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REPORT ON
THE HORSESHOE MINE
Fay, Nevada,
November 1st, 1910.

LOCATION:

This property is situated in the Eagle Mining District, Lincoln Co., Nevada. It is 27 miles from the county seat of Pioche, and 17 miles from the town of Modena, on the San Pedro, Los Angeles and Salt Lake R.R. The property is connected with both these towns by good wagon roads. The railroad town of Modena is 507 miles from Los Angeles, and 273 miles from Salt Lake City.

The altitude at the mine is 7500 feet and the climate is excellent.

MINING CLAIMS:

The property consists of 6 patented mining claims, and comprises 120 acres.

TITLES:

A perfect title to the property is vested in W.H.Stokes, F. Stokes and O. Stokes, who acquired it by direct purchase. There are no liens or incumbrances of any kind on the property.

HISTORY:

The Horseshoe mine was located about ten years ago, and although high-grade gold ore was found on the surface, very little except assessment work was done on the property until two years later, when A. W. McEwan, a well-known mine operator from Montana, took over the mine. The new owner immediately began active and systematic development of the property. He opened up the mine by a 400-ft. shaft, built a fine mill and cyanide plant, installed the present water supply system and built the town of Fay. The mine paid from the grass roots and at the end of two

years, McEwan had netted a profit of over \$300,000.00. At the end of this period McEwan became interested in a mine in Peru, and leased the Horseshoe to G. Pray Smith. The high-grade ores of the upper levels, had already been exhausted by McEwan, who had failed to keep his development work ahead.

Smith changed the arrangement of the mill and made many costly and foolish experiments in the treatment of the ore, which resulted in his making a complete financial failure of the undertaking.

When Smith finally abandoned the property, it was so heavily encumbered with debt that it had to be sold to satisfy the claims of the creditors.

The Stokes Bros., Eastern capitalists, became the new owners of the Horseshoe. But as these gentlemen were totally without experience in mining matters, they employed men to operate the property who were either incompetent or dishonest. The result was that they lost money in the venture, and two years ago the property was closed down.

About a year ago, E. E. Fuller, a well-known and experienced mining man, took a bond on the property from the Stokes Bros., and devoted a good deal of time, money and energy to putting the mine in good shape. By an arrangement between Mr. Fuller and the Stokes Bros., the property was recently bonded to Mr. John Rooke-cowell and is now once more in active operation. The development of the mine is being pushed ahead, and the large dump of mill tailings is being cyanided with good results. While the plant has been thoroughly overhauled with a view of again starting up the mill.

GENERAL FORMATION:

The country rock is porphyry, intersected at the Horseshoe Mine by a strong rhyolite dyke. The ore bodies traverse both the porphyry and the rhyolite, and are apparently true fissure veins, their formation being subsequent to the rhyolite

intrusion. There are seven distinct veins on the property, which are evidenced by the extensive outcroppings which occur throughout the whole extent of the claims.

Most of these outcroppings yield small quantities of free gold to the pan. Exploration work has been done on four of these veins.

CHARACTER OF THE ORE:

The ore, which is identically the same in all the veins, is a white free milling quartz. So far there has been no change in the character of the ore with depth; the same ore is found on the 400-ft. level of the mine as on the surface. The gold contents are in a fine state of division and entirely in the free state. The silver is partly free and partly in the form of horn silver. The ore contains no other metals and is entirely free from any trace of sulphides.

The ore is readily amalgamated and very amenable to cyanide treatment.

ORE BODIES:

There are seven veins on the Horseshoe property, but so far, only four of them have been explored.

HORSESHOE VEIN:

This is the principal vein and the vein on which most work has been done. It has a general strike N.N.W., with an average dip to the west of 60 degrees. It outcrops frequently and is very strongly defined on the surface and the mine workings. This vein has been explored to a depth of 420 ft. by an inclined shaft sunk on the ore body. Horizontally, it has been explored for a distance of over 1000 ft. There are over 3500 ft. of workings on this vein.

Almost all the ore developed by former operators in these workings has been found of sufficient value to be milled at a profit, and they just gutted the workings, without doing

any development to a supply of ore for the future. So that with the exception of about 2000 tons between the 300 ft. and 400 ft. levels, there is practically no ore available in the present workings.

