

The Mining And Metallurgical Journal

VOL. XVIII. No. II

LOS ANGELES, CAL.,

March 1, 1898,

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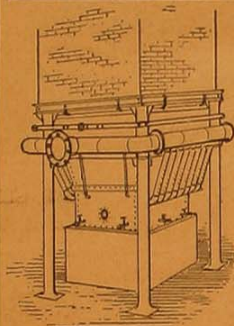
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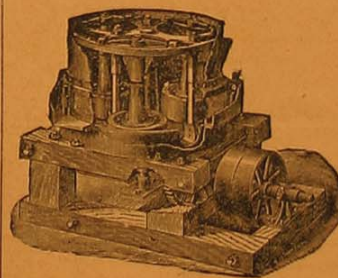
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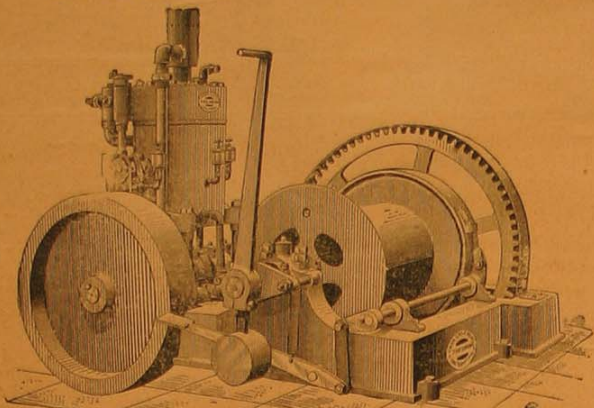
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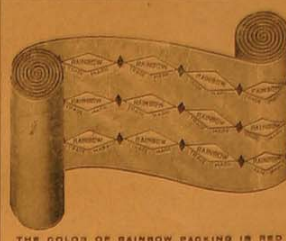
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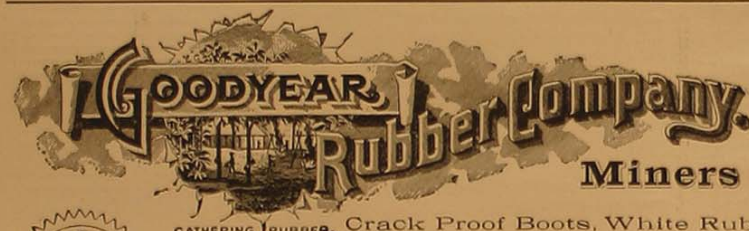
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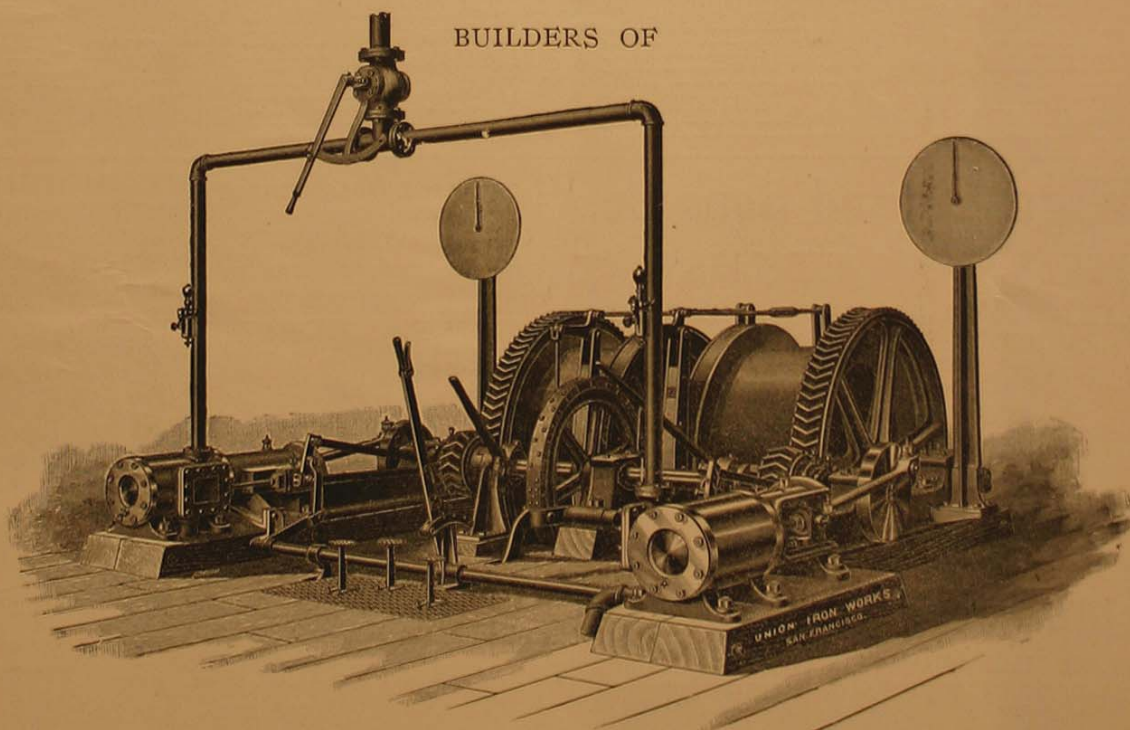
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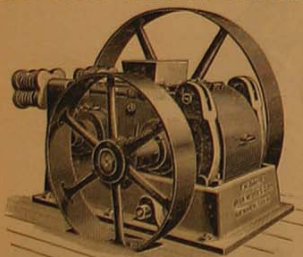
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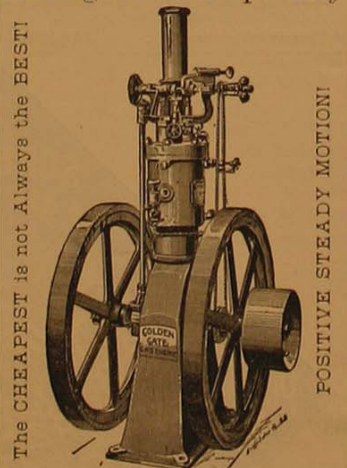
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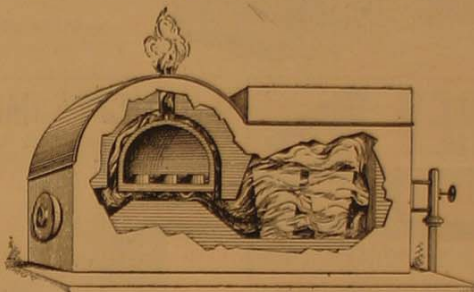
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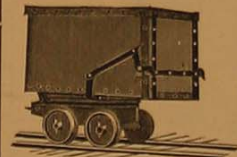
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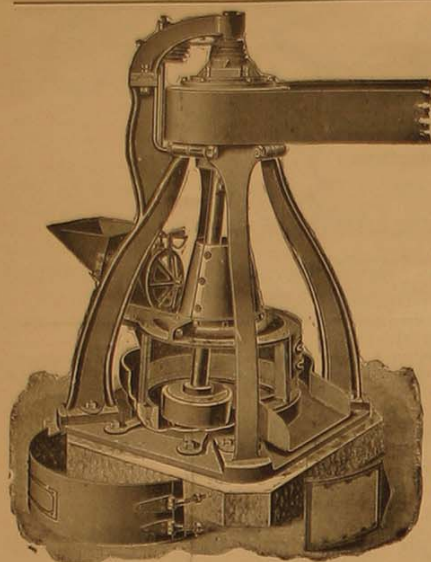
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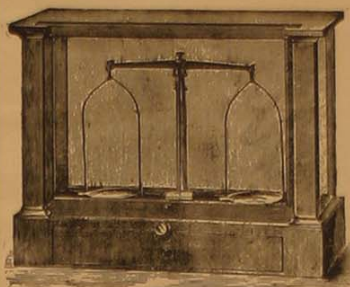
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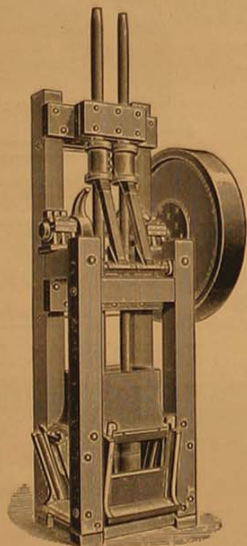
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GOLD PRODUCTION, PRESENT AND PROSPECTIVE.

It is stated, on what may be deemed good authority, that the gold production of the world, during 1897, amounted to \$240,000,000. It is not improbable, considering the unusual energy put into gold mining that the output for the present year will be equal to that sum, and perhaps greater.

The estimate is that not more than two-fifths of last year's output will ultimately find its way to the mints, so great is consumption in the arts and manufactures. As the tendency of all nations is to the gold standard, there is likely to be a considerably larger demand for gold for monetary uses. It is stated by good authority that the addition of \$100,000,000 annually will not keep pace with the growth of commerce, for through machinery and more scientific methods, production is becoming greater and less expensive, and it is well known that the extent of consumption depends in a measure upon the volume of production.

Consumption of gold, otherwise than in mintage or monetary uses, will not decline, on the contrary, it will be greater as the world grows richer.

The stock of gold now in existence, and which is devoted to monetary uses, is alleged to be \$4,000,000,000. If the world wholly goes to the gold standard, this sum will furnish the basic or redemption money to accommodate the vast commerce of the world, both international and domestic. There are no statistics showing the volume of the world's commerce. The present commerce of the United States averages about \$1,750,000,000, and its domestic trade is more than \$30,000,000,000. The foreign commerce of Great

Britain is 3,335,000,000,000, and her domestic is perhaps \$20,000,000,000. Taking these figures as a basis, it is seen that the commerce of the world, international and domestic, must run into hundreds of billions of dollars. In a few years at the farthest, the practicability of the single gold standard of value will be thoroughly tested.

INCREASING DIVERSITY OF VIEWS.

In regard to financial legislation, new ideas and plans are being frequently presented. There is really no expectation in the country that anything of importance will be done on that subject during the present session, or during the existence of the present Congress. It is not wholly for the reason that the Senate and House differ, but because there is such diversity of views in regard to theories and specific measures among the members of both Senate and House.

The situation is the same among the people, and the ambitious for political preferment are racking their brains to devise some plan that will meet approval from the masses. There are those who proceed on radical lines, and others who are struggling to find some middle or half-way ground on which a compromise and harmony can be effected, a ground that will be acceptable to a sufficient number of people to constitute a majority. As it now is political parties are being split into fragments. The radicals on both sides are obstinately insistent, and it will be difficult to induce them to consent to occupy any intermediate position.

While the solution of the money problem seems destined to be postponed for a considerable time, it is consoling that the country is being educated on the subject by discussion and the presentation of a variety of plans, and that in consequence, when a solution is finally reached, it is likely to be wise and satisfactory, more so than if consummated without the aid of enlightened public judgment. The financial is the greatest of national questions now before the country, and it should receive the most thorough consideration before final action is taken. It is a question upon which reorganization of political parties is inevitable. The money question has an intimate relation to our mining industries, especially to the mining for gold and silver. Its solution will have a political influence for good or evil to all our industries and to our commerce.

A WISE MOVEMENT.

A bill is pending in Congress designed to create an international bank, or, in other words, a corporation with power to establish a bank in this country and branches in other countries of the western hemisphere. The object is to afford the means of obtaining exchange to accommodate the trade between them and the United States.

It is a well known fact that when the Central and South American States buy in this country, or we buy of them, payment is made respectively by exchange on European banks. The loss to us and to those countries is of the premium on exchanges, which in the aggregate amounts to a large sum. But more serious than that is the embarrassment to trade through the indirect process of making payments. If a central bank is established in this country and branches in the countries south, payments will be direct, simple and in-

expensive, and being so, the effect will be to enlarge commerce with them.

In consequence of submitting to indirect payments through European clearing houses, the United States has been deprived of a deserved financial reputation. All countries in the western hemisphere regard London as the financial center of the world, and it has had a potential influence in building up British commerce. We are the leading nation of the American hemisphere in population and wealth, and there is no reason why we should not hold the same position financially. The clearing house for the western half of the world should be in the United States, and when that is accomplished, we will easily advance to a much higher commercial position. Our commercial growth has been restrained during the whole of our national existence, by dependence upon European channels for settling balances of trade even with our nearest neighbors. The movement on foot is a wise one, it should have been earlier inaugurated. When the plan has been put thoroughly in operation, this country will be relieved from financial dependence upon European countries, and our dealings with the countries of the Western hemisphere materially enlarged, and to the natural advantage of them as well as of this country. We want their markets and they want ours, because there is a great extent and dissimilarity of productions.

A GREAT MINERAL BELT.

No state in the Union possesses greater or more varied resources than Montana, and no other state in the process of time will surpass it in the number and importance of its industries.

Within its borders in the recesses of the Rockies three great continental rivers take their source, and these, with their tributaries, make it one of the best watered of the arid or semi-arid states.

There never was a time in the history of the great state of Montana when there were so many really good mining districts, demanding the attention of prospectors and mine promoters as at the present time.

Mining conducted with the same care and attention and perseverance necessary to success in all other lines of business is just as safe and eminently more profitable. It is a well known fact that the mining districts withstand the business depressions at times better than any others. Certainly the mining states have come out from under the general wreck earlier and in immensely better condition than the industrial and trust concerns

As will be seen the many districts comprising the great county of Madison have during the year brought forth many new and promising mining interests, as well as keeping the older ones in operation, producing an immense amount of gold bullion. While placer mining has not been carried on as extensively, the quartz mining has greatly increased. Madison county is one of the most prosperous of Montana's gold-producing districts.

Between the auriferous and argentiferous ore-bearing districts in this county one can travel from eighty to one hundred miles in various directions and keep within the bounds of mineral belts. In consequence of such a large area and the multiplicity of excellent prospects worthy of mention, space forbids more than a brief review of the properties, particularly notable on account of their output and showing.

