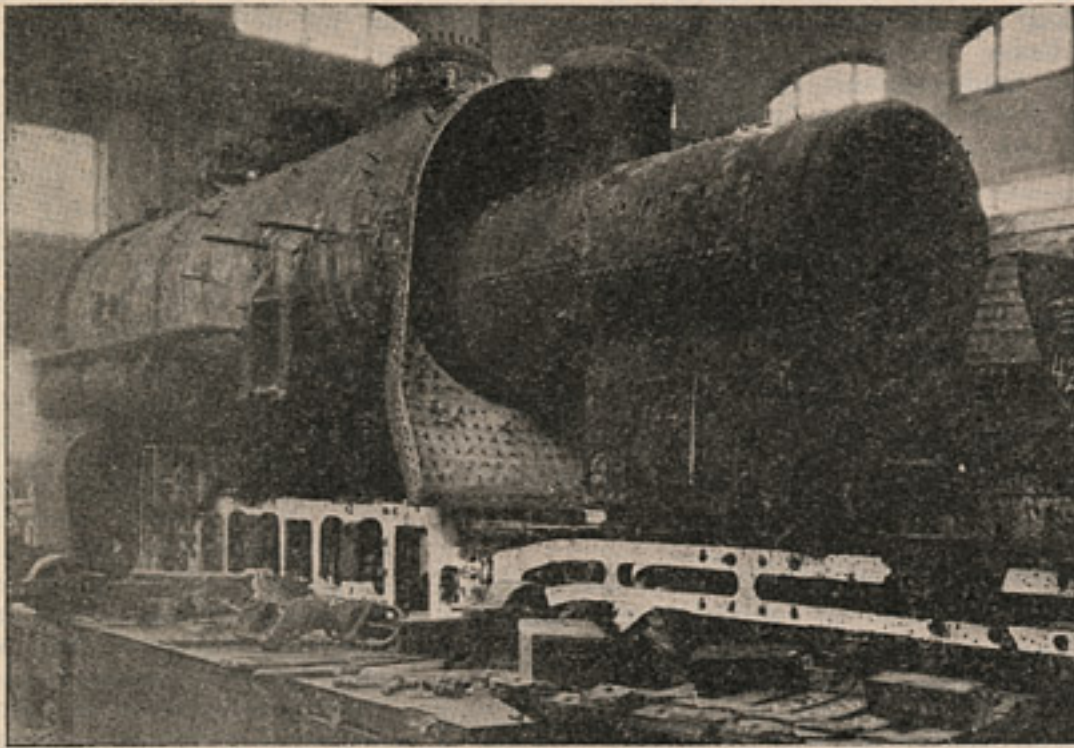
Bay and River service were purchased, a very considerable number of them have been built at the Company's ship yards in Oakland and the most of the metal work furnished from Sacramento shops. The boilers and all metal work for the steamer Solano with the exception of the engines proper and the wheel shafts were gotten out here. At the time this boat was built in 1879 it was the largest car transfer boat in existence. About the same time all the machinery, boilers and metal work for the river boats Modoc and Apache was gotten out at these shops. In later years the machinery and boilers for the Seminole, Navajo, Thoroughfare, Alameda, Santa Clara and Contra Costa were also built here.

In 1863 the shops proper consisted of a small repair shop for locomotives and another for cars. The machinery of the shop of Goss and Lambert on I street in Sacramento was utilized. Few years later this shop was taken over by the company and the machinery moved to the present site. An iron foundry was built which was put into operation in 1868. Since that time all the general iron casting used for cars, locomotives and steamer work have been made at Sacramento. The present foundry is divided into two sections, one specializing in wheels for freight cars and the other doing miscellaneous work.

The Wheel Foundry

When under full operation 300 standard wheels are made in the wheel foundry every day, requiring about 125 tons of molten iron. This is made from pig iron in a large furnace known as a cupola. This consists of a long steel shell, 90 in. in diameter, with a high stack. A lining of fire brick runs from the bottom to the top of the stack. Coke is thrown into this cupola, followed by a layer of pig iron, this method being followed until the furnace is full. A fire is then started at the bottom, and as soon as the lower layer of coke becomes ignited the air blast is turned on which strikes this hot coke. A very high temperature is thus obtained which is sufficient to melt the pig iron which drips into the furnace bottom. As soon as enough is collected the cupola is "tapped" and this metal allowed to run into a large pot. From this smaller amounts are taken for the pouring of the wheels. As the coke burns out and the iron melts more coke and iron are thrown in. This process continues through the day until the required number of castings have been made, when the