The workings to the north of the shaft are badly caved and at present inaccessible. The breasts of all the drifts to the south are in good ore, and by extending these a very large tonnage of ore could be made available in a short time at a comparatively small expense.

There is a well-defined ore chute on this vein, pitching to the south, which carries high values. This chute has been cut on the 100 ft. and 200 ft. levels and some very rich ore mined from it. The 300 ft. and 400 ft. levels have not yet cut this chute, but they will encounter it as they are extended south.

The average value of the ore exposed in the workings of the Horseshoe vein is between \$5.00 and \$6.00 per ton in gold and silver. A number of assays show the proportion of values. As I have said before, the Horseshoe vein is very strongly defined, both on the surface and underground at the lowest level. And from all present indications, there is every reason to believe that this vein will continue with depth and the horizontal extensions of the present workings.

THE BARBARA VEIN:

This vein is situated 75 ft. east of the Horseshoe vein and outcrops well on the surface. It has been explored to a depth of 300 ft. by a cross-cut run from the 300 ft. level of the Horseshoe vein, and from this point a drift has been run on the Barbara for a distance of 100 ft.

This vein is almost vertical and has a strike N.W. It joins the Horseshoe vein, of which it is probably a spur, at a point 500 ft. south of the shaft.

The Barbara vein has an average width of four feet, and a sampling of the ore exposed showed an average value of \$7.20

per ton. A considerable quantity of ore has been milled and mined from this vein.

THE OLNEY VEIN:

This vein is parallel and 50 ft. west of the Horseshoe vein. At this point a drift has been run on the vein for a distance of 100 ft. The vein has an average width of 5 ft. No ore has yet been stoped from this vein. A general sample taken from the roof of the drift assayed as follows: Gold \$5.96, silver \$1.14, total \$7.12 per ton. The ore in the south breast of the Olney drift is over 5 ft. in width and has the following assay value: Gold \$6.39, silver \$2.01; total \$8.40 per ton.

THE WEST VEIN:

This vein is parallel to and 250 ft. west of the Horseshoe vein. It outcrops extensively on the surface for several miles. A shaft sunk on this vein for a distance of 40 ft. shows an average width of 4 ft. A general sample taken from this shaft assayed as follows: Gold \$4.60, silver \$1.20; total \$5.80 per ton.

A crosscut is now being driven from the 200 ft. level of the Horseshoe vein to cut a fifth vein, situated 400 ft. east of the Horseshoe. This crosscut, which is following a rich stringer of quartz, is now in over 300 ft. A large number of samples were taken from different parts of these veins, to determine the average value of the ore, and it is worthy of note that samples taken from almost any part of the surface croppings are found to contain gold and silver values when assayed.

The surface of the Horseshoe shows a regular network of veins which may come together with depth and form a large ore body. Indications at present point to this.

THE MINE:

Access is obtained to the mine by means of an inclined shaft sunk on the Horseshoe vein, a vertical distance of 420 ft.

The different levels connect with this shaft.

WATER:

Water was encountered in the mine at a depth of 360 ft. and enters the mine at the rate of 5000 gallons daily. It is at present removed by the skip, but could be handled better by a small pump. *208 gal per hr 3.5 gal per min*

TIMBERING:

The formation is very solid and scarcely any timber is used in the mine.

ORE AVAILABLE:

At the present moment there are 2000 tons of ore available between the 300 ft. and 400 ft. levels, and about the same amount above the 100 ft. level of the Olney vein. There are also about 600 tons of ore broken on the 400 ft. level, making a total of 4600 tons of ore at present available. This will average \$6.00 per ton in value.

MINE EQUIPMENT:

The mine is well supplied with rails and ore cars. The ore is removed from the mine by a two-cylinder 8 X 14 hoist, which raises the ore in a skip and delivers it at a point above the mill, where it is discharged by gravity into the mill ore bin. The hoisting plant is in good condition, and has a capacity of 150 tons a day for a distance of 1000 ft.

AIR DRILLS AND COMPRESSORS.

COMPRESSOR PLANT:

The mine is equipped with machine drills, the plant consisting of--

1 Compressor 12 by 16,
1 " 10 " 12,
6 Burley drills, 3½ in.
6 Murphy stoping machines,
All air pipe, connections, etc.

This plant is in first-class working order.