Although the first explored in the state of Montana, Madison county's mines contain a wealth, at present the least developed, that will demand the brawn and brain of generations to come. Railroad transportation is utterly lacking, as well as smelting or other means of treating the baser ores—and one will not materialize without the other.

Since the Gaylord plant has been completed, the smelter, town and all other adjuncts located within the Madison county line,—the first legitimate efforts to open up the vast mineral resources on a large and liberal scale—it has been remarked with absorbing interest.

considered too remote from the railroad to command attention for the present.

Long years ago, Alder gulch, near Old Baldy Mountain, was worked for sixteen miles by drifting entirely, timbers for same costing \$1.00 a piece, eight foot lengths. It required an expert workman who could put in two sets of timber four feet square each day. Ground that would not pay one ounce per man each shift was considered too poor to work at a profit. The total yield is estimated at about \$100,000,000, and all this was worked with an average head of less than 250 miners' inches of water.

The Easton mine, situated on Mill creek,

the mine, consisting of stamps, rolls and concentrator, with which the second class ores are worked.

The Bamboo Chief, located on the west side of Alder gulch, has a well defined lode from a few inches to three feet in width, with granite hanging and porphyry foot walls.

Some of the best ore from this mine went \$450 gold to the ton, while the second class averages from \$30 to \$40 per ton gold and three or four ounces silver.

Developments have shown a wonderful body of ore in an extension of the U. S. Grant, less than one mile from Virginia City, containing both gold and silver.



VIEW OF VIRGINIA CITY, COUNTY SEAT OF MADISON COUNTY, MONTANA

Gold and silver bearing ores are not the only minerals found within this county's boundaries, for veins of coal have been discovered to extend from the upper Ruby Valley clear through to the upper Madison. In the latter region large veins have been reported. One prominent vein thirty-four inches thick has been traced for ten miles.

Another item of interest which very few, even those living within the limits of the cognizant of, is the bona-fide existence of petroleum.

A very large copper deposit, carrying as high as sixty per cent, is well known, but is

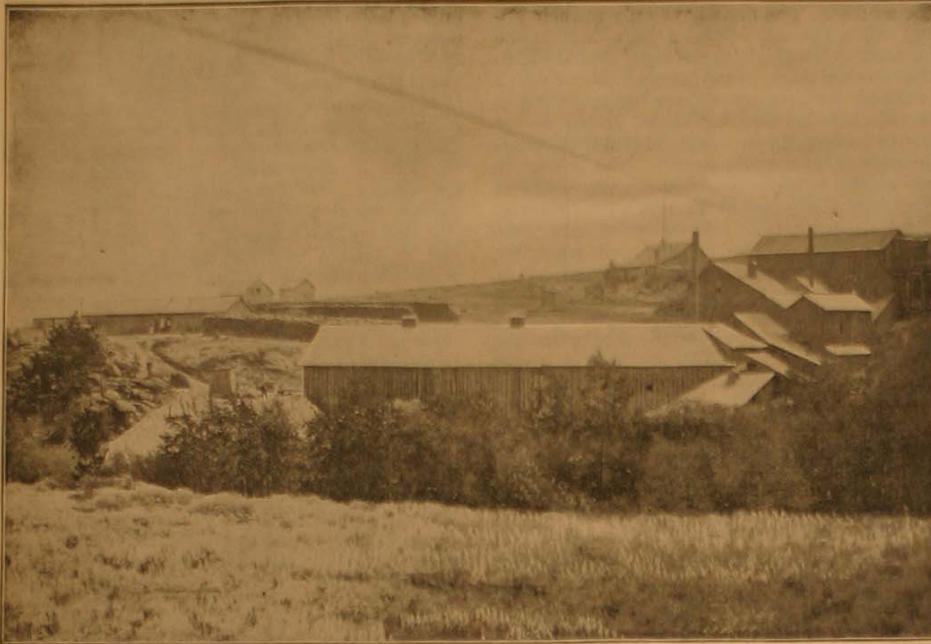
five miles from its confluence with Alder gulch, below Virginia City (having put into circulation about \$400,000) has given a new impetus to the quartz interests in Madison county. About six years ago it was bonded by Fine and Pankey, for a nominal sum, after which they immediately realized \$18,016 from a number of tons of ore already extracted and found on the dumps. This ore averaged 113 ounces silver and $1\frac{1}{4}$ ounces gold per ton. The ore body is regular and the value holds out well as depth is attained. Major Henry Elling, who is now conducting the entire proposition, has erected an additional plant at

A district which has declined to a sorrowful degree on account of the low price of silver, is the Ram's Horn District. The veins of this section are almost entirely composed of silver-bearing ores.

The Lower Hot Springs (Red Bluff) District is one of the principal districts where mining is carried on, on a paying basis.

It would be a difficult matter to enumerate the mines of this great section, the larger portion of which are very valuable, some of the owners of them having refused \$100,000 for same.

The production from this section alone has



MILL OF REVENUE MINING COMPANY, MADISON COUNTY

done much to swell the great total production of Madison county.

Quite an impetus has been experienced in the Moraine like hills of Revenue and from Norwegian to Meadow creeks, and up in the rugged defiles of Bald Mountain.

Scores of most excellent prospects, well worth the attention of mine promoters, have been brought to light, but space forbids individual mention.

Among the larger properties the Revenue mine stands first. A cyanide plant is in operation, working from twenty-five to thirty tons of ore per day, the average of which is about \$30 per ton.

The ore shoots in this property are bunchy, measuring at times six to eight feet in width, and occasionally pinching down to as many inches.

During the season of 1894, high-grade ore was encountered in which the gold was so coarse and free that the cyanide process had to be abandoned for a time.

The Leiter, another great property, is owned by the Leiter Company and consists of fifteen mining claims, one placer and three millsites, all patented and situated at Leiterville, on the left fork of Wisconsin creek, about eight miles north of Sheridan.

The early discoveries were made in 1877 by Jerry Sullivan on the Sullivan, Grey Eagle and Daniel lodes. Since then many finds have been recorded.

Very little can be said of the Silver Star District. There are a number of fine propositions in the district but not much work is reported at present.

Rochester, situated about ten miles from Twin Bridges, is one of the oldest quartz mining camps in Madison county. This camp remained dormant for a long stretch of years, but a few years ago it took an upward turn and several mines of the surrounding country are now producing handsome incomes for their owners. The product of the mines in this locality is fine milling gold ore and it pays anywhere from \$30 to \$75 per ton.

The Pony mining district is known as one of the best mineral sections in the state. It is impossible in a brief sketch to give but a

small idea of its magnitude. At the present time the most important properties are included in what is known as the Boss Tweed group, owned by Henry Elling and W. W. Morris. This group comprises some twenty-five claims, a large number of which are patented. The group was under option to an English syndicate in 1893, but what they accomplished we are unable to learn. We present herewith a view of Morris & Elling's Clipper mill at Pony.

The fact is apparent that Madison county does not receive its proper credit for all the concentrates and ores shipped to smelters at Butte, Helena and other points.

Three thousand five hundred tons of ore and concentrates, principally the latter, have been hauled by ten and twelve-horse teams from the vicinity of Virginia City and Sheridan—not estimating the amount hauled by four and six-horse outfits and milled in camps—and these two points are only the yield of the west side of Tobacco Root Range.

Hydraulic mining is the art of separating gold from gravel, sand and clay cement through the medium of moving water and the force of gravity. The process is one lying wholly within the domain of the science of mechanics—a branch of human knowledge now so well understood that results may be predicted with extreme accuracy if correct premises are obtained.

The *Manual of Hydraulic Mining*, by Theo. F. Van Wagnen, is written solely for the use of the practical and working miner, who, rarely deficient in common sense, is generally unacquainted with the principles of physics and more or less rusty in arithmetical methods. In the daily discharges of his business he is continually confronted with engineering problems of more or less complexity and compelled to depend for their solution—trained engineering advice being unobtainable or too expensive—upon his own limited experience or upon that of his co-laborers. Under these circumstances errors in construction and operation are frequently repeated.

The *Manual* does not claim to cover the whole subject nor to answer all questions in hydraulic engineering. Nor will it take the place of an experienced and competent engineer in important enterprises. On the contrary, no miner who is not himself an expert and who can afford it, should be without such advice and assistance as can be afforded by a well-educated and practiced hydraulic engineer.

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CLIPPER MILL OF MORRIS & ELLING AT PONY, MADISON COUNTY, MONTANA

GOLD MILLING IN THE BLACK HILLS.

BY PROF. H. O. HOFMAN,
Of the Dakota School of Mines, Rapid City, Dakota.

(Continued from our issues of Feb. 1st and 15th.)

Subjects treated upon in preceding issues are as follows:

I. THE ORES.

Character of the Ores.
Sorting of the Ore.

II. ENUMERATION OF MILLS.

III. OUTLINE OF PLANT AND PROCESS.

IV. GENERAL FEATURES OF THE MILLS.

Distribution of Power.
Supply of Water and Fuel.
Auxiliary Arrangements.

V. THE MILLS IN DETAIL.

Grizzlies.
Rock Breakers.
Ore Bins.
Feeders.

Battery-Foundations, Frames and Guides.

The essential importance of a good foundation is well known. In preparing it, a rectangular pit from 11 to 14 ft. deep is first dug to receive the mortar-block. It is made sufficiently long and wide (4x6½ ft.) to leave a space about 24 inches all around the block. The bottom is then carefully levelled and some sand tamped down. On this are placed two layers of 2-inch plank, spiked crosswise to each other, and then the planks which form the mortar-block. The latter used to be placed directly on the bottom of the pit, the uneven tops being sawed off afterwards. Now care is taken that this 4-inch wooden floor shall be accurately horizontal, and that the distance between it and the bottom of the mortar shall have the length of the mortar-block. The top of the block is only planed off, which saves time. By the use of this flooring, the time required for replacing a mortar-block is reduced from six or seven days to five. The mortar-block consists of planks, from 11 to 14 ft. long (according to the depth of the pit), of varying breadth, and not more than 2 or 3 in. thick, as it is difficult to find wood of greater thickness which is sound throughout. They are spiked together, and are fastened above and below with binders, bolted to each other by transverse rods, the upper binders (8 by 12 in.) being even with the top of the mortar-block, and the lower binders (12 by 12 in.) 3 ft. lower down. The space around the mortar-block is then carefully filled and tamped with rock and tailings up to the level of the mud-sills, which are about 4 ft. below the bottom of the mortar. When the top of the mortar-block has been planed off and levelled, a sheet of rubber cloth, ¼ in. thick, is placed over it and the mortar put in place. Through the four holes in the flanges on each side, pass eight bolts, from 3 ft. to 4 ft. 6 in. long, and from 1¾ to 1½ in. in diameter, with which the mortar is fastened to the block.

In placing the planks forming the mortar-block, and in adjusting the bolts that hold down the mortar, a decided improvement has lately been made at the Homestake mills. The planks, which always stand upon end, were formerly so spiked that their width was parallel to the short side of the mortar. The holes for the eight bolts were then bored into the mortar-block from above; at a suitable distance below, recesses were chipped out to receive the nuts which secure the lower ends of the bolts. Now the planks are so placed

that their width is parallel to the long side of the mortar. The bolts have only at their upper end a thread, and end in a loop at the bottom. Through these loops and through the mortar-block, pass horizontally 2-inch iron rods. The planks, on the two sides of the block, where the bolts pass down, are cut out to receive them. The advantages of this arrangement are apparent. In addition to the mortar being securely and evenly tied to the block, it is easier to renew the mortar-block if necessary. The pit need only to be dug in front of the mortar, and when the front binders have been removed, it is easy to tear out the planks, one after another, with pick and adze. In putting in the new block, the two outside rows of planks, with cut places to receive the bolts, are kept ready to that only four horizontal 2½ in. holes for the rod need be bored when the planks have been spiked together. With the old method, two trenches had to be dug, instead of one, if a mortar-block was to be exchanged. Then the planks had to be chipped out in pieces until room enough had been made for them to be torn off. This cost much labor and time.

Battery Frames.—These are generally 12 by 24 in. in size, with recesses for the boxes of the cam-shaft. They are placed on the short sides of the mortar, and are independent of the mortar-block, standing on the cross-sills (which are placed on the top of, and at right angles to, the mud-sills), and tied by the upper and lower guide timbers, and, at the foot, by two longitudinal beams, bolted to them, and let into the cross-sills. The frames are braced either from the back or the front of the battery according to the way in which the power is transmitted to the cam-shaft. In the Homestake, Highland, Golden Terra and Father de Smet mills, where the line-shafts are at the back of the battery, the frames are braced by posts, general placed on an incline between frame and cross-sill, leaving the entire front of the battery unobstructed. In the Golden Star and Caledonia mills the cam-shafts receive their motion from line-shafts placed on the cam-floor, and the frames are braced against the cross-beams to which the boxes of the line-shafts are bolted.

Guides.—The stamps are held upright by two sets of guides, fastened to the guide-timbers which tie the battery-frames. The upper guides are above the tappets, the lower ones between the cam-shaft and the top of the mortar. At the Homestake mill, the center of the lower guides is 17½ in. above the top of the mortar, and the cam-shaft, revolving between two sets of guides, is 3 ft. 10½ in. below the center of the upper, and 4 ft. above the center of the lower guides, making the total distance between the two sets 7 ft. 10½ in. At the Caledonia mill, the distance from top of mortar to center of lower guides is 16½ in.; from these to center of cam-shaft, 3 ft. 4½ in.; from this to center of upper guides, 4 ft. 2½ in.; total, 7 ft. 6¾ in. Each set of guides consists of two pieces of 4 in. pine plank, 16 in. deep, having semi-circular grooves, through which the stems of the stamps pass. Between the two parts of the guides, when new, are inserted small pieces of wood to hold them slightly apart. When the grooves are somewhat worn, these slats are removed, and the guides brought nearer each other. Later on the faces are planed off to diminish the size of the grooves, so that the stamps may not be held too loosely. Each set of guides is secured to the guide-timber with eight ¾-in. bolts. The grooves in the guides are lubricated with a preparation of black lead and linseed oil, mixed warm in

such proportions as to form a soft paste. Oak guides last eighteen months; pine only four months.