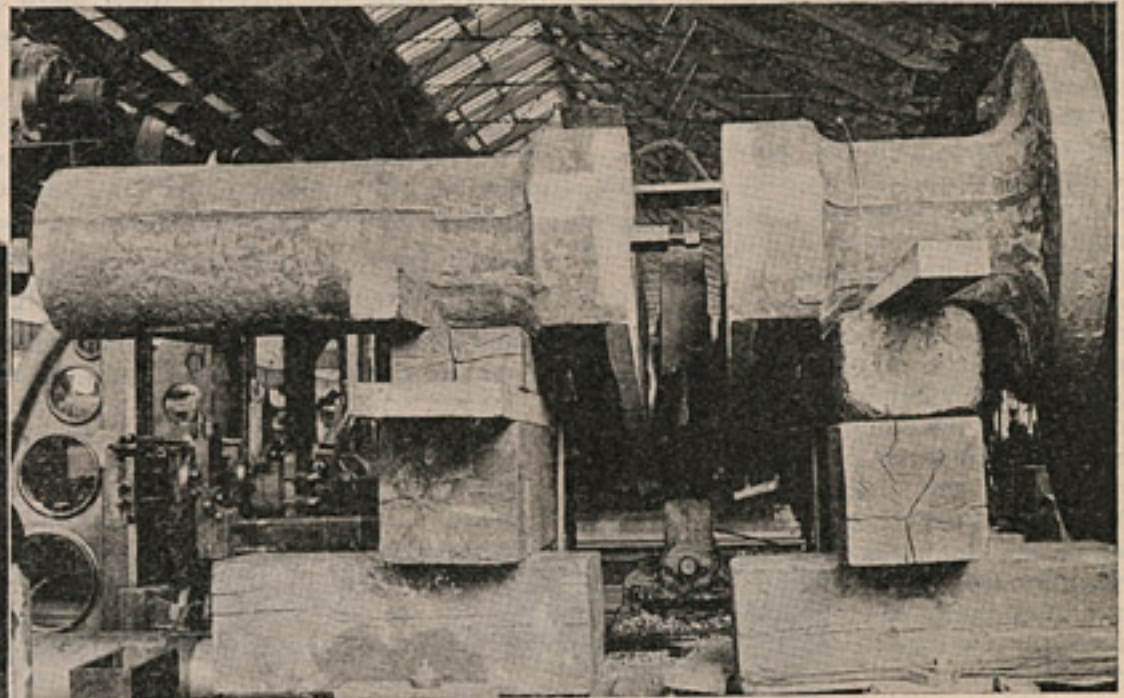
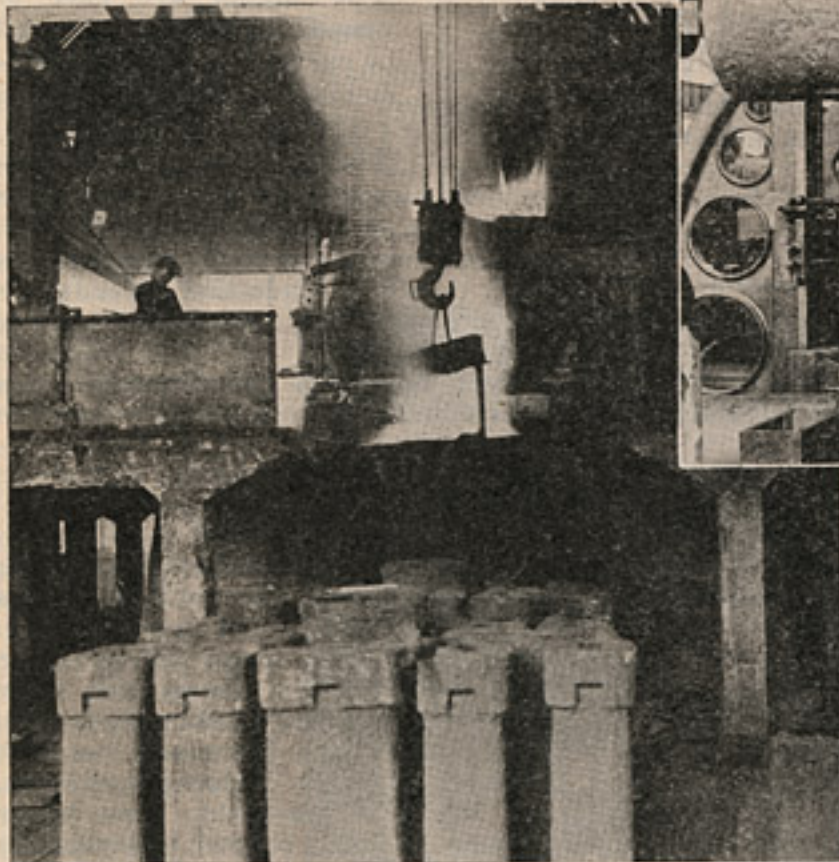
What the Camera Found at Sacramento Shops