POWER:

As the mine shaft is situated only a few feet from the mill, power for the hoist and drills is furnished from the mill boilers, thus effecting a great economy.

FUTURE DEVELOPMENT WORK:

I would recommend that the drifts in the present workings of the Horseshoe vein be extended south. The cost of this work will not exceed \$6.00 per ft. and using machine drills, each drift should advance 100 ft. per month. This work will develop over 100,000 tons of ore in one year at a cost of less than \$30,000.00. As these drifts advance south, crosscuts may be run to connect with the Barbara and Olney veins, and drifts run on these if good ore is encountered. I would also recommend the further sinking of the present shaft to a depth of 1000 ft. This could be accomplished within a year at a cost not exceeding \$20,000.00. The east crosscut on the 200 ft. level should also be continued until it cuts the vein, which will be within 100 ft. The cost of this will be \$500.00. A like amount should be spent in prospecting the surface.

This will make a total of \$51,000.00 to be spent on the mine. With this expenditure the mine should be in a position to pay regular dividends and take care of its own future development.

TREATMENT:

As the values carried in the ore are entirely free and there is an entire absence of sulphides, sulphates or other substances which might interfere with the extraction of the values, the metallurgical treatment is a very simple matter. The ore is treated as follows: The ore is discharged from the mine skip into the ore bins above the crushers, where it is reduced to pass a half-inch mesh screen. The crushed rock is then fed automatically to two Monadnock mills, where it is

ground to pass a 20-mesh screen, and thence over amalgamated copper plates. The pulp then goes to classifiers, where 22% is separated as slimes. These are conveyed to the slimes plant, where they are treated by decantation. The sands are cyanided separately.

52% of the values are saved on the plates and 38% by the cyanide, making a total extraction of 88%. (90% ?)

The ore is very friable and easily crushed.

MILL EQUIPMENT:

The mill consists of the following plant:

- 2 Gates crushers,
- Grizzlies, etc.,
- 2 7-ft. Monadnock mills.
- Plates, classifiers, pumps, etc.

The mill is in good condition and running order, and has a capacity of 120 tons a day.

The cyanide plant, which also includes a slimes plant, is very complete and modern in construction. The tanks are of iron and the plant has a capacity of 150 tons a day.

THE POWER PLANT:

This consists of:

- 1 Horizontal tubular boiler of 60 H.P.
- 2 Horizontal tubular boilers of 80 H.P.
- 1 Horizontal tubular boiler of 40 H.P.
- 1 Bates Corliss engine of 125 H.P.

This plant provides power for the mill, and the air drills and hoisting plant at the mine.

It will thus be seen that there is excess power available. The consumption of fuel, when the plant is running to its full capacity, is 9 cords of wood a day.

A smaller plant, consisting of one 30 H.P. vertical boiler, and one 10 H.P. vertical boiler, supplies power to a small hoist, which is at present used in elevating tailings to the cyanide tanks, and to a 4 H.P. vertical engine, which alternately pumps solutions and saws wood for the boilers.

Steam from these boilers is also used to warm the leaching vats, and the solutions in the zinc boxes, during the cold weather.

The whole power plant is in good working order.

F U E L:

The fuel at present used at the mine is wood, nine cords being used daily when the plant is running to its full capacity. The wood, which consists of pine and cedar, costs \$4.00 a cord, delivered at the mill. There is sufficient wood available close to the mine to last two years. After this, wood will have to be transported a greater distance and will cost more. The remedy will be to use crude oil as a fuel. The cost of installing oil burners for the boilers would be \$500.00. The cost of crude oil, delivered at the mine, is \$3.00 per barrel. Nine cords of wood, the daily consumption of the plant, is equivalent to 14 barrels of crude oil.

From these figures a comparison may be made between the costs of using wood and crude oil as a fuel at the Horseshoe mine. Cost for 24 hours, using wood--

9 Cords wood at \$4.00	-	-	-	\$36.00
3 Firemen at \$3.00	-	-	-	9.00
Total	-	-	-	\$45.00

Cost for 24 hours, using crude oil--

14 barrels of oil at \$3.00 - - \$42.00.

This makes a difference of \$3.00 a day in favor of oil as a fuel. Later on this will become an important consideration.