Mortars.—Two kinds of single discharge mortars are used in the district. Each consists of one solid casting. The bottom and sides are so thick as not to need any lining, this thickness decreasing very considerably as the feed is approached. The outside walls are vertical, with the exception of the discharge, which projects somewhat. The top is closed by two pieces of 2-in. plank, which rest on lugs ¾-in. wide, cast in the mortar, 2-in. below the top. These planks have each five semi-circular recesses which, when placed together, form holes for the passage of the stems. In addition to these five large holes, two smaller ones are bored for the 1-in. water supply pipes, placed between stamps 1 and 2 and 4 and 5. Two mortars are placed close together, as the stamps of both are set in motion by one cam-shaft. In order to reach the mortars, etc., a passage way is left between every two pairs of batteries. The water supply is derived from a 3-in. main, running along the front of the batteries. From it passes upward a 2-in. pipe between each pair of batteries. With this is connected a 2-in. horizontal pipe, from which four 1-in. pipes branch off at right angles, two for each mortar. In addition to this water supply, there is a 1-in. pipe at each passage-way, close to the mortar, coming from 3-in. main. A hose is attached to clean the apron-plates, and for other purposes.

The points of difference between the two mortars lie in the inside dimensions of the lower part of the mortar and in the arrangement and number of the inside amalgamated copper plates.

1. The Homestake mortar, weighing 5400 pounds, is 54½-in. high and 54¾-in. long. The feed-opening, beginning 6½-in. below the top, is 24-in. long, 4½-in. wide and 7-in. deep. On entering the mortar it remains 24-in. long and 7-in. deep. At the bottom of the feed, forming the continuation of the incline over which the ore passes into the mortar, is a lip, 4¾-in. wide and 1¼-in. thick, designed to discharge the ore against the upper half of the stamp head. The lower edge of the lip is 14-in. above the inside bottom of the mortar. As the lip wears out fast it might be well to cast it thicker, as has been done in the Caledonia mortar. Taking the front view of the mortar, we find, 15½-inches from the bottom, the discharge-opening, 48½-in. long and 21¾-in. high. The frame is inclined outward about 10 degrees from the vertical. On the short sides of the discharge-opening are grooves to receive the chuck-block, screen-frame and curtain, which are held in place by keys and sockets. The chuck-block is also fastened at the bottom by two horizontal keys supported by lugs on the outside lip of the mortar below the discharge. Viewing the mortar in cross-section, we first have the two bottom flanges, 3-in. high and 5-in. broad. The bottom of the mortar (the mortar-bed) is 7½-in. thick, the sides, at the foot of the dies, 3½-in. The inside dimensions are: Width at the bottom, 10½-in.;* length 50-in.; height to issue of mortar (not of pulp), 8¾-in.; width at this point, 13½-in.; at the top of discharge-opening, 20 in.; at the top of mortar, 16 in.; total inside height, 47 in. The casting is ¾-in. thick, from the top down to the feed-opening, on three sides, the back being a little thicker.

A mortar lasts four years, wearing pretty uniformly at the sides and back.

*Formerly the width was 14 inches, but, in order to increase the crushing capacity, it was reduced.

2. The Caledonia mortar weighs 5700 lbs., is 57½-in. high and 54-in. long. The feed-opening, beginning 15½-in. from the top, is 8-in. wide, 11-in. deep and extends the entire length of the mortar, having a strengthening rib in the center. At entering the mortar it is 40½-in. long and 7½-in. deep. Here the lip, 2½-in. thick and 8-in. wide, measured on the incline, begins. The bottom of the lip is 15-in. from the foot of the dies. As in the Homestake mortar, the ore is discharged towards the head of the stamp. The lip serves as a protector to the amalgamated copper plate below it. The discharge-opening in front, 50 in. long by 17-in. high, begins 10-in. above the bottom of the flange. Its frame is also inclined outward about 10 degrees from the vertical. The grooves on the sides receiving only the screen-frames and the curtain, are simpler in construction than those of the Homestake mortar. The lugs for the horizontal keys are the same. Taking the cross section, we find the flanges 3-in. thick and 4½-in. wide. The mortar-bed is 7-in. thick, the sides, at the foot of the dies, 4½-in. The inside dimensions are: Width at the bottom, 10-in.; length 50½-in.; height, 14-in. to the issue of mortar and pulp, where the width is 16 in. This increases to 19 in. at the top of the discharge. The top of the mortar is 13½-in. wide, and the total inside height 50½ in. The casting, from the top down to the feed opening, is ¾-in. thick.

A mortar lasts six years, and wears out more on the short sides than at the back.

In comparing the two types, we see that they differ in the feed-opening, as already discussed. The feeding-lip also differs, that of the Caledonia mortar being thicker and wider than the other. The increase of width is necessitated by the presence of the amalgamated copper-plate below the lip: the mortar itself is also wider at the issue for the same reason. The depth of the Homestake mortar is 8½-in. and that of the Caledonia mortar 14-in. The latter corresponds with the height at which the issue of the pulp occurs. In the Homestake mortar the issue is raised by the insertion of the chuck-block, 16¼-in. above the foot of the dies, thus giving, with a shallower mortar, a deeper issue of pulp than the Caledonia mortar.

Dies—The Homestake management casts its own dies. The quality of iron used is between gray and mottled, the top of the cylindrical part being chilled. The foot-plate has beveled corners, and is 10-in. long, 10½-in. wide and 1¼-in. thick. The cylindrical part or "boss" is 9 in. in diameter and 5-in. high. The level of the die is 10-in. below the discharge which takes place over the chuck-block. The die weighs 121 pounds (one-seventh of the weight of the stamp) and lasts about six weeks, crushing 180 tons. By that time the cylindrical part has become slightly convex, and is worn down to 2-in. from the foot-plate. Its weight has been reduced to about 30 pounds; thus 48 pounds of iron are consumed for every 100 tons of rock that are crushed.

The Caledonia mill buys its dies outside. They are of chilled white iron. The foot-plate has also beveled corners, is 10-in. wide by 9½-in. long and 1½-in. thick. The cylindrical part is 8-in. in diameter and 5½-in. high. While the dies in the Homestake mortar fill its bottom completely, those of the Caledonia fit perfectly in the width only, there being a 2-in. space in the length that has to be divided up between the five dies. The distance from the bottom of screen to top of die is 6-in. The die weighs 160 pounds (about

one fifth of the weight of the stamp) and lasts three months, crushing 300 tons of hard rock. The cylindrical part is then worn down within 1-in. of the foot-plate. The worn out die weighs 38 pounds, making the consumption of iron 40 pounds for every 100 tons of rock. Amalgamated copper plates are placed along the entire length of the mortar. In the Homestake mortar, one plate is set to the discharge opening; in the Caledonia mortar there are two plates; one under the discharge opening, the other beneath the lip of the feed-opening.

The Homestake mills used the so-called chuck-block placed against the lower flange and the two side-flanges of the discharge. The chuck-block consists of a 2-in. plank, bolted to the back of a 1¾-in. board and extending from 2 to 2½-in. above it. Its inside upper edge is rounded off, and over this, and along the inside face a three-sixteenth-in. copper plate is fastened with iron screws. The recess formed on top of the front board, 1¾-in. and from 2 to 2½-in. deep, is taken up by the lower part of the screen frame. Between this and the front board is placed a strip of carpet to form a tight joint. The frame is held in place by a vertical piece of flat iron bolted to the center of the front board, a horizontal wedge being driven between the two. The front board has an iron facing along its lower half, and two vertical strips towards the ends, to protect the wood against the two horizontal and the two vertical wedges with which it is fastened to the mortar. To the back (beneath the 2-in. plank having the sheet copper), is tacked a strip of rubber cloth, which helps to make a tight joint between the wood and flange of mortar. Two chuck-blocks of different heights are in use. When the dies are new, a chuck-block 7 in. high is inserted; when they have worn down 2 in., another chuck-block 5-in. high replaces it. Thus the height of discharge is kept nearly uniform. The distance between the face of the shoe and the chuck-block (2-in.) is rather small. The violent motion of the battery-water drives the sand against the copper plate and scours off amalgam that has been caught on it. Thus comparatively little amalgam can settle on the plate. Wooden chuck-blocks last six months. After this time the coppers have to be removed and put upon new blocks, or they are scraped very carefully, put aside, melted and sold. Mr. R. Graham, the millwright of the Homestake mill, has therefore replaced, in his mill, the 2-in. plank to which the copper plate is screwed by ¾-in. iron, to which three-sixteenths in. copper plated is riveted with copper rivets. The face of the 1¾ in. wooden front board is covered with ½-in. iron; thus the distance between face of shoe and Graham chuck-block is 3½-in. instead of 2-in. This iron chuck-block lasts as long as the mortar, and more amalgam collects on it than on the wooden one. Of the free gold received, 55 per cent is caught on this inside plate.

The reason that the Caledonia mill has amalgamated copper plates at both front and back, is that the ore milled is not oxidized at all, which makes it harder to extract the gold. The aim is to keep the pulp longer in the battery and thus counteract the refractory character of the ore. The plate in front is 5-in. broad, the one at the back, 8-in. Both are made of three-sixteenths in. copper and are simply bolted to the mortar, the lower edge of the plates being 9-in. above the foot of the dies. Of the free gold removed, 60 per cent is caught on these inside plates.

(To be Continued.)

CORRESPONDENCE

CALIFORNIA.

TUOLUMNE MINES.

(From our Special Correspondent.)

Mother Lode.

THE RAPPAHANNOCK.

Is now down to 750 feet, and it will be continued down to the 1000 mark before any lateral exploration will be made. Then the mine will be worked upwards on the "shoots" that were cut at the 600 and 300 foot levels.

THE ALAMEDA.

to the north of the Rawhide, is developing into a most valuable property. Work, sinking and drifting.

THE TARRANTULA

is looking very well. Sinking on their ore body which shows free gold. Dr. Redding, the late superintendent, has resigned, owing to some little misunderstanding with the English shareholders. The company is formed of Anglo-American stockholders. Dr. R. was a very general favorite and the work that was carried out under his direction from the opening, and from the purchasing of the property, reflects the greatest credit on the late careful and painstaking superintendent, who placed the mine by his skillful efforts and developments in its present prosperous condition. The company did not study its best interests by permitting him to resign and leave.

"THE TRIO" COMPANY

are sinking both north and south shaft. Gold shows in the rock.

THE DUTCH MINE.

The above property promises to be a second Rawhide. Their 20-stamp mill is kept continuously crushing—turning out dividends.

THE SANTA YSABEL

mines are being opened up by three shafts; power, electricity; looking well.

THE JUMPER.

Every thing surrounding this property marks a most prosperous condition. To the south are many mines being developed with very good prospects.

THE EAGLE AND SHAWMUT

mines are turning out monthly golden bars. This is a first class property.

East Belt.

THE DEADHORSE

mine is steadily crushing. This is the deepest mine in the country and among the best.

THE PENNSYLVANIA AND CARLOTTA

shafts are both sinking. The rock is high grade.

THE CONFIDENCE

mine is stoping rich rock—their mill constantly crushing—results all that can be desired.

THE WHEEL PERRIN

is being unwatered by a San Francisco party, for the purpose of examination and probable purchase.

THE KELTZ MINE

struck a heavy sulphurated quartz and a large vein; the old works are as usual productive of good results. Mill running.

THE MOUNTAIN CITY GROUP

of mines are working steadily, developing their exceedingly rich veins. The formation is black metallic slate. The ore on the dump after a rain storm shows up splendidly with the precious metal. We predict a bonanza in this property.

THE GREY EAGLE.

This mine is showing up well for a good property. Extensive works are being put up.

Middle Belt.

THE GERRYMANDER.

The mill-plates show up exceedingly well, the result of free gold in the quartz—but it is a sulphuret ore of high grade and heavy percentage.

ARGUS.

DAGGETT, SAN BERNARDINO CO., CAL.,

February 19th, 1898.

EDITOR JOURNAL:—This section of the country is looming up in great shape and future developments will be carried on in a grand scale.

That this county has a great quantity of borax in sight the following notes on the Pacific Coast Borax Co. will demonstrate.

There has been a general change of management in the operation of the mines. During the past year the ore has been extracted by contract, but the company have placed their own men in the mine and will take out just what ore they want, and pay the men by the day, direct from the company's funds. There are from fifty to seventy-five men working in the mine at the present time. Four 20-mule teams and a steam wagon are required to haul the ore from the mine to the railroad. With these facilities the company can ship 120 tons of ore per day, or about eight to ten cars. There are twenty claims owned by the Pacific Coast Borax Co. on two parallel ledges which run through the country. Nearly all the claims follow the trend of the ledges. The larger of the two ledges was supposed to have been too low grade and was not worked until recently, when they have extracted a large quantity of marketable ore, that is, ore sufficiently high grade to ship.

This company is busily engaged in building a railroad from twelve miles north of Daggett to the borax mine. They have a force of men and thirty teams at work. During the construction of this road they will have to build a large bridge across the Mojave River. There is a great quantity (some twenty to thirty carloads) of rails and ties on the ground. This road will be standard gauge for first half of the distance with a third rail in between the other two for the convenience of the narrow gauge train. At the terminus of the standard gauge road there will be, it is reported, erected a refinery to work the low-grade ores in the mines and on the dump, of which there is an unlimited quantity. From this point the road will be narrow gauge and run up Borax Canyon, an irregular, tortuous defile in the mountains. The reason of this

move on the part of the company, it is said, was to tap the mines belonging to the firm, which are located in the vicinity of the canyon.

Under the present management these properties bid fair to be a dividend-paying proposition for many years to come.