Difference in size of the boilers of Locomotive 1611 in service in 1883, and of Locomotive 4210, in service in 1911, is indicated above. Below, the pouring of steel from electric furnace into a ladle.

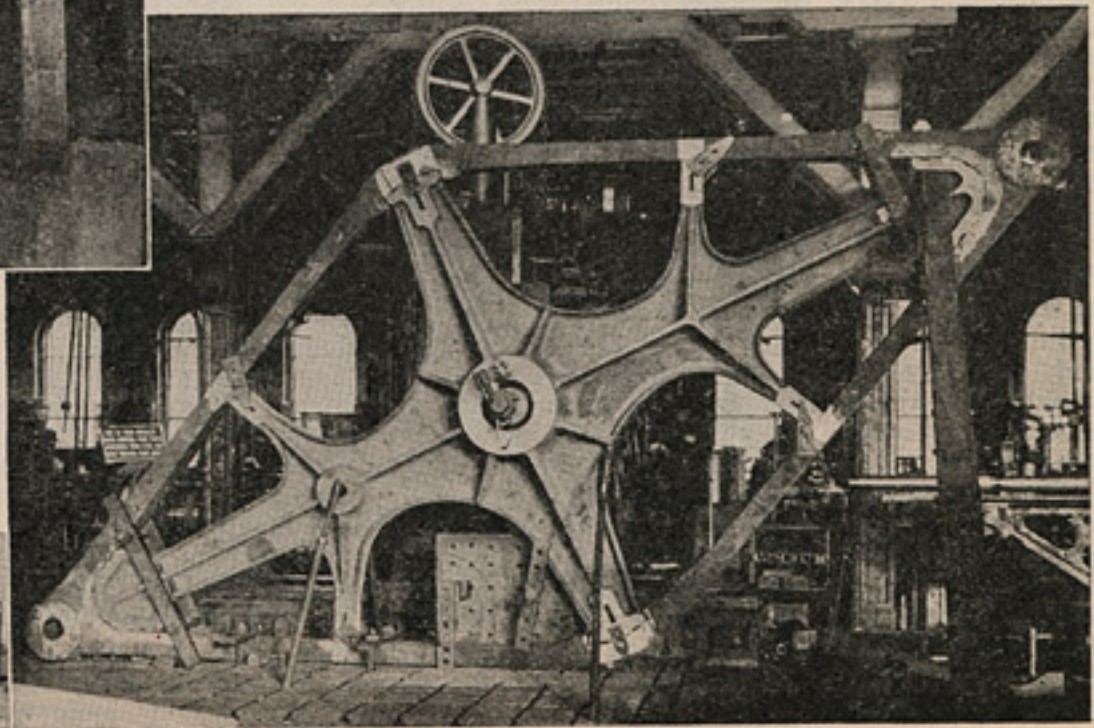


An apprentice-pattern-maker is shown above paying close attention to a machinist who is showing him some fine points.



Pieces of machinery of enormous size are handled at the Sacramento shops as shown by the picture above, the turning of crank pins for the steamer "Alameda."

Another big job is the finishing of the walking beam for the steamer "Newark," pictured at the right. The first steel car built by the Company is shown below. It was a product of the Sacramento shops.



air is turned off and the furnace cleaned, patched and made ready for the following day.