MINE TIMBERS AND LUMBER:

These are obtained from Modena at a cost, delivered at the mine, of \$40.00 per thousand.

WATER SUPPLY:

The Horseshoe mine owns its own water right. The water, which in the driest season of the year amounts to 25,000 gallons daily, is conveyed in a pipe from a spring four miles

distant from the mine, to a tank situated 180 ft. above the mill and 290 ft. above the site of the proposed new cyanide plant.

The water is very pure and entirely free from any substances which would interfere with cyaniding. From the storage tank the water is distributed to the mill and the town of Fay. This supply of water is ample for the mill, the cyanide plant, and all camp purposes.

WAGES:

The following wage rates prevail in the district:

Drillers- machine men-	-	-	-	-	\$3.50	per day.
Muckers	-	-	-	-	3.00	" "
Firemen	-	-	-	-	3.00	" "
Engineers	-	-	-	-	3.50	" "
Carpenters	-	-	-	-	3.50	" "
Blacksmiths	-	-	-	-	4.00	" "
Amalgamators	-	-	-	-	4.00	" "
Solution men	-	-	-	-	4.00	" "

Labor is plentiful in the district.

SUPPLIES:

Food supplies, horsefeed, etc., are obtained locally at reasonable prices. Mining and other supplies are obtained from Salt Lake or Los Angeles.

FREIGHT:

The freight rate between the mine and Modena is \$5.00 per ton.

SHOPS, ASSAY OFFICE, ETC.

There is a good blacksmith shop and machine shop with power-driven tools; also a well-equipped assay office, bullion room, and several storerooms, in connection with the mill.

TOWNSITE:

The townsite of Fay, consisting of 110 lots, is also included in the property. Six of these lots have been sold to outsiders. The following buildings belong to the property--

- 1 Cottage with 4 rooms and bath,
- 1 Cottage with 5 rooms and bath,
- 1 Cottage with 4 rooms and bath,
- 2 Cottages with 3 rooms and bath,
- 1 Store, 20 X 50, known as the Fay Mercantile Co.
- 1 Warehouse, 12 X 40 feet.
- 2 Small stores,
- 1 Saloon,
- 1 Large Stable,
- 1 Small Stable,
- 1 Carpenter shop,
- 1 Oil House,
- 1 Large bunk-house for 50 men,
- 1 Boarding house for 50 men,
- 1 Office building.

TELEPHONE:

There is direct telephone communication between the property and Modena.

MAIL AND STAGE LINE:

A stage runs daily between the mine and Modena, which carries passengers and mail. It leaves Modena daily at 1 P.M. except on Sundays.

TAILINGS DUMP:

There are between 50,000 and 60,000 tons of tailings below the Horseshoe mill, the result of past operations. These tailings have already been cyanided, but so inefficiently that they still contain considerable values in gold and silver, which can be extracted at a profit if they are properly treated. In fact, the present operators of the property are engaged in working over these tailings, treating 2000 tons a month, with very satisfactory results.

I spent several weeks testing this tailings dump, my samples being taken from a number of borings made in the dump, five feet apart. Careful assays made on these samples showed the whole tailings dump to have an average value of--

Gold.....	\$0.90 per ton,
Silver.....	1.18 " "
Total.....	<u>\$2.08</u> per ton.

A number of leaching tests on these tailings made in the laboratory, showed the following extraction of the values--

Gold	86%
Silver	81%

A sizing test showed the presence of 22% of slimes, which would not interfere with a successful percolation. Analyses showed the tailings to be entirely free from interfering elements. The consumption of cyanide was found to be less than half a pound per ton. The present operations of treating the tailings on a large scale are confirming these results. A very careful and systematic sampling of these tailings was made several years ago on behalf of G. Pray Smith, by two well-known cyanide experts, who spent over two months in making experiments. Their results confirm mine in almost every detail, except that they found the average value of the tailings to be \$1.90 per ton instead of \$2.08, as I found it.

The tailings fill up a narrow valley for a distance of 700 feet. The valley has a slope of 9%.

If these tailings are carefully cyanided under skillful operators, they will yield a profit which will more than pay all the expenses connected with the development of the property. The present method of handling the tailings, by tramming them up an incline to the vats, is an expensive one. If they are to be treated, it would be great economy to move the present cyanide plant to a point below the tailings dump, where they could be sluiced into the vats, which would be discharged by the same means.