Bartlett & Stanley are working a few men prospecting their borax mine in this section. They are experimenting as to the best process for the extraction of the acid. They have a small plant and have succeeded in extracting the acid on the ground very economically. These gentlemen have just shipped in a consignment of sulphuric acid, to be used in freeing the acid from the ore. Crude acid, averaging 75 per cent., is shipped to San Francisco, where it is refined and marketed all over the world. It is thought that in time they will rival the Pacific Coast Works.

The silver mines are all shut down and the once lively camp of Calico is now deserted and dead.

There is considerable prospecting going on in the desert for gold ores, and some prospects already discovered bid fair to develop into paying properties. It is hoped that the new mill at Barstow will give an impetus to the mining industry of this section as the miners will have an opportunity to sell their ores to the sampling works erected in connection with the mill.

It is reported that J. R. Lane has bought the Preston mine from Thos. Preston. This mine is located about twenty miles north of Daggett. He will erect a 10-stamp mill thereon.

INVINCIBLE.

NEW MEXICO.

ELIZABETHTOWN, Jan. 3, 1898.

EDITOR JOURNAL:—There has not been one third of the number of men in the mines at this time of year, as at the present time, for twenty years. There has never been a time in the history of the camp when there were so many mines paying. Daily new mines are being added to the paying ones, and without doubt the coming spring will see the Elizabethtown camp and its surrounding the greatest producing camp New Mexico has ever enjoyed.

The Blakeslee Tunnel, is now in 600 feet and has a four foot vein of ore that carries \$20 in gold. When finished the tunnel will measure 4,000 feet and give a depth of 2000 feet under Baldy mountain. A full force of men are now working the property.

Joe Lowery and Nick Harms are pushing work on the Tom Boy. A number of rich stringers have been cut and the main lode is expected to be reached soon.

The Mills Tunnel company have discontinued working the New Moon mine until spring, owing to water in the shaft which they cannot control. They have let the third contract of 100 feet on the tunnel and are pushing work on the same. It has completed good buildings at the mouth of the tunnel, and gone through a vein of one to two hundred feet of ore carrying gold from \$3 to \$6 per ton. They are now in rock that gives every assurance that they will strike a high grade lode within the next hundred feet. Without doubt, when their property is developed they will show more pay lodes than any other property in the camp.

"ALWAYS TRUE."

Patents of Interest to Mining Men.

January 25, 1898. No. 597,820.—Art of obtaining gold and silver from auriferous and argentiferous materials. N. S. Keith, Chester, England. Filed, Feb. 21, 1895. The process of obtaining the precious metal from a cyanide solution, containing cyanide of mercury, which consists of passing a current of electricity through the solution to a metallic cathode, whereby an easily removable layer of the precious metal and mercury is simultaneously deposited on said cathode.

February 1. No. 598,193.—Apparatus for electro-deposition of gold and silver. Emil Andreoli, London, England. Filed, October 1, 1895. Patented in England, Sept. 4, 1895. In an apparatus for the electro-deposition of gold, silver, or other metals, anodes of peroxidized lead, acting in the presence of and in combination with a cyanide or cyanide-compound solution.

February 1. No. 598,084.—Ore roasting furnace. L. D. Godshall, Everett, Washington. Filed, Oct. 27, 1897. Upon each side of the furnace is arranged a track-rail and stirrers are mounted upon a shaft, the wheels of which run upon the rails. A wall prevents the ore from working into the rail-chamber, a slot being left for the shaft to travel through as it passes from end to end of the furnace.

We are pleased to extend greetings to our contemporary, *The Los Angeles Review*, devoted to the financial, mining and other interests of the southwest, whose Volume 1, No. 1, we have before us. It is a bright, newsy little sheet of 12 pages, published by the Review Publishing Co., of which Messrs. R. R. Hill and A. Richardson, two literary men of note are the proprietors.

Mr. Richardson had charge of the special mining edition of the *Los Angeles Times*, published some little time ago, which reflects credit upon him.

Mr. Hill is a very pleasant young man and is well known in Los Angeles, having been in the employ of the *Times* for a number of years.

The *Review* undoubtedly has a bright future and we welcome it with all our heart, and hope the mining industry will be materially benefitted, particularly the mines of Southern California.

Southern California has a great many excellent properties that only need developing to become good paying propositions, and with the aid of the *Review* we expect to bring them before the investing public.

The *Southwest Bullion* has been launched at El Paso, Texas. The *Bullion* is devoted to the mining and smelting interests of New Mexico, Arizona, Western Texas, and Old Mexico.

It is published weekly and edited by Jno. I. Ginn. The subscription price is \$1.00. In one of the *Bullion's* short editorial notes, they say: "The *Bullion* has arrived to stay, and it brought along a sufficient quantity of coined bullion to supply its terrestrial wants for many moons."

The Colorado Iron Works Company have just made a shipment of two carloads of machinery to Old Mexico. One carload being concentrating machinery for the San Vincent Mining Company, at Ameca, and the other carload constituted settling bowls for the Great National Mexican Smelting Company at Monterey.

CHAIN BUCKET DREDGE.

The outline illustration of dredge boat, shown herewith, is one that will be of interest to those using or contemplating the use of such apparatus. This covers many of the demands brought forth in the Alaska-Yukon gold fields, as it is especially designed for prospecting along rivers.

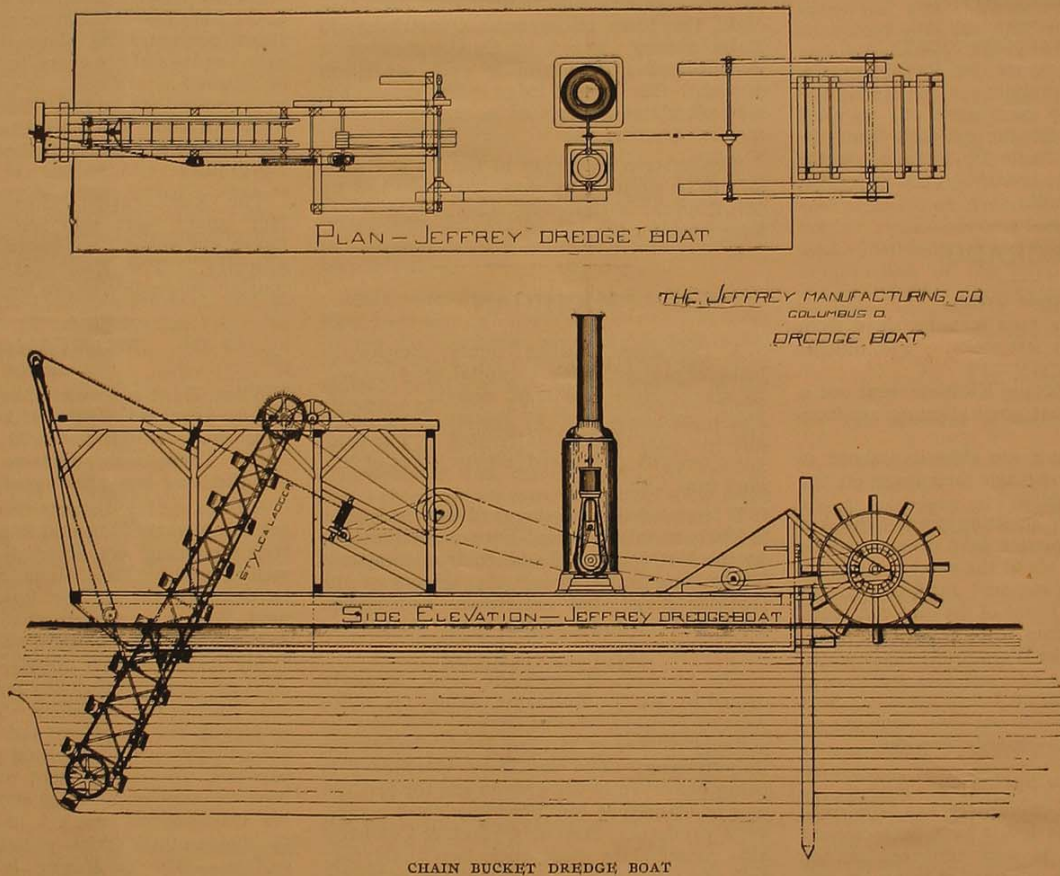
The Jeffrey Manufacturing Company's long experience in the manufacture of chains, buckets and appliances makes it possible for them to furnish chains, dredging machinery and appliances as few other manufacturers can. Its special chains for this class of work have been used for more than ten years, and can thus be purchased without any experi-

ing and lowering, to suit the different depths of the water, also for drawing it out of the way when its services are not required. The buckets for the heavier outfit are arranged with truck wheels at each end, the latter traveling on a suitable track forming a part of the ladder frame. This makes an admirable support for both the loaded and empty buckets and reduces the friction, wear, as well as the power consumed, to a minimum.

The lighter style of elevator is intended for light service, and consists of a wooden ladder, with suitable rods and braces for carrying the chain attached firmly to the buckets by means of steel plate attachments, both the loaded and return chains being supported on idler

boiler, but any other power can be used such as electricity, gas, oil, also horse power, if no other is available. Each boat is usually equipped with a chain drive to the stern wheel, which is by far the simplest and cheapest that could be provided for this purpose. Inquiries from interested parties are solicited and will receive prompt attention. Address the Jeffrey Manufacturing Company, at Columbus, Ohio, or at any of its branches.

Dr. Nelson of Milford, Utah, placed an order with The Colorado Iron Works Co.; for a Ten-stamp gold amalgamating mill, to be erected at that place. The power for this



CHAIN BUCKET DREDGE BOAT

ment. In the illustration herewith, the type of boat or scow is of ordinary construction, while the engine and general arrangement is such as to make it possible to propel the boat as well as to operate the dredging machinery from the same engine. Briefly described:

The equipment ready for work consists of an elevator, engine and stern wheel drive with the driving connections for transmitting the power. There are two styles of elevators principally used for dredging purposes. The heavier outfit consisting of a heavy iron ladder frame, with two strands of Jeffrey roller chain and special buckets at intervals of 3 or 4 feet. The elevator is usually equipped with a steam hoisting arrangement for elevat-

ing and lowering, to suit the different depths of the water, also for drawing it out of the way when its services are not required. The buckets for the heavier outfit are arranged with truck wheels at each end, the latter traveling on a suitable track forming a part of the ladder frame. This makes an admirable support for both the loaded and empty buckets and reduces the friction, wear, as well as the power consumed, to a minimum.

The lighter style of elevator is intended for light service, and consists of a wooden ladder, with suitable rods and braces for carrying the chain attached firmly to the buckets by means of steel plate attachments, both the loaded and return chains being supported on idler

sprocket wheels. This makes a very simple and economical construction, especially adapted to light work and smaller capacities. Occasionally the buckets are provided with teeth, to assist in digging. In all cases the Jeffrey roller chain used for the reason that it has been demonstrated, after many years of service, to be the best all around chain for this work.

The Jeffrey Manufacturing Company is prepared to build parts for dredges, such as chains, buckets, ladder frames, etc., to suit special conditions and the views of the purchaser, to be operated either by hand or steam power. The power for the operation of this machinery usually consists of an engine and

plant will be sufficient to run Twenty stamps. The Colorado Iron Works Company, are western agents for the Erie City Iron Works engines and boilers, and will furnish the engine and boiler of their make, for this plant.

Messrs. Chas E. Billen & Co., Engineers, purchasing and forwarding Agents of Chicago, Ill., have just issued their first catalogue of Machinery and Supplies for Mines and Mills.

This catalogue is the only one of its kind we have ever received and contains a fund of information not obtainable from any other source. If you wish a treat send for Chas E. Billen & Co. catalogue Vol. 1, No. 1.

Miscellaneous Mining News.

ALASKA.

A dispatch from Nanaimo stated that the steamer Noyo arrived there from Skaguay. She had twenty-five disgusted passengers aboard, tired of the country after their first experience. The treasure on board was \$10,000. One of the passengers said that 200 men could do all the work offered at Skaguay and that there were at least 500 men there who had nothing to do but drink and gamble.

Among the parties that have recently gone to Copper river is one of thirty-five persons from Stamford, Conn. They sailed from Seattle recently on a schooner they had chartered, taking with them a steam snow-sled.

CALIFORNIA.

SAN BERNARDINO COUNTY.

The Randsburg-Santa Fe Reduction Co. has begun active operations in the erection of their plant. Forty men were put to work Feb. 15th grading for the railroad from the main line of the Santa Fe Railroad to the mill. They are also breaking ground for the foundation of the mill.

COLORADO.

Cripple Creek.

A shipment of 52 tons was recorded from the Raven company last week. The returns are not yet in.

Lessees on the Mollie Kathlene sent out a 10-ton shipment last week that assays from five to six ounces.

Clements & Frank are shipping about 30 tons of two-ounce ore from their lease on the Six Points on Bull Hill.

About 150 tons of smelting ore left the Anchoria Leland properties last week. The grade is remaining about the same.

The Elkton company sent out fourteen cars of ore last week. Three of the cars contained second and eleven cars third-grade ore.

Shipments from the Work company's workings amounted to 53 tons net last week. It had an average value of \$26 70 per ton. Several other shipments are out but none are reported from lessees.—*Mining Investor*.

Idaho Springs.

The new plant of machinery has been completely installed, the levels have been cleaned out and the shaft is now timbered on the Crockett mine. A contract is being let this week for the sinking of the shaft below the adit level and three shifts must do this work. At the place of sinking a big body of ore was encountered in the adit, and, although it was stoped but 25 feet above the adit and underhand stoped for 20 feet more, it produced in a few months about \$75,000 worth of high-grade mineral. The air at that time was bad, and, after getting out all of the mineral possible, the parties in charge would not put up money to sink a shaft, a dividend having been declared for all of the surplus and leaving no working capital. After laying idle for a number of years, some Chicago business men concluded to take a flyer, and they sunk a shaft from the surface to connect with the adit, a distance of about 170 feet. The indications were so good that they put in a plant of machinery and are now ready to get in under the ore body, it having pitched down and away from the mouth of the adit, which was driven

for 700 feet. The shaft will be sunk for 300 feet below the adit, and opportunity will be given for drifting in the ore chute, which seemed to show an increase in the width of the adit as it went down. The manager has had \$30,000 placed to his credit for preliminary work.