These wheels are made in sand molds, with a metal chill for the tread. When the metal is poured in this mold, the chill quickly cools it on the tread, making it "chilled" or very hard iron, the hub remaining soft and machineable. As soon as solidified these wheels are taken to the annealing pits for gradual cooling which eliminates any danger of cracking or breakage from internal strains, set up by the quick cooling of the outer layer. After four days they are taken from the pits and inspected and are given various tests to determine their strength, etc.

The General Foundry

The general foundry makes all of the general castings, of which there are nearly a half million different patterns in use by this Company. Everything is made here from brake shoes to the largest steamer casting, weighing many tons. One of the castings for which the Sacramento foundry is noted is the locomotive cylinder. This casting is very intricate, besides being of large size, and requires most careful work.

Iron for the general foundry is melted in the same manner as in the wheel end, but here the quality of iron is very soft as most of the casting must be machined. Patterns for the jobs are placed in a box, known as a flask and sand is rammed in all around. This pattern is then carefully withdrawn and the mold closed. After filling with metal it is allowed to stand until solid, when the casting is taken from the flask, the sand shaken free, and it is then sent to the cleaning room. Here the final sand is either chipped or sandblasted free from the casting and the work is then ready for the machine shop. About 55 tons of metal a day are made into castings here during the rush season.

Brass Foundry

Brass as well as iron is very extensively used in all of our work. The earliest brass foundry work was carried on in one corner of the iron foundry. It was later moved to a building by itself as the work increased and is now housed in a new building erected during the last year which has about 20,000 feet of floor space. Of the brass castings used for locomotives, cars and steamer work, about 95 per cent are made in this shop, the daily output of which has at times been as high as 15 tons. Castings are made here which weigh as

little as one half an ounce while others weigh hundreds of pounds. Journal brasses are cast, machined and lined with babbitt in this shop and as they go out are turned over to the store department for delivery to all points on our lines. Different varieties of metal are made to suit the different demands from a strong "gun metal" to meet the demands of the steam

distinguished from the repair shops proper, is the rolling mill. The late Charles Crocker, one of the builders of the Central Pacific Railroad, said, "I do not see why we cannot make anything that we need at our Sacramento shops." Working on this assumption a 12-inch rolling mill was built in 1878. At that time practically all rolled iron came "around the

"Horn" a long, slow journey. There was plenty of scrap material all around us and when the original mill was built we were able to help ourselves in the matter of bar iron and did not have to wait for deliveries. This industry has now developed until we have two 12-inch and two 18-inch mills served by 8 large reverberatory furnaces and with these we roll practically all the bar iron and steel that is used by this Company between the sizes of 1/2-inch round or square to 3-inch round, or 1 1/2-inch by 6-inch in flat section. The manufacture of tie plates the upkeep of its thousands of miles of track is also the work of the steel foundry and rolling mill. The ingots are cast in proper forms and delivered in carload lots to the rolling mills where they are rolled into long bars. These bars are then conveyed on a series of rolls to a gang punch that is equipped with special attachments which punches, loads and records the number of plates each car contains when loaded.

These mills roll 235 different sizes and shapes of merchant bars and the tonnage output is approximately 5,600,000 pounds per month.

Forge Shop

Another of our industries which is closely allied to the rolling mill is the forge shop.

A peep in the forge shop at the Sacramento General Shops will show you three mammoth steam hammers, four lighter steam hammers, two belt hammers, five air bending machines, four forgings machines, one heavy bulldozer, and several blacksmith forges, which are continuously in operation, turning out the forgings that are used on the new locomotives and new freight equipment, that the Southern Pacific Equipment Co. is now building.

Besides the forgings for the new equipment, this shop is turning out forgings of all descriptions for the repairs to the locomotives and cars of the Pacific System. Some of the different articles manufactured in this department are locomotive main and side rods, spring hangers, brake beams, rudder stocks, equalizers, draw

Success of Great Plant Reflects Spirit of the Workers

In connection with the story of the Sacramento General Shops, A. D. Williams, Superintendent of Motive Power, Northern District, writes:

BE it said after all, these shops and the vast machinery activities of which we write would be as naught, were it not for the royal, loyal men and women employed therein.

The spirit of faithfulness, interest and earnestness manifested by these men and women in earning a livelihood and the joy gleaned from doing a worthy piece of work, is the measure of the success obtained and related.

So it is at Sacramento Shops, and, so it is in any industry, the real factor of success is the manifestation of the brain power of its employees.