An estimate of the cost of treating the tailings, and of the profit which would accrue from the operation, is given later.

The cost of moving and re-erecting the plant below the mill dump, as no new material of any kind would be required, would not exceed \$2500.00.

This is in any case the best and most convenient location for the cyanide plant, and when the mill is running, the pulp can be conveyed to the leaching vats by a sluice, at no additional expense. As water can be delivered at this point below the dump under a head of 290 ft., the operation of filling and discharging the vats by sluicing would be a very simple and economical one.

ADDITION TO PLANT:

As there is extra power available, it would be advisable to add another Monadnock mill to the plant. This would entail an out-

lay of \$2500.00 and would increase the capacity of the plant to 150 tons a day. This would considerably reduce the cost of operation.

The following estimates are based on the supposition that the capacity of the plant has been increased to 150 tons a day, and that the development work on the mine, which I have laid out, has been accomplished.

They are based on a thorough knowledge of the conditions at the mine, and, I believe, are conservative.

COST OF MINING:

As the power for the air drills and the mine hoist is supplied from the mill boilers, this item has, for the sake of convenience, not been included in this estimate of mining cost.

This estimate is based on using Murphy stoping machines in 4 ft. stopes, with one operator to each machine, and on mining and delivering at the mill ore bin, 150 tons of ore daily.

Cost per day--

15 drillers at \$3.50	\$52.50
4 Trammers at \$3.00	12.00
2 Hoist men at \$3.50	7.00
2 Skip tenders at \$3.00	6.00
1 Blacksmith at \$4.00	4.00
1 Helper at \$3.00	3.00
2 Shift bosses at \$4.00	8.00
Powder, fuse and caps	30.00
Candles	3.00
Repairs and timber	7.50
Total	<u>\$132.00</u>

Which makes the cost of mining \$0.88 per ton.

COST OF CRUSHING & AMALGAMATING:

As there is extra power available, it would be advisable to add a third Monadnock mill to the plant. This would bring the capacity of the mill up to 150 tons a day, equal to that of the cyanide plant, and would considerably reduce the cost of operation.

Daily cost--

2 Crusher men at \$3.50	\$7.00
3 Engineers at \$3.50	10.50
3 Firemen at \$3.00	9.00
3 Amalgamators at \$3.50	10.50
Wood, 9 cords at \$4.00	36.00
Repairs	4.00
Forward,	<u>77.00</u>

Total	\$84.00
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This also includes the power supplied to the mine.

Daily cost for 150 tons.

Which is \$0.32 per ton.

This estimate is based on the assumption that the cyanide plant has been erected below the tailings dump, and that 150 tons of tailings, which rest on the slope of 9%, will be sluiced into the vats by a stream of water under a head of 290 ft. The vats will be discharged by the same means.

2 Sluice men at \$3.50	\$ 7.00
3 Solution men at \$3.50 ,.....	10.50
1 Helper at \$3.00	3.00
Zinc, acid, fuel and other suppl.	10.75
Cyanide	18.75
Refining and transporting bull'n	3.00
Total	<u>\$53.00</u>

SUMMARY OF COSTS:

AVERAGE GRADE OF THE ORE:

- 14 -

\$7.00 per ton. Taking this and my own sampling of the mine into consideration, I am of the opinion that we may safely rely on the ore having an average of at least \$5.00 per ton.

PERCENTAGE OF EXTRACTION:

There is no record of the extractions of values made by former owners, but the present operators have milled and cyanided several hundred tons, with an average extraction of from 85% to 90% of the values.

Taking into consideration the extremely simple character of the ore, which is an ideal one for cyaniding purposes, I believe that an extraction of 85% of the values can be relied upon.

STORE:

The property includes a large store building in the town of Fay, which is at present closed owing to the small number of men employed at the mine. When the property is again in operation on a large scale, it will pay to again open the store, as besides the men employed at the mine, there would be a good local trade with other mines and neighboring ranches.

I estimate that the profits accruing from this source would amount to at least \$500.00 per month.

RENTALS AND WATER RATES:

The property supplies water to the town of Fay, and rents several houses. The income from these sources amounting to \$150. per month.