IDAHO.

John Coudron and J. B. Black have sold their group of claims, formerly known as the Trump Group, to John M. Davis of Mercur. The claims are on the Hailey gold belt, eight miles from the town of that name in Blain county.

The Graysons of San Francisco, now have a clear right to the Gold Hill property in Boise county, the Coughanours having lost the suit brought to quiet title.

At the Iowa mine, near Quartzburg, in Boise county, owned by D. Coughanour, a good streak of free milling gold ore is reported. The 14-foot ledge is low grade, but a streak about one foot wide, recently uncovered is very rich.

The western extension of the Gold Hill is said to be showing up well. It is worked by Mr. Church, of Colorado, who bought it not long since for \$18,000.

MICHIGAN.

A Coldwater, Branch county, company is being organized, with a capital of \$100,000, to manufacture Portland cement. L. W. Hoch, ex-postmaster at Adrian, and Leigh Hunt of that city, are interested. The company recently purchased ninety acres of low land near Coldwater.

It is stated that a general advance in wages is likely to follow the advance recently made by the Metropolitan Land & Iron company. There is no union among the miners of the Gogebic range, but conferences have taken place between some managers and delegations of miners.

The 80 acres of limestone land, formerly owned by Mr. J. McKinnie, lying 1½ miles west of Trenton, Wayne county, will now be actively worked by Mr. J. B. Ford, who became its purchaser. The necessary machinery is being conveyed to the ground and the product will be utilized at Mr. Ford's soda-ash plants, at Wyandotte. Messrs. Church & Company also contemplate doing their own quarrying, and are now looking over 65 acres of land 2 miles below Trenton, now owned by Joseph Anderson.

MINNESOTA.

A large portion of the men at work stripping the Aetna Mining Company's property have been discharged, and little will be done till spring. The late John R. Thomas, president of the Thomas and Aetna Iron Companies, was at the head of this concern.

It is announced that The Sellers Mining company will reopen its mine at Hibbing and operate it extensively.

The Consolidated Mines company is trying to get more men and recently advertised for 100 at points 300 miles from the mines. It pays \$1.65 per day and contract men average \$2.

Some officials of the Minnesota Iron company have been making an examination of the Sauntry property. It is one of the greatest deposits of ore of various grades on the Mesabi.

MISSOURI.

On the McConey land Albert Frye is drifting at 70 ft. on a 12-foot face of lead and zinc ores in open ground with only enough water to wash the ore. Last week he made his first turn in of 10 tons of zinc and 10,250 lbs. of lead ore.

Chappel Mining Company is drifting at 65 ft. on a good face of zinc ore and will make a good output of ore this week. They are also sinking a second shaft and getting good signs of ore in open ground.

On the Empire Company's land Hennessy & Co. have four lots and are putting up a large steam concentrating plant that will handle over 125 tons of ore every 10 hours, and will be finished in 10 days. They have over 350 tons crushed ore on top. They will hoist dirt from two shafts and are drifting at 140 ft. on a 40 ft. face of disseminated zinc ore in shooting ground.

The Kindergarten, Horseshoe and Blue Hen mines were sold last week for a good figure, the amount not stated, but it is a good property. The Kindergarten produced 20 tons of top-grade zinc ore last week.

MONTANA.

Allen, Kent and others have taken a bond for one year on the Wise Mike claim, in the Sunflower district, and will begin work at once. There is, it is said, no payment down, and the bond is in the sum of \$25,000.

All the mining districts tributary to Clancy are being worked, several mines in each district producing ore, some of which will run well in gold. The Warm Springs district, particularly the middle fork of that large field, is showing up remarkably well just now in every mine being operated.

Jos. Garneau's last shipment from the Golden Gate, near Clancy, was sent to the Colorado smelter for treatment. There was about 23 tons in the shipment and it netted about \$600. The cost of smelting was about \$7.50 per ton, an improvement over that of the East Helena concern of about \$4 per ton. Mr. Garneau has struck a new prospect near the Golden Gate which promises well on the surface.—*Western Mining World*.

NEW MEXICO.

Output of Hillsboro gold mines for the week ending Thursday, Feb. 17th, 1898, as reported for *The Advocate*:

	Tons
Wicks.....	30
Butler.....	15
Richmond.....	45
Happy Jack.....	5
Snake Group.....	100
Opportunity.....	25
Sherman.....	5
Prosper.....	5
Eighty-five.....	5
Rex (silver-lead).....	5

Total 240

Total output since Jan. 1, 1898.—1430.

OREGON.

The owners of the Steam Beer mine at Leiland, Josephine county, were incorporated last week. The incorporators are Rutgers Van Brunt, Walter E. Smith and R. G. Smith.

The first shipment of machinery for the Powell Creek Mining Company arrived last week at Grant's Pass, Josephine county, from San Francisco. It consisted of a good supply of pipe of varying sizes.

A rich strike was made last week on Missouri Flat, Josephine county, by those energetic miners, Davidson Bros. and G. W. Bailey. According to current reports, a good ledge of rich quartz has been discovered which is producing \$20 a day.

Last week a telegraphic dispatch from Cottage Grove, Lane county, announced that a very rich strike had been made in the Bohemia mining district. A ledge ten feet wide has been found, the ore in part going \$30,000 to the ton, and the remainder \$500 to the ton.

An important mining deal, involving the property of A. H. Carson and David Lindsey, on Oscar creek, near Grant's Pass, is pending. Portland parties have taken a bond on all the Carson property, and three-quarters of a mile of the property of Mr. Lindsey, lying on each side of the creek. This does not include all of Mr. Lindsey's property, but so much of it as the parties deemed necessary to fill out the property desired. Mr. Carson himself worked up the deal. The money is to be paid over by the 4th of March. There is no richer creek anywhere than Oscar creek. *Oregon Mining Journal.*

SOUTH DAKOTA.

Golden Slipper is said to be a very rich property. A 200-foot shaft has been completed on the property. Regular shipments of ore are being made.

A vein has been struck in the Two Strike mine which assays very well. The mine is easily worked and will soon be more thoroughly worked by a larger force of men.

The formation on the Blue Lead property, near Sheridan, is copper. Prospecting has been going on for some time with diamond drills. At 200 feet a vein of copper has been struck assaying 15 per cent. copper.

The Omega mine is the most promising in the Pactola district. It is well developed and a low grade of free milling ore is being worked to a profit. It is owned by eastern capitalists.

UTAH.

An up-raise is now being made at the Valeo Mine, at Park City, to connect the tunnel with the incline on the ledge from above. This work has been progressing for some time and a few short weeks will see it completed. This will supply the mine with good air, and give the management an opportunity to prospect the vein to a good depth. The work is being done according to a survey made several weeks since. Little or nothing can be learned from the officers of the company regarding this work, but the fact that it is being done will be good news to the stockholders, as when connections are once made, it will not take long to determine the extent

of the ore bodies, at least to a depth of 500 feet; and it will also more than likely prove the true course and dip of the vein—something that becomes of more vital importance to the owners of the property every day. The uneasiness that now exists among shareholders will, by this new move, soon be expelled. There has nothing happened at the property to cause any one at all interested to feel at all discouraged, other than the failure of the lower tunnel to encounter the ledge, but many conditions might have been responsible for this disappointment. The Valeo we hope will come out all right.—*Record.*

De La Mar Mine.

No large steel construction undertaking, at a distant point, was ever advanced to completion more rapidly than the huge mill and shaft house structure which covers the slope of Golden Gate Hill at this writing. All the material and machinery are shipped. However, surface operations—i. e., ore treatment, probably, will not begin till the middle of the month, though Manager Cohen hopes to be handling 300 or 400 tons per diem by that time. The marvels of this ground seem to be endless. Only the other day, a body of hard, solid, almost flint-like lime rock was broken into, from one of the deep workings, which returned \$18 to \$70 gold per ton. It fails to show a color by panning and in every way is unique.

Main operations through many months have been through a winze from 900-foot level in the Bullion Beck mine, the deepest point of main shaft—to a depth of 1260 feet from surface, entailing additional expense in the handling of ore. At a late meeting of directors, it was decided to sink main shaft to a total depth of 1,500 feet, and work on this improvement has commenced. At two or three points in the lower workings some large bodies of ore have recently been cut. The mill has not yet resumed work on the second grades, and it is probable that before resumption an amalgamating adjunct will be installed.

WASHINGTON.

A rich strike has been reported at the Little Gem mine, three miles east of Rockcut and one mile from the Little Giant in Pierre's Lake district, of the north half of the Colville Indian reservation. This portion of the reservation was thrown open to mineral settlements in 1896, and in the last few months a considerable number of claims have been developed. The vein encountered at the bottom of the 90-foot shaft of the Little Gem, 10 inches in width, assays very high in free gold. The Federal Mining Company of Spokane is the owner.

The *Redlands Daily Record* has the following to say regarding a smelter at Los Angeles: "The need of a smelter becomes more apparent daily. The character and quantity of ore found in this and adjoining counties is such that miners are compelled to ship to San Francisco or stop work altogether. There are thousands of tons of ore on dumps ready for shipment, but will not bear the excessive rates of freight. Nothing would revive the mining industry of Southern California more than a plant of this character within easy reach of all mines."

We heartily endorse the *Record's* expressions.

FOREIGN MINING NEWS

LOWER CALIFORNIA.

The Triunfo Silver Mines.

Samuel R. Rhodes of Hermosillo, in the latter part of August, obtained an "option" on the tailings of the Progreso Mining Co's mill at Triunfo, Lower California. This property is little known, although the mill has been running since 1869 and the dumps contain over 400,000 tons of tailing. The oldest dump contains several thousand tons of 25 ounce silver tailings, the result of an attempt at amalgamating base ores. Since then these silver ores, carrying from forty to eighty ounces of silver per ton have been leached and the tailings assay \$2.50 gold and 10 ounces silver per ton, associated with arsenic, antimony and zinc. There are five silver mines connected with the mill by railway—the pay roll numbering fifteen hundred employees. Although Mr. Rhodes' option was good only till December 31st, 1897, he has succeeded in forming a company in Washington, D. C., and in beginning the erection of a plant. After careful tests it was found that at least \$5.00 per ton can be recovered at a maximum cost of \$2.25, on American money basis. The cost of reduction has been decreased by the Ladd-Chittenden Leaching trough, and by a combination of the hypo and cyanide processes.—*Lower Californian.*

MEXICO.

The Mineral Wealth of Chihuahua.

The estimated mineral wealth of the State of Chihuahua is said by Messrs. Enrique C. Creel, manager of the Miner's Bank, and Frederico Ducloz, manager of the Mexican Ore Co., in the city of Chihuahua to be as follows:

Santa Eulalia.....	\$1,600,000
Parral.....	1,350,000
Cusiuhiriachic.....	700,000
Batopilas.....	700,000
Barranca del Cobre.....	100,000
Urique.....	100,000
Corralitas.....	500,000
Quasapares y Palmarejo.....	800,000
Morelos.....	50,000
Guadalupe y Calvo.....	150,000
Ocampo.....	400,000
Pinos Altos.....	350,000
Concheto.....	350,000
Yoquiva.....	50,000
Urachic.....	100,000
Magistral y Terrazas.....	300,000
Sabinal.....	300,000
Murillo.....	150,000
Descubridora.....	300,000

Total.....\$8,150,000

This is divided as follows:

Silver.....	\$1,650,000
Gold.....	1,500,000
Lead.....	650,000
Copper.....	350,000

Total.....\$8,150,000

Gold was first discovered in Colorado in 1858, and since then the State has produced \$530,000,000 in gold and silver. Out of 56 counties of the State 26 are gold producers.

GENERAL NEWS.

THE PATIO PROCESS.

HISTORY OF THE PATIO PROCESS.

The Patio process for reducing ore was invented or discovered by Bartholome Medina, a native of the town of Pachuca, in Mexico, in 1557. It is still practiced and used extensively in that country and South America in all its primitive simplicity, and when we take into consideration the very cheap labor, the almost total absence of fuel and the great scarcity of water in many of the mining districts, we can well see why it has not been superseded by other methods.

Medina himself was no chemist, but the modifications made later on by scientific men have shown the process to be one of the greatest importance, and that the accidental invention of this process has proven a great source of profit to the Republic of Mexico there can be no room for doubt. These modifications introduced upon the Medina method were, not only in a mechanical but also in a chemical way, part of the process. The use of the pure chloride of sodium would never probably have been adopted had not the scientists suggested it, as in early Patio days a combination of sulphate of copper with water was considered indispensable for the reduction of many ores.

The oldest system of grinding ores for the Patio process is the one that is now still in use in many places in Mexico, Peru and Chili. The ore is first brought to the hacienda and crushed by a primitive, ill-constructed Chilian Mill, this being made entirely of wood or stone and being propelled by mules or horses. The great defect experienced with these has been that the cylinders revolving upon the bed plate wear out quickly, necessitating many stoppages, and therefore causing an additional expense in the grinding of the ore. The first improvement introduced was the use of cast iron tires on the outside of the stone wheels, the tires being fastened to the wheels by wooden wedges; this system has been in use until late years, when improvements have been made in the manufacture of steel tires, and rings of this kind have been experimented upon in the haciendas of Pachuca and Guanajuato. These tires are of a very homogeneous metal and wear very equally. They last from four to ten times as long as cast iron rings.

Next it was found that the bottoms of the Chilian Mills did not wear as long as the revolving wheels, and first cast iron and then forged steel plates were put in to protect the foundation stones. Later on, the whole of these mills were made in iron, and these are the mills that are now in use in the largest haciendas.

THE PATIO PROCESS.