To these men and women then, of the rank, from the laborer up through the scale to the top-most supervision, mostly belongs the credit and honor for the accomplishments recorded herein.

boat inspection service to a "soft brass" which is to be manufactured into trimmings.

Steel Foundry

Steel, the master metal, has been the deciding factor in the world's development. From the days of the ancients, when steel was made in crude air-blown retorts, to the present time, numerous changes in the manufacture of steel have been made, some to increase tonnage, some to improve quality. The latest of these developments is the electric furnace and the largest installation west of Chicago is in the Sacramento shops.

This furnace is composed of a heavy cylindrical, steel shell, lined with brick and having a brick roof, similar to the top of a coffee pot. The bottom is made of a material known as magnesite, burned into a monolithic mass, shaped like a saucer. In addition to the furnace itself, there are innumerable auxiliary appliances for tilting the furnace, regulating the electric current, etc. At the present time this one furnace is making about 750 tons of steel a month, pouring 7 to 8 tons at a time. Of this, about 30 tons a month go into steel castings, the rest into slabs, known as ingots, for use in the rolling mill.

Another one of our industries as

bars, draw bar yokes, brake hangers, arch bars, brake rods, brake chains, brake shoe, keys, pipe clamps, roof clips, truss rods, break shafts, steps, sill steps, pinch bars, radial stay bolts and other forgings too numerous to mention.

The heavier forgings which are made for the floating equipment and the company's largest locomotives are forged from heavy ingots, under the three mammoth steam hammers. These forgings are then taken to the machine shop and finished.

Many thousands of bolts are made daily in this shop for use in the manufacture and repair of cars and locomotives in the different structures scattered over our lines, and in the track itself upon which our freight and passengers are transported.

Frog Shop

About three years ago a building was erected for the making and repairs of frogs, crossings and other track material. This work was done previously in the machine shop and blacksmith shop. This track work, from the repairing of picks to the building of the most complicated crossings is now centered in one spot. This relieved the machine shop and blacksmith shop to a very considerable extent and made it possible to greatly increase the productive capacity of these shops.

Spring Shop

Sacramento Shops can boast of a spring shop as well equipped as that of any railroad in the United States. Originally this work was done in one corner of the blacksmith shop. About thirty years ago it was moved to a building of its own, and this year sees it installed in a new and commodious building, where there is room for considerable future expansion. When in its original quarters it employed 11 men and had a capacity of about 150 tons of springs made and repaired in a year. Now 40 men are employed in this shop and the capacity has been increased ten times. All kinds and characters of springs, from one weighing but a fraction of an ounce to a heavy locomotive spring weighing 635 pounds are made here.

Pattern Shop

The pattern-maker is one of

Cover Illustration

AN activity found at only one place on the Pacific System—the making of car wheels—at Sacramento, is illustrated by the Bulletin's cover picture, showing the pouring of the metal in the wheel foundry.

The men who are pouring the liquid metal from the glowing ladle into the moulds are, reading from left to right, E. H. Cooper, molder, Tony Domich, helper, and John Pinto, helper.

The photograph was taken especially for the Bulletin cover by D. S. Joslyn, draftsman and photographer in the Sacramento Shops drafting room

the most important men in the shops. The iron foundry, brass foundry and the steel foundry have to depend upon him to furnish the pattern from which their product is made. He must take the drawing or the sample and from that build up his pattern. He not only must be a close and accurate worker but must thoroughly understand drawing and in addition understand the work in these different shops so that when his pattern is completed it can be used. Upon him the machine shop depends, for after the casting is made it must be finished in the machine shop and if his work has not been close and accurate it may be necessary to throw the casting away. In our pattern shop between 30 and 40 men are continuously employed and their work is the foundation for

the activities in the foundries and machine shops.

Saw Mill and Cabinet Shop

Another industry which is very important is the cabinet shop and saw mill. These shops manufacture the wooden parts for cars, both for freight cars and the finest passenger and private cars. During the past year 4,620,000 feet of lumber were used in getting out certain parts for new freight cars. In addition to this 7,800,000 feet were handled for other work consisting of parts for passenger and freight cars. In order to form an idea of what these shops do, it should be known that in the last year it has completed 200 office desks, made 340,000 feet of various kinds of moldings, 45,000 signal flag staffs, 19,000 freight car end and side posts, and other articles in like proportions.