ESTIMATE OF PRODUCTION & EXPENDITURE FOR ONE MONTH:

This estimate is based on the understanding that the work recommended in this report has been accomplished, and that 4500 tons of ore of an average value of \$5.00 per ton, are mined and milled in thirty days. And that 85% of the values are extracted in the process.

PRODUCTION:

Bullion	\$18,000.00
Store profits	500.00
Rentals and water	150.00
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Total	\$18,650.00

EXPENDITURE:

Mining	\$ 3,960.00
Milling	2,520.00
Cyaniding	1,440.00
General expense	1,775.00
Mine development	1,500.00
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Total	\$11,175.00

This is a net profit of \$7475.00 per month, or \$89,700.00 per annum. This would pay about 15% dividends on a capitalization of \$600,000.00.

The values contained in the tailings dump make it a very valuable asset, which can be made immediately available. There are over 50,000 tons of tailings, which contain over \$2.00 per ton in gold and silver. It will take a year to cyanide this dump, and the net profit should be \$1.00 per ton, or \$50,000.00 on the whole dump.

A certain quantity of ore, amounting to over 7000 tons, will be extracted from the drifts in the course of development work. This, with the ore available in the mine, will amount to 12,000 tons. This ore can be treated in the mill running one daily shift of eight hours, at a profit of \$2.00 per ton, or \$24,000.00 in the course of a year.

Thus, from these two sources, which are at present available, the sum of \$74,000.00 can be secured.

This will more than pay the initial cost of opening up the property.

The actual amount of capital required to start operations will therefore be very small. Just enough to pay the cost of moving the cyanide plant and starting operations in the mine, will be sufficient. This amount will not exceed \$6,000.00.

With this small investment, the property can be made to pay all the costs of its development, and after a year become a steady and profitable producer.

SUMMARY:

The data contained in the foregoing report was collected during an examination of the Horseshoe Mine, extending over two months. The estimates are based on a study of the conditions at the mine, and on an experience of many years of mine management. At present there is very little ore available in the mine, but this is because the former operators simply gutted the workings without a thought to the future of the mine. From the strong surface showing, the indications in the mine, and the fact that the faces of all the drifts are in good ore, there can be no doubt but that there is a very large body of ore still undeveloped on the property. And there is no reason why the grade of this should not be equal to that of the ore already extracted. If we take into consideration that the property is equipped with a fine mill, cyanide plant, hoisting plant, compressor plant, houses for the workmen, and that all the heavy preliminary expense connected with starting mining operations, is eliminated, that the property has its own water supply at the mine, and that it is close to a railroad, it will be seen that this property possesses many advantages as an investment..

The tailings dump, too, forms a valuable asset, which can be immediately realized upon, and thus only a small amount of capital will be required to begin operations.

If the suggestions contained in this report are carried out, the property will, within a year, be placed on a permanently profitable basis, and I therefore have no hesitation in recommending this property as well worthy of the attention of the investor.

Estimate of Daily Cost of Running the Mill for One Eight-Hour
Shift, and Milling 35 Tons of Ore Daily.

MINING AND CYANIDING.

1 Engineer	\$ 3.50
1 Fireman	3.00
1 Amalgamator	3.50
1 Crusher man	3.50
1 Solution man	3.50
1 Helper	3.00
Supplies	1.50
Repairs	3.00
Wood	12.00
Refining and transporting bullion	2.00
Cyanide, acid, zinc, etc.	9.00
Assaying	3.00
Superintendence	7.00
Total	\$57.50

MINING.

1 Hoist man	3.50
1 Blacksmith	4.00
1 Helper	3.00
8 Machine men at \$3.50	28.00
4 Trammers at \$5.00	12.00
1 Skip tender	3.00
1 Shift boss	4.00
Powder, fuse, caps, candles	11.00
Timber and repairs	2.50
Total	71.00
Total daily cost of mining, milling and cyaniding 35 tons and doing development work	\$128.50

Assuming the ore to have an average value of \$5.00, and that an extraction of 80% is obtained, this will give us bullion returns amounting to \$140.00 per day, which will thus cover the cost of the development work laid out in this report. This work being confined to extending all the drifts of the Horseshoe vein south.

(Signed) John Rooke-Cowell, E.M.

Los Angeles, California,
November 1st, 1910.