The ore on being taken from the mine is given to sorters or pepenadors—men, women and children, all working—who break the ore into small pieces and with great skill select what experience teaches them is rich enough for smelting, throwing aside the waste or what is supposed to be too poor for treatment; the remainder is the second class ore, which is to be crushed and pulverized by the Arrastra or Chilian Mill, with a view to its future treatment by amalgamation by the Patio process.

The ore is first crushed by a primitive stamp mill, which is run by mule-power. As a rule, the stamps are made of wood and shod

with iron, and will weigh from one hundred pounds to two hundred pounds each, and in most cases have flat stones for mortars. This reduces the ore to a fineness of wheat, or, in some cases, the size of corn, depending upon the character of the ore. The pulp is then taken from the mill and placed in the Arrastra or Chilian Mill, where it is ground into a perfect slime or mud. Of these two methods the more popular is

THE ARRASTRA.

The Arrastra is commonly worked by mules, which turn a vertical shaft, from which one, two or four cross-bars or arms project far enough beyond the circle of the mill to hook on one or two animals, as may be desired. Some small Arrastras will have only one animal, while the larger ones will have as many as six.

The construction of this crushing mill is very simple.† * * * *
An upright spindle is provided with a gudgeon on each end and notches or openings made at the proper distances for inserting the driving arms. Two posts are then set firmly in the ground directly opposite each other and in a line with the center of the mill. These posts are far enough from the outside of the circle of the mill to allow the animals attached to the sweep or arm to pass between. From the top of these posts a cross-beam is placed, in the center of which is an aperture to receive one end of the upright spindle, the lower end of which fits into the center stone. The sweeps are then fixed into the upright and the Arrastra is ready to receive the crushing stones or drags.

The amount of ore crushed by this old-time process will depend largely upon the size of the Arrastra, the number of mules used, the condition and character of the ore; as a general proposition, from 300 pounds in a one-horse mill to 1,300 pounds in a four-horse mill.

Often instead of crushing in the Arrastra the ore is crushed in the Chilian Mill—the choice of these methods depending to a certain extent on the nature of the ore and on the permissible first cost of the plant, the first cost being greater in the case of

THE CHILIAN MILL.

The original Chilian Mill was built in the same manner as the Arrastra, with the same circle of stones and heavy stone pavement inside, but in place of the stone drags a large stone wheel was fitted on the sweep, and as the animal moved the wheel revolved, crushing the ore much more rapidly than the Arrastra. These Chilian Mills are more costly than the Arrastras, but they have recently been greatly improved, and are coming more largely into use. After the ore is properly crushed we reach the stage of

THE PATIO.

The pulverized pulp when taken from the Chilian Mill or Arrastras, is in the shape of a thin, slimy mud, and is placed in vats or open spaces on the ground where a large part of the water is evaporated by the heat of the sun and it is then ready for the Patio.

The Patio or Amalgamating Floor is a large open space with a slight incline to allow the water to run off. In this open space is a number of circular spaces, from twenty to forty feet in diameter, surrounded with frames of wood or low walls of stone. (Sometimes

the openings or walks between the Patios are paved with small stone.)

To these spaces the pulp or "lama" is removed and a certain charge deposited. This is called a torta, and may weigh fifty, or as much as one hundred tons, and will form a layer of soft mud from six inches to one foot thick. This is allowed to dry in the sun until the operator is satisfied as to its condition. A small percentage of salt is then added, according to the character of the ore under treatment, and the mules or animals are then driven over it, treading the pulp and mixing it thoroughly. It is then allowed to rest for a day, sometimes several days, when magistral and mercury are added. Magistral is prepared by mixing roasted copper pyrites, iron pyrites and a small quantity of salt. The amount of mercury and other chemicals used in a torta or charge is fixed by the value and character of the ore under treatment. The time in which a torta may be worked off will vary from fifteen to forty-five days, according to the season of the year, as much depends on the natural heat of the sun.

When the tests of assays show the operator that the torta is in a proper condition and amalgamation has taken place, the treading by animals ceases and the torta is finished.

The next operation is to wash the whole mass and separate the amalgam. This is done in several simple ways and a very high percentage is saved.

Up-To-Date!

Mine Owners, Mill Owners and Smelter men, who are about constructing flumes for conveying water, will do well to examine the Asphalt Flume Lining made by the Ready Rock Asphalt Roofing Co. of Los Angeles, Cal. It is attracting attention from the largest wide-awake concerns in the country. The Roofing made by this company has attained a world-wide renown, and it is safe to say the flume lining made by them will find a ready market.

PERSONAL NEWS ITEMS

MR. EDMUND JUESSEN, manager of the Idaho Company's mining properties at Elk City, Idaho, is at present in Chicago, at the instance of a Chicago company who are desirous of having Mr. Juessen examine mining properties in Colorado.

Anyone knowing the present address of JOHN HARRINGTON, formerly of the Esmeralda mine, at Sierra Mojada, State of Coahuila, Mexico, would confer a favor by sending the same to Wm. Gwynn, Durango, Durango, Mexico, Apartado 47. t f

J. W. PARK of Twenty-nine Palms called on the editor of the JOURNAL last week, having just come in from the desert country.

W. H. HARDINGE has just arrived in Los Angeles, Cal. Mr. Hardinge is an experienced mining expert and is endeavoring to find a suitable piece of property for some Colorado capitalists.

DR. A. R. RHEA of Daggett, San Bernardino Co., was a caller at the JOURNAL office the other day and afforded us a very pleasant afternoon.

COL. H. L. PICKETT of Salt Lake City, Utah, spent a few days in Los Angeles last week, during which time he made the JOURNAL a very pleasant call.

JAMES D. ROBERTSON, Mining Engineer and Metallurgist with the Consolidated Kansas City Smelting and Refining Co. of Argentine, Kas., has just made a visit to Los Angeles, Cal.

THEODORE F. VAN WAGENEN the well known Hydraulic Mining Engineer of Colorado has accepted a position as manager of a large placer mining concern of Placerville, Boise county, Idaho. This company is going into the business on a large scale, operating dredges by electricity, etc.

O. S. BUCKNER, Superintendent Confidence mine, Confidence, Cal., has returned to the mine from San Francisco.

†See our issue of December 1st, 1897, which gives one form of Arrastra, and all are similar with the exception that nearly all Arrastras in Mexico are run by mules and have driving arms to attach the mules to.

Average Monthly Prices of Silver.

In New York per ounce Troy, from January 1st, 1893, and for the years 1897 and 1898:

Month	1893	1897	1898
	Cents.	Cents.	Cents.
January.....	66.77	64.79	67.13
February.....	66.77	64.67	67.67
March.....	63.06	63.06	68.40
April.....	61.85	67.92	67.92
May.....	60.42	67.75	67.75
June.....	60.10	68.69	68.69
July.....	59.61	68.75	68.75
August.....	54.19	67.34	67.34
September.....	55.24	65.68	65.68
October.....	57.57	66.05	66.05
November.....	57.91	64.93	64.93
December.....	58.01	65.24	65.24
Year.....	59.79	67.73	67.73

MINING STOCK MARKETS.

LOS ANGELES, CAL., Feb. 28, '98.

The market is dull, but prices holding well. News continues good regarding all the active stocks, and the favorites are well handled.

Wedge is still the feature, 21,000 shares changing hands in one day's call, the price shows a slight decline, but still looks like a good buy at anything below 5c.

The balance of the list is strong but dull. Reports from all the properties for the month of February are now in the secretary's hands, and can be seen at his office.

Wedge is selling at about \$4.00 per share and holds the best at present.

Pacific Consolidated selling and active, 3,000 shares sold at \$2.25 one day last week.

Rand Mountain has been selling at \$1 to \$1.25 per thousand. About 25,000 shares changed hands.

Old Dominion has been going at 3c., and seemed to stay at about that.

Sun Dance is being offered at 25c., but sells at about 20 to 24 cents.

SAN FRANCISCO, Feb. 27, 1898.

The market has been more active the latter part of this month. More improvement has been noted in both the Challenge and Caledonia mines. It is thought that an important strike will take place on the Brunswick.

News from the Comstock mines is of a more interesting character than for over a year. The dead work in several is completed, and in the others is almost.

In the Union, nothing of an important

nature has been done. Work in the Ophir is to the west on the central tunnel level and also 1000-foot level.

Dead work on the Riley in the Sierra is all that is being done. We have no word that they have started the new cross drift on the 1650-foot level on the Consolidated Virginia. All work in this mine is nearly all done on the 1550-foot, 1650-foot and 1750-foot levels. In the Best & Belcher and Gould & Curry, work is being done jointly on the 800-foot Bonner shaft.

No work is being done on the Hall & Norcross.

Ore of fair grade, averaging about \$20 per ton, has been found in the Occidental, 200 feet south from where the best showing was on the 650-foot level, 400 feet north.

The south drift in Potosi 600-foot level is in good formation. Take it altogether, the market is much better than for some time.

ROSSLAND, Feb. 26, '98.

It is satisfactory to learn that Mr. D. J. Macdonald, Provincial Inspector of Metalliferous Mines, reports that as a recent official visit to Rossland, all that he asked in the interests of the protection of mine workers in connection with the appliances of the local mines, was conceded readily and willingly.

The Le Roi owners have used their monthly dividend money for improving their smelter at Northport. The British American Corporation has bought for \$285,000 another important Rossland mine, the Columbia and Kootenay. Le Roi shares are now \$8.50. War Eagle stock has risen to \$1.06.

In the Ainsworth, Nelson & Slocan districts, some of the mines are getting along well. Reco is selling at \$1.70 and Slocan Star at \$2.30.

The Rambler-Cariboo mine has been shipping two carloads of ore regularly each week. This is a good showing, but on the other hand, Ruby Silver and Lucky Jim mines have closed down for the season.

Le Roi is still in the lead, as she has taken out during the past two weeks nearly 2,000 tons of ore. Most of the ore goes to the new smelter at Northport. Much saving is done in treating by this company, as it costs them only about 30 cents per ton to treat it at their new place, instead of \$5.00 per ton at Trail.

NEW YORK CITY, Feb. 24, '98.

It is a little better in the local mining stock market. The Colorado group is showing up well.

There was a drop in the Isabella, Golden Fleece changed hands at 50% @ 53 1/2 c. and Small Hopes for which there is some demand went at 85c. an advance of 10c. Union, which reports a net profit of \$3,974 for December is selling at 13c.

Brunswick Consolidated of the California stocks is selling at a demand at 19c. The Comstocks with the exception of the Sierra Nevada are depressed. The Homestake of South Dakota remains firm at \$44. Deadwood Terra is still pressed for sale at \$1.00 per share.

California and Virginia have dropped to 91c.

Sales were made that brought \$1.15 per share for Sierra Nevada.

It is understood by good authority that the New York and Honduras Rosario Mining Company of South America have just declared a dividend of 10c. per share amounting to about 15,000 dollars payable March 5th, which makes about \$30,000 declared so far this year.

SALT LAKE CITY, Feb. 25, 1898.

The mining share market this week was somewhat irregular and with gains in most stocks. The heavy payments of dividends and continued favorable reports from the properties produced a healthier tone for the market that presages a broadening effect on this class of investments. The enormous accumulation of money must in time exert a powerful influence and create new avenues for the employment of capital. It is looked for much benefit to be given to the mining interests by it the coming year.

On light business, Ajax held strong at last week's figures. Offerings are not heavy and the indications for better figures seem good. Alice was in good demand, and on no business fixed much higher prices. In the Bullion-Beck mines the demand was quite good, however, the stock just about held last week's prices. Little was done in Buckeye, and no change occurred in quotations.

Centennial-Eureka has held its annual meeting last week. Offerings of the stock were light, indeed. Chloride Point was held quite firmly near last week's figures. A dividend has been promised for this month, although not yet declared. Dalton was active but stationary, while the

Dalys continued low and without feature. The new mill at the Dexter has started and the stock is much stronger. It looks like a purchase for a hold. Eagle was lower, while Four Aces continued active under 4 cents.

The Geyser-Marion mines justified very much higher prices on the stock. Galena continued strong, but about unchanged. A much better feeling prevailed in Grand Central. Horn Silver was inactive, and Homestake remained about stationary.

After Mercers annual meeting, the stock developed new strength. Mammoth paid its dividend on Wednesday of last week, and notwithstanding the favorable reports made at the annual meeting, sold off heavily. Northern Light fluctuated considerably, closing without much change from last week's figures.

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WANTED, by a young experienced man, position as quartz mill man, one who can keep mill running.

Address, A. E. CHARLESWORTH, LOCKFORD, CAL.

WANTED, by a young man, a position as Assayer, etc.; experienced, competent and has a good knowledge of all metallurgical operations. Good references.

Address, T. K. JOURNAL OFFICE, Stimson Block, Los Angeles, Cal.

WANTED:—Assayer wants position or can take full charge of Mine or Mill. Experienced and good references.

Address, "MINHUB" care Mining Journal, Los Angeles, Cal.