General Machine Shop

This shop was first built in 1869. The size was doubled in 1872, and it was extended to its present length in 1888. In 1904 its capacity was almost doubled by adding a section the whole length of the shop for use as an erecting shop. The old erecting shop was turned into a bay for large tools and an electric crane was installed to serve them. In the new erecting shop a 240,000 pound crane was installed, which lifts the heaviest locomotives off and on their wheels. In addition a smaller crane is also used for taking care of the lighter parts. This shop is equipped with machinery for handling all classes of work needed on our lines from turning the smallest pin to the finishing of the largest shaft or cylinder on our steamers, as well as the making and repairing of all parts on locomotives.

Here you will find a lathe which will take a shaft 30 feet long or turn a piece 76 inches in diameter. Adjoining this lathe is found our last installation, a double head slotter on which we can finish four locomotive frames at one setting. Next to this is a reversing motor planer which will take a job six feet wide and 24 feet long. On this planer all frames are planed before they go on the double head slotter just mentioned. The cylinders for locomotives as well as many large jobs are handled on two large Morton draw cut shap-



Interior of the wheel foundry at the Sacramento General Shops. This is the only place on the Pacific System where car wheels are made. The wheels made here are of unusually fine quality.

ers which plane all sides, bore out the valve chambers and after the cylinders are bolted together plane a radius on the top to fit the smoke arch, by use of a machine feed which was designed here.

In addition to the above machines, this shop is equipped with many lathes, planers, shapers, vertical and horizontal boring mills, milling machines and drill presses of various sizes and capacities.

Historic Machine

The most interesting piece of machinery in the shop is a Brown & Sharpe milling machine which was purchased by the Central Pacific Railroad Co. in 1869 and has been continually in service up to the present time. This machine has been operated by the following old employees:

J. H. Andrews, 1870 to 1873.

R. A. Renwick, 1873 to 1876.

E. B. Hussey, 1876 to 1879.

H. Ingham, 1879 to 1886.

C. J. Little, 1886 to 1899.

E. S. Bechtold 1899 to 1911.

Since that time different men too numerous to mention have been turning out work on the little machine. There is only one other machine of this type known to be in existence and is now in a glass case in the factory of the manufacturers at Providence, R. I.

Another very necessary part of the machine shop is the tool room. The general idea of a tool room is that it is a place where tools are passed out to the workmen. This is correct but only reflects a very small portion of the activities. The tool room force not only passes out tools but must keep them in first class working order. They also manufacture new tools, not only reamers, taps and other small hand tools, but they make jigs for the expediting of duplicate work, punches and dies for our punches, presses, etc. to the extent of many thousands of dollars per year. While a large amount of money is spent on these tools it is money well spent as their use cuts down the bill for labor and cheapens the parts produced.

The Boiler Shop

The boiler shop is one of the most important shops at Sacramento. The boiler is the heart of the locomotive. Our boiler shop does not confine itself exclusively to the manufacture of locomotive boilers for boilers of any and all purposes are made and repaired here, and we have the reputation of making as fine a boiler as is made anywhere in the country. In addition to boilers, tenders, structural work, bridge work, and a large variety of work where plate metal is used, I beams, channels and other shapes are fitted up in this shop. Rolls, punches, shears and drills here handle plates up to 1¼ inches in thickness. The plates and other pieces which make up the boilers are sheared, punched, rolled, flanged and otherwise worked until they are in proper shape to fit their respective locations. Close and accurate work is demanded

No Increase in R. R. Expenses from Sale of Oil Lands

Money Received Used to Increase Railroad Facilities, Thus Increasing Opportunity for Employment

IN a newspaper item appearing recently it was said that some employees believed the sale of Southern Pacific oil lands to the Pacific Oil Company has resulted in an increase in operating expenses of the railroad. The following are the facts:

The operating expenses of the Southern Pacific Company have not been increased one dollar through the sale of its oil lands; instead they probably have been decreased through some employees being paid by the oil company who were formerly paid by the railroad. Away back in 1903 the rule was established that the market price of oil used for fuel should always be charged in the operating expenses of the Company. The Company has not at any time paid more than the market price and it is at that price that it is now purchasing oil and charges are being made.

The practice of the Company was adopted by the United States Railroad Administration. Three-fourths of the oil produced was and is light oil not suitable for fuel and it had to be sold for refining purposes at market prices and fuel oil purchased or exchanged for it on the basis of market prices.

The amount of money received by the Southern Pacific Company for

these oil lands was \$43,750,000. It has had this much more money to invest to provide additional railroad facilities, which means offering more opportunity for employment. In other words, this amount of capital has been released from oil lands where it was tied up and put into active railway service. It was not given to the bondholders or stockholders or anybody else, but has been put to work. The rate of dividend to stockholders of the Southern Pacific remains as it has been for many years, 6 per cent. Interest charges remain unchanged by this transaction, except that as the Company has had this liquid capital on hand its need for borrowing money has been lessened.

The lands that were sold to the oil company were not a part of the Southern Pacific's property devoted to railway operation. The value of the land itself was not included in the valuation of the property on which a return is to be earned under the Railway Transportation Act, and its revenues and expenses were kept independent thereof. The Company's fuel oil supply has been protected in connection with the sales whereby the Company pays only the ruling market prices for its fuel oil.

both for steamers and locomotives as the United States sends inspectors to look after this work and see that it is performed in accordance with the rules and specifications laid down. The State of California also has its rules for the manufacture of boilers used in stationery service as well as for all tanks and drums to which pressure is applied. For these reasons if for no other it is necessary that the finest work be done.

Blacksmith Shop

While the rolling mill produces the bar iron and the hammer shop works out rough forgings with powerful tools it is still necessary to put the individual touch on nearly all forgings before they go to the machine shops for finishing. This calls for the expert work of the blacksmith and his helper and upon them depends in a large measure the cost of the work in the machine shop and also its safety when put into use on locomotives, cars and steamers.

Copper Shop

While the sheet metal shop is known as the copper shop the working in copper is but a small part of its activities. This shop handles all steel below ½-inch in thickness. To

obtain an idea of the extent of work done we have only to look at the fact that during the last year over 300,000 pounds of galvanized iron were used. The large part of the metal used in this shop goes into tinware, as it is called, for use on all parts of the system. In making up this work, riveting has to a large extent been done away with. The sheets are fastened together by an electric spot welder which welds the two pieces together wherever they are touched. This also tends to cheapen the cost so that we are able to get out more and better work. Work which formerly required 5 hours to do by hand is now done on this welder in one hour.

Pipe Shop

Forty years ago the amount of pipe on a locomotive could be carried by a man on his shoulder. These pipes consisted of a feed pipe to carry the water from the tender to the pump, a blower pipe, and a heater pipe to warm up the water in the tender if necessary. Today it is doubtful if fifty men could carry the pipe in one of our large locomotives.

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Sacramento Shops

(Continued from Page 8)

During the past year we have used on new locomotives alone 12,128 valves and pipe fittings and 24,800 feet of iron pipe. In the shops and yards there is over 65 miles of pipe ranging from 12-inch down in diameter. This pipe is used for the distribution of water, steam, gas and compressed air.

Electric Development

Electric energy was first made use of at these shops in May, 1889, when one 35-light arc dynamo and one 500-light incandescent alternating dynamo were installed. These machines were run by a high speed steam engine and furnished light for seven years. When the first hydro electric power plant was installed at Folsom 22 miles away and electric energy brought by a long distance transmission line to Sacramento it was decided to shut down this steam driven plant and purchase power. On August 10, 1896, the first electric motor was installed in the Sacramento Shops in our spring shop. This was a 10 horsepower motor and is still in service on a machine in the rolling mill, having given 25 years of continuous service. During the same year four more motors were installed, all of which are still in service. Since that time more and more electric power has been installed until we now have a total horse power of 6059.5. These motors range from 1/8-horsepower to 400 horsepower and there are 409 of them. We also have four electric welders in constant use. The amount of work which we have for these welders to perform makes it necessary to keep them in operation during the whole 24 hours, and still more of them are needed. There is also an extensive fire alarm system protecting the shops, with 16 general firm alarm boxes and 23 still alarm boxes of the Gamewell type.

Passenger Car Department

The Sacramento passenger car shops today have nine tracks accommodating our largest cars with ample room to work in and around them. On these tracks the heaviest of our work is done. Our truck shop is one of the best equipped shops in the country for passenger car trucks and there are four tracks in this shop with overhead geared pneumatic hoists running on tracks for the purpose of lifting the trucks from their wheels and thus saving much time and work as without them the trucks would have to be handled by jacks.