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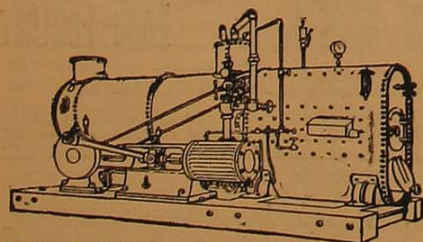


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MINING STOCK QUOTATIONS

BOSTON	
Aetna Con.	4 00
Allouez	—
Anaconda	—
Arnold	22 00
Atlantic	—
Bonanza	—
Boston and C. C.	—
Butte & Boston	20 25
Calumet & Hecla	45 00
Central	15 50
Centennial	—
Dominion Coal	21 50
Dominion Pref.	104 00
Franklin	—
Gold Coin	2 00
Humboldt	—
Illinois Steel	40 00
Kearns	17 00
Lake Sup. Iron	—
Merced	4 75
Napa Cons.	8 50
New Idria M.	—
Old Dominion	20 25
Oscoda	34 50
Pioneer	5 00
Quincy	110 1/2
Ridge	—
San Ysabel	—
Tamarack Jr.	—
Tamarack	126 00
Tecumseh	3 00
Wolverine	16 00

NEW YORK	
Alamo	03 1/2
Alice	40
Annetta	45
Best & Belcher	60
Brunswick	05
Bulwer	—
Crown Point	65
Con. Cal. & Va.	—
Cripple Creek Con.	08 1/2
Deadwood	—
Favorite	11 25
Fortuna	—
Golden Fleece	45
Gould & Curry	45
Hale & Norcross	—
Homestake	28 50
Iron Silver	—
Mexican	30
Mollie Gibson	19
Ontario	4 50
Plymouth	—
Quicksilver	3 00
Quicksilver pfd.	11 00
Standard	1 60
Union Con.	—
Yellow Jacket	—

COLORADO SPRINGS STOCKS

Alamo	03 1/2	Isabella	30
Anaconda	—	Iowa	—
Argentine Juanita	20	Jack Pot	05 1/2
Bankers	04 1/2	Jefferson	08 1/2
Ben Hur	02 1/2	Mollie Gibson	23
C. K. & N.	00 1/2	Mount Rosa	—
C. C. & Manitou	00 1/2	Pharmacist	09 1/2
Creede & C. C.	—	Portland	70
C. C. Consolidated	09	Peoples	02 1/2
Garfield Grouse	40	Sacramento	02
Golden Fleece	30	Star of the West	—
Gold & Globe	—	Union Gold	22
Gold Standard	03 1/2	Virginia M.	02 1/2
Inley	300	Work	05
Ironclad	04 1/2	—	—

LOS ANGELES, CAL.

Brown Dake	—	Magganetta	03 1/2
Cavil	002	Mohawk Action	01 1/2
East Armagosa	009	Old Dominion	—
Gold Bug	009	Pacific Con.	01 1/2
Laguna	50	Rand Mt.	02
Lucky Star	7 50	Wedge	02 1/2

SAN FRANCISCO.

Alpha	—	Exchequer	—
Alta Con.	10	Gould & Curry	24
Andes	24	Hale & Norcross	1 55
Belcher	23	Justice	55
Best & Belcher	35	Mexican	39
Bodie	—	Ophir	60
Bullion	10	Overman	60
Challenge	26	Potosi	46
Chollar	50	Savage	28
Confidence	85	Sierra Nevada	57
Con. Cal. & Va.	1	Union Con.	30
Crown Point	17	Yellow Jacket	03

SALT LAKE CITY

Alice	25	Little Pittsburg	01 1/2
Ajax	25	Lower Mam.	40
Alliance	15	Lucky Bill	—
Anchor	70	Malvern	—
Bogan	—	Mammoth	2 05
Buckeye	02	Maxfield	8 10
Cull. Beck	3	Mercur	8 10
Con. Eureka	20	Morgan	12 1/2
Chloride Point	39	Northern Light	50
Dalton	—	Omaha	15
Daly	95	Ontario	4 00
Daly West	3 25	Overland	—
Dalton & Lark	07 1/2	Richmond Ana.	—
Dexter	1 40	conda	01 1/2
Eagle	02	Rover	15
East Golden Gate	—	Sacramento	20
Eureka Hill	—	Silver King	15 00
Four Aces	01 1/2	Sioux Con.	02
Galena	65	Sunbeam	20
Gemini	—	Sunshine	20
Geyser-Marion	1 10	Swansea	1 80
Grand Central	60	So. Swansea	1 27 1/2
Homestake	00 1/2	Utah	70
Horn Silver	1 50	Utah Con.	—

ROSSLAND, BRITISH COLUMBIA.

Alberta	05	Josie Mac	12 1/2
B. C. Gold King	07	Josie	38
Beaver	10	Jumbo	75
Big Three	10	Knight Templar	05
Bluebird	07	Kootenay-London	10
Bruce	10	Le Roi	8 00
Butte	01 1/2	Lilly May	18
Caledonia Con.	05 1/2	Mabel	15
California	15	Mayflower	10
Camp Bird	05	Monita	18
Celtic Queen	05	Monte Christo	19 1/2
Centre Star	—	Morning Star	08
Colonna	24	Mugwump	03
Commander	18	Nest Egg	05
Deer Park	12	Northern Belle	09
Della Colla	07	Novelty	09
Delaware	12	O. K.	10
Eastern Star	20	Palo Alto	05
Enterprise	20	Phoenix	13 1/2
Eric	03 1/2	Phoebus	15
Eureka Con.	05 1/2	R. E. Lee	10
Evening Star	08 1/2	Red Eagle	08
Georgia	10	Red Mount. View	—
Gratitude	10	Red Point	—
Golden Drip	15	Ross'd H'mest'ke	05
Good Hope	03 1/2	Rosland, Red Mt.	10
Grand Price	03 1/2	St. Elmo	12 1/2
Great Western	08	St. Paul	06
Hattie Brown	—	Silver Bell	04
Helen	04	Silverline	05
High Ore	04 1/2	So. Cross & W. Con	20
Imperial	10	Virginia	12
Iron Horse	20	War Eagle Con.	1 00
Iron Mask	38	West Le Roi	21
I. X. L.	10	White Bear	11

DENVER STOCK REPORT.

Aetna	003 1/2	Elkton	92
Alamo	02 1/2	Eureka	009
Anaconda	42	Garfield Grouse	04
Arcadia	004	Golden Fleece	25
" Consolidated	50	Goldsmith	008 1/2
Argentum Junia	—	Gold Standard	02 1/2
Bangkok-C-Bell	02	Inley	003 1/2
Bankers	04	Iron Clad	02 1/2
Ben Hur	02 1/2	Isabella	28 1/2
Bob Lee	04 1/2	Jack Pot	04
Boston & C. C.	01 1/2	Jefferson	08 1/2
Chimbarazo	002	Mollie Gibson	70
C. K. & N.	008	New Zealand	05 1/2
Colo. C. & M.	01 1/2	People's	01 1/2
C. C. Con.	08 1/2	Pharmacist	08 1/2

HELENA, MONTANA

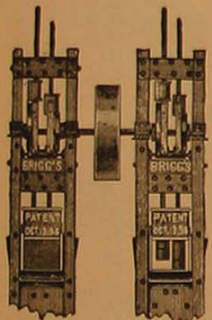
Am Den & M Co.	1 00	Helena & Frisco	8 00
Bald Butte	2 50	Iron Mountain	—

Bi-Metallic	—	Merrill	—
Combination	—	Ontario	—
Con T & P 'n' n.	35	Yellowstone	11
Diamond Hill	—	—	—

MEXICO

Name of Company	State	Price
Alamita	Hidalgo	\$ 5
Amistad y Concordia	"	24
Angustias	Guanajuato	710
Araval y Anexas	Hidalgo	200
Asturiana y Anexas	Zacatecas	210
Barradon y Cabras	Durango	300
Barloome de Medina	Hidalgo	100
Cabazon y An.	Zacatecas	20
Candelaria de Pinos	"	160
Candelaria de Panuco	"	20
Candelaria de Chalch	"	80
Capuraya	Durango	120
Carmen	Hidalgo	350
Castellana y San Ram	Tepic	80
Cerro Colorado	Chihuahua	10
Cinco Senores y An.	Guanajuato	550
Concepcion y Anexas	S. Luis Potosi	260
El Oro	Guanajuato	40
Esparanza y An.	Mexico	1,300
Guadalupe	Guanajuato	100
Huasteca	Santa Ana	180
Luz de Borda	Michoacan	40
Luz de Maravillas	Hidalgo	200
Pabalon	"	150
Palma	Zacatecas	150
Purissima de los Com	"	5
Real del Monte	Hidalgo	900
Refugio y Va	"	60
Restauradora	Durango	80
Rosario y Anexas	Hidalgo	270
San Rafael y Anexas	"	100
San Rafael y Anexas	"	925
do, Free Stock	Hidalgo	400
San Rafael del Oro	"	20
Sta. Maria de la Paz	S. Luis Potosi	730
Sirena	Durango	80
Soledad	Hidalgo	40
Sorpesa	"	250
Trinidad	Guanajuato	40
Tiauxingo	"	27
Uruapan	Hidalgo	260
Zaragoza	"	15
Zomahuacan (gold)	Vera Cruz	100
Zona Min de Pozos	Guanajuato	15

Note—The above Mexican stocks are figured on the basis of Mexican silver.



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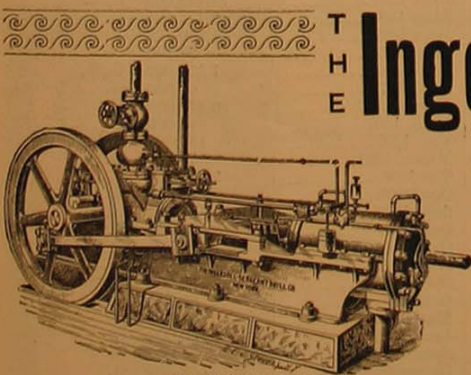
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INCORPORATED MINES PAYING DIVIDENDS.

NAMES OF MINES	LOCATION	No. of Shares	Capital Stock	Par Value	Amount of last Dividend	Date of Last Dividend	Total Amount Paid in Dividends	Kind of Mineral Produced
Aetna Cons.	California	100,000	\$ 500,000	\$ 5	\$ 10	Sept 1897	\$ 110,000	Q.
Adams	Colorado	150,000	1,500,000	10	04	October 1895	693,500	S, L, C.
Alaska, Treadwell	Alaska	200,000	5,000,000	25	35½	October, 1897	3,250,000	G.
Alaska Mexican	Alaska	200,000	1,000,000	5	10	Oct., 1897	297,031	G.
Alice	Montana	400,000	10,000,000	25	03	Oct 1897	1,055,000	G. S.
Anaconda	Montana	1,200,000	30,000,000	25	125	May 1897	3,750,000	C.
Anchoria Leland	Colorado	600,000	600,000	1	01	Oct 1897	84,000	G.
American Gold	Colorado	300,000	3,000,000	10	02	Aug 1897	273,000	G. S. L
Atlantic	Michigan	40,000	1,000,000	25	1 00	Feb. 1897	740,000	C.
Bald Butte	Montana	250,000	250,000	1	03	Sept 1897	512,500	G. S.
Bangkok C-Bell	Colorado	600,000	600,000	1	01	July 1896	107,510	S. L. C.
Big Six	Colorado	500,000	500,000	1	00½	April 1897	5,000	G. S.
Boston & Montana	Montana	150,000	3,750,000	25	3 00	Aug 1897	6,275,000	G. C. S.
Bullion Beck and Champion	Utah	100,000	1,000,000	10	50	Mar 1897	2,465,000	G. S.
Bunker Hill and S	Idaho	300,000	3,000,000	10	05	Oct 1897	324,000	S. L.
Cariboo	British Col.	800,000	800,000	1	02	May 1897	156,965	G.
C. O. D.	Colorado	500,000	500,000	1	01	March 1896	25,000	G.
Calumet & Hecla	Michigan	10,000	2,500,000	25	10 00	Oct. 1897	50,850,000	C.
Centennial Eureka	Utah	30,000	1,500,000	50	1 00	Mar 1897	2,010,000	S. L.
Central Lead	Missouri	4,000	400,000	100	1 00	Oct 1897	16,000	L.
Charleston	South Car.	10,000	1,000,000	100	1 00	Feb 1897	150,000	
Champion	California	34,000	340,000	10	25	Aug 1897	273,200	G.
Consolidated, California and Virginia	Nevada	216,000	21,600,000	100	25	March 1895	3,592,800	G. S.
Copper Queen Consolidated	Arizona	200,000	2,000,000	10	25	June 1895	1,910,000	C.
Crescent	Utah	24,000	600,000	25		July 1897	280,000	
Daly	Utah	150,000	3,000,000	20	25	Mar 1897	2,925,000	S. L.
Deadwood Terra	Dakota	200,000	5,000,000	25	40	June 1897	1,320,000	G.
De Lamar	Idaho	400,000	2,000,000	5	25	Jan 1897	2,250,100	S. L.
Della S.	Colorado	1,000,000	1,000,000	1	10	Jan 1897	60,000	G.
Doe Run	Missouri	5,000	500,000	100	50	October 1897		L.
Dalton and Lark	Utah	2,500,000	2,500,000	1	00½	August 1896	87,500	S. L.
Elkton Consolidated	Colorado	1,250,000	1,250,000	1	03	Sept 1897	361,960	G. S.
El Paso	Colorado	650,000	650,000	1	01	Aug 1897	5,393	G. S.
Florence	Montana	500,000	2,500,000	5	01	May 1897	132,530	S.
Galena	Utah	100,000	1,000,000	10	05	Jan. 1897	71,000	G. S. L
Garfield Grouse	Colorado	1,200,000	1,200,000	1	01	Feb. 1897	24,000	G.
Geyser-Marion	Utah	300,000	1,500,000	5	03	Nov 1897	54,000	G.
Golden Eagle	Colorado	1,000,000	1,000,000	1	01	Sep. 1896	10,000	G.
Golden Fleece	Colorado	600,000	600,000	1	01	Feb. 1897	569,179	G. S.
Gold Coin	Colorado	200,000	1,000,000	5	05	Aug 1897	150,000	G. S.
Gold and Globe	Colorado	750,000	750,000	1	3-10	July 1897	51,625	G.
Hecla Consolidated	Montana	30,000	1,500,000	50	50	Feb 1897	2,175,000	S, G, L, C.
Helena & Frisco	Idaho	500,000	2,500,000	5	04	August 1896	475,000	S. L.
Highland	S. Dakota	100,000	10,000,000	100	20	Oct 1897	3,424,918	G.
Holy Terror	S. Dakota	300,000	300,000	1	03	Sept 1897	18,000	G.
Homestake	Dakota	125,000	12,500,000	100	25	Oct. 1897	6,431,250	G.
Hope	Montana	100,000	1,000,000	10	10	Nov 1897	732,252	S.
Horn Silver	Utah	400,000	10,000,000	25	12½	January 1896	5,080,000	S. L.
Idaho	Brit. Col.	500,000	500,000	1	05	Mar 1887	162,000	
Iowa	Colorado	1,000,000	1,000,000	1	00½	Oct 1897	65,000	G.
Iron Mountain	Montana	500,000	5,000,000	10	01	Sept 1897	497,500	S.
Isabella	Colorado	2,250,000	225,000	100	00½	June 1897	270,000	G.
Kearsarge	Michigan	40,000	1,000,000	25	10	Aug 1897	160,000	C.
Last Chance	Brit. Col.	500,000	500,000	1	04	Jan 1897	42,000	S. L.
Le Roi	British Col.	500,000	2,500,000	5	10	Oct 1897	625,000	G.
Minnesota	Minnesota	165,000	16,500,000	100	1 50	July 1896	3,240,000	I.
Montana Ore Purchasing	Montana	40,000	1,000,000	25	01	October 1897	640,000	
Moose	Colorado	600,000	600,000	1	01	January 1896	186,000	G.
Morning Star	California	2,400	240,000	100	8 00	Sept. 1897	558,600	G.
Mt. Rosa	Colorado	1,000,000	1,000,000	1	00½	Oct. 1896	30,000	G.
Mercur	Utah	200,000	5,000,000	25	12½	Oct 1897	825,000	G.
Mammoth	Utah	400,000	10,000,000	25	05	Nov. 1896	1,150,000	G, S, O.
Moon Anchor Gold	Colorado	600,000	600,000	1	02½	Nov 1897	65,000	G.
New Elkhorn	Colorado	300,000	1,500,000	5	24	Sep. 1896	72,000	G.
New York & Hon. Rosario	Central A.	150,000	1,500,000	10	10	Oct. 1897	832,500	S. G.
Napa	California	100,000	700,000	7	20	Oct 1897	870,000	Q.
New Idria Quicksilver	California	100,000	500,000	5	10	Sept 1897	20,000	Q.
Ontario	Utah	150,000	15,000,000	100	10	June 1897	13,445,000	S. L.
Osceola	Michigan	50,000	1,250,000	25	1 00	June 1897	2,172,500	C.
Parrot	Montana	230,000	2,300,000	10	06	June 1897	1,656,122	C.
Pennsylvania Consolidated	California	51,500	5,150,000	10	05	Sept 1897	20,750	
Portland	Colorado	3,000,000	3,000,000	1	01	Oct 1897	1,163,000	G. S.
Princess	Colorado	1,000,000	1,000,000	1	00½	Feb 1897	45,000	G.
Quincy	Idaho	100,000	2,500,000	25	4 00	August 1897	9,470,000	C.
Rambler-Cariboo	Brit. Col.	1,000,000	1,000,000	1	02	April 1897	40,000	
Reco	Brit. Col.	1,000,000	1,000,000	1	50	May 1897	187,500	S. L.
Sacramento	Utah	1,000,000	5,000,000	5	00½	March 1897	22,000	G.
Small Hopes Consolidated	Colorado	250,000	5,000,000	20	10	Mar 1896	3,275,000	S.
South Swansea	Utah	150,000	150,000	1	05	Oct 1897	59,960	S. L.
Standard	California	200,000	20,000,000	100	10	Sept 1897	3,757,868	G. S.
St. Joseph	Missouri	250,000	2,500,000	10	15	Oct 1897	24,000	L.
Silver King	Utah	150,000	3,000,000	20	25	October 1897	1,237,500	S, L, G.
Slocan Star	Brit. Col.	2,000,000	1,000,000	0.50	05	Mar 1897	350,000	
Smuggler Union	Colorado	50,000	5,000,000	100	1.00	Oct 1896	150,000	G. S.
Swansea	Utah	100,000	500,000	5	05	Oct 1897	61,500	S. L.
Tom Boy	Colorado	200,000	2,000,000	10	20	March 1896	410,000	G.
Tamarack	Michigan	60,000	1,500,000	15	3 00	June 1897	4,950,000	C.
Union	Colorado	1,250,000	1,250,000	1	01	June 1896	73,000	S.
United Verde	Arizona	300,000	3,000,000	10	25	December 1893	562,500	C.
Utah	Utah	100,000	1,000,000	20	02	Feb. 1897	175,000	G. S.
Utah Consolidated	Utah	30,000	150,000	5	02	Sept. 1896	3,000	S. L.
Victor	Colorado	200,000	1,000,000	5	10	March 1897	765,000	G.
Western Mine Enterprise	Montana	500,000	500,000	1	10	Mar 1897	12,000	
War Eagle	British Col.	500,000	500,000	1	06	October 1896	187,000	
S, Silver.	G, Gold	L, Lead.	C, Copper.	Q, Quicksilver.	I, Iron.	B, Borax.		