Upholstery Shop

Our upholstering shop is a complete factory in itself. It would be a long task to enumerate the many articles manufactured in this department. Canvas hose for filling locomotive tenders, engine seat cushions, mattresses and furniture, and an estimate shows

that 78,420 articles are manufactured here for shipment in a year.

When a car is shopped for general repairs all upholstering must be first removed—seats, cushions, rubber matting, curtains, etc. These are all thoroughly cleaned and renovated so that they are as good as new. All hair is removed from cushions, re-picked and sterilized. Feathers are also treated by passing through a steam renovator.

One of the new industries taken up by this department is the vulcanizing of rubber. This is making wonderful progress in reclaiming old rubber matting, etc., which in the past, when badly worn, had to be cast aside.

Plating Department

The electro-plating department performs all classes of plating work, so essential on all modern railroads. Everything possible is done in this department to perform this work economically and thoroughly and it may be said that this is one of the most efficient plating rooms of any large railroad shop.

Seven hundred locomotive headlight reflectors have been resilvered here during the past year. There are from 500 to 750 pieces of silverware on each dining car. Approximately 26,000 pieces of silver are replated during the year. This does not cover the tableware used in depot restaurants or on ferry boats.

The cleaning and polishing of all interior trimmings from passenger coaches is also taken care of in this department.

Car Machine Shop

This shop is ordinarily known as the wheel shop as it fits up all the cast iron and rolled steel car wheels used under cars, locomotives and tenders. It handles approximately 100 pair of cast wheels per day in addition to the rolled steel wheels and a large amount of machine work which pertains strictly to cars. All car wheels come to this shop, the

wheels are taken from the axle, and if either wheel or axle is in condition to be used again are fitted up to be put under other cars. A few days ago a pair of cast iron wheels came to this shop for dismounting. On looking at them it was discovered that the wheels were cast in the year 1868.

Car Paint Shop

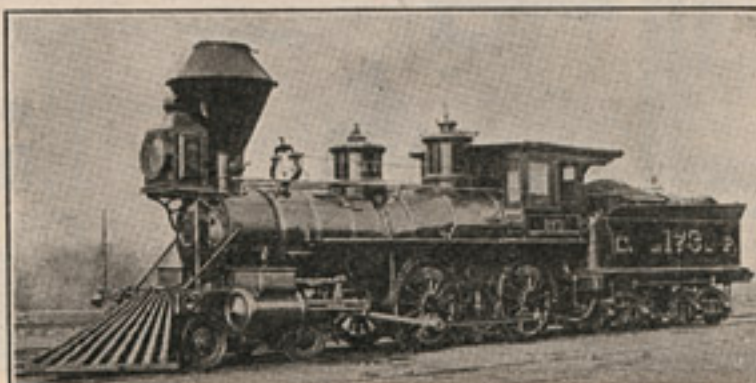
The car paint shop has track room for 23 cars. Here the cars are thoroughly renovated, cleaned, varnished, and made ready for service. On wood coaches, when paint has become worn and cracked, it has to be removed by the burning process. When steel cars become corroded and the paint worn out they have to be sand-blasted under very careful conditions. This necessitates the same painting procedure as on the wood car.

The Sacramento paint shop is not only a paint shop for cars but is a supply house for the whole system, store orders from all parts of the system being taken care of in this department.

Furniture glass, mirrors and signs for all purposes are made here. We mix paints of all kinds and for all railroad purposes. During the past year ten thousand gallons of assorted paints have been mixed for the Maintenance of Way Department for division use.

Over 500 mirrors of all kinds and sizes are manufactured here during the year as well as art glass, filling orders from all parts of the system. A large saving is made by substituting glass made from old gothic sash. This glass is first sand blasted and then dyed green, bringing it near the color of the rough green glass, and is much more durable as it is plate glass.

In addition to the car paint shop where all passenger cars are handled there is a small paint shop known as the locomotive paint shop which takes care of the painting of locomotives and tenders. In old times locomotives, particularly those on passenger runs, were made very brilliant by the art of



The little "engine" with the big smokestack at the left is C.P. 173, the first locomotive constructed at the Sacramento General Shops, in 1872. Compare it with the Pacific type passenger locomotive below which was built at the same shops in 1918. The latter weighs 234,000 lbs. loaded and the tender weights 141,000 lbs. loaded.