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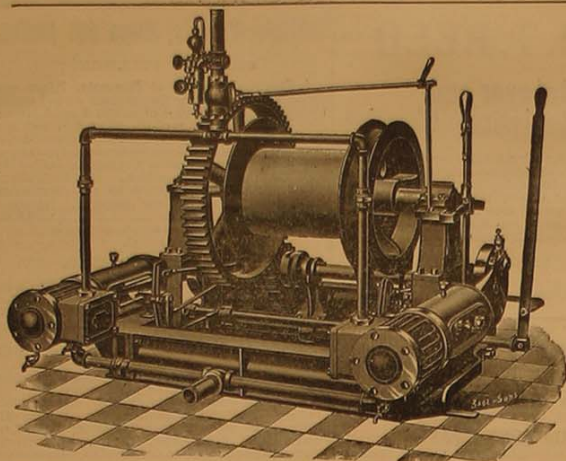
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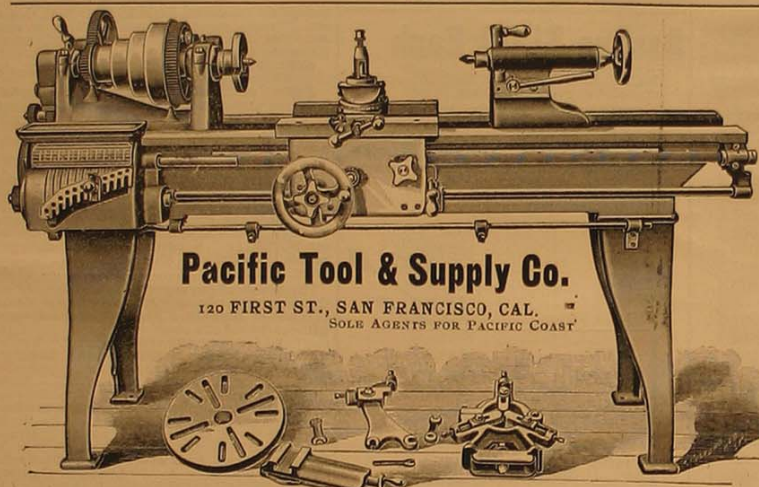
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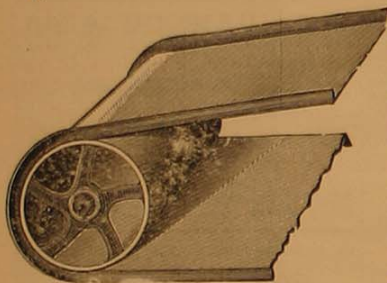
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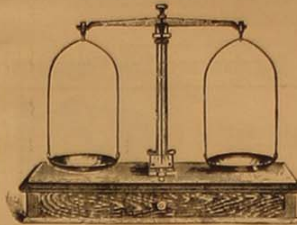
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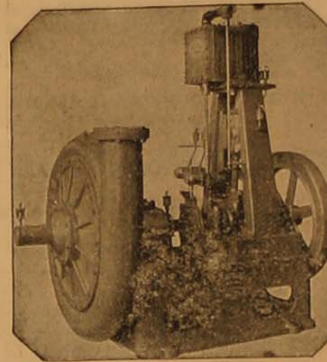
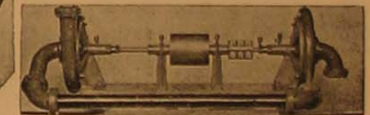
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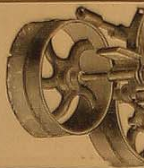
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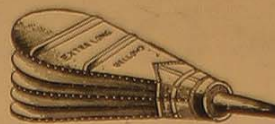
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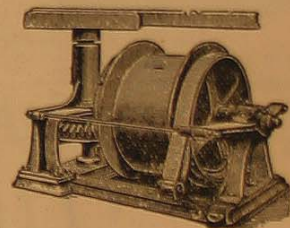
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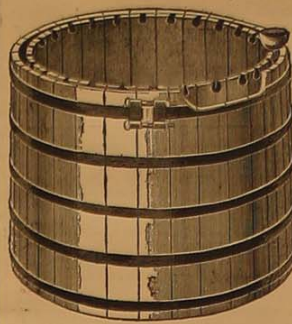
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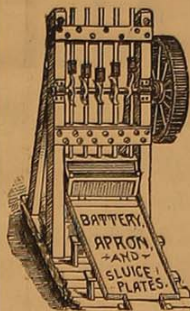
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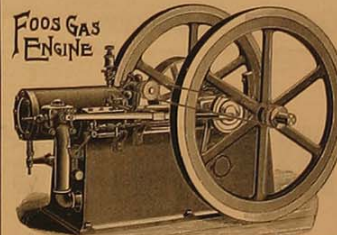
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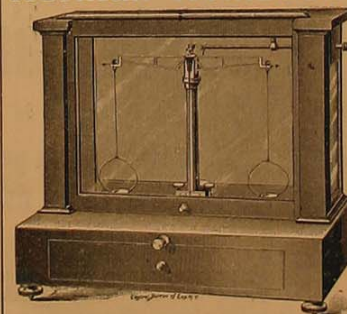
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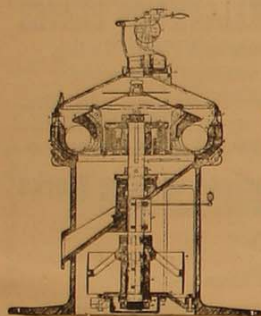
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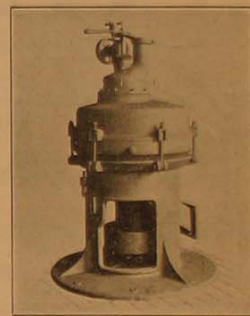
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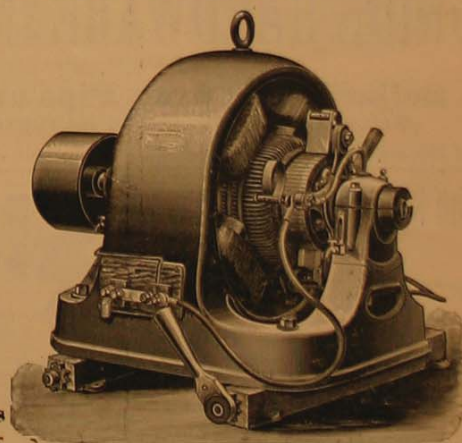
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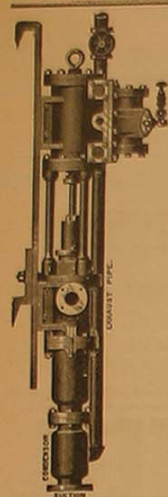
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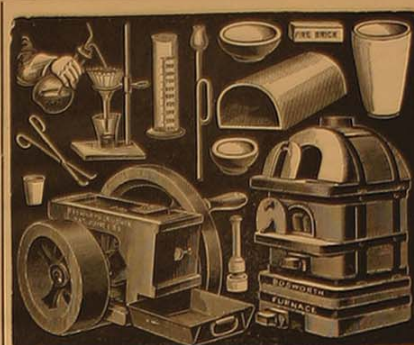
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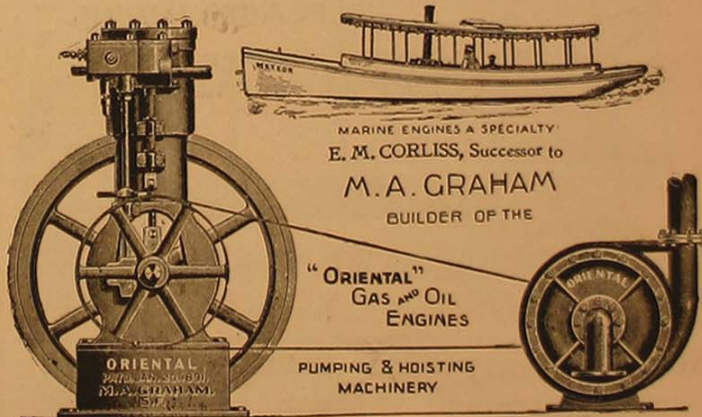
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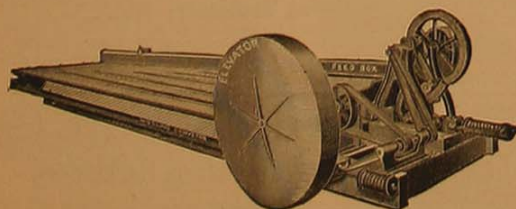
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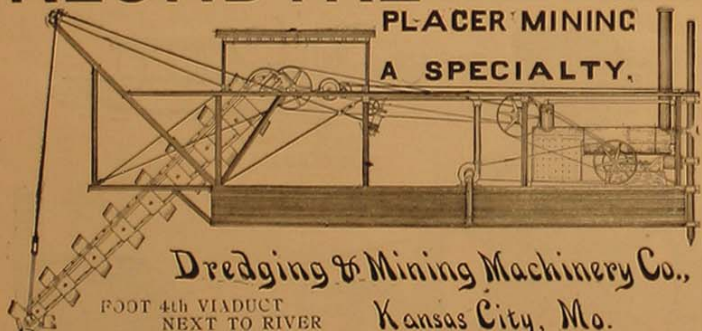
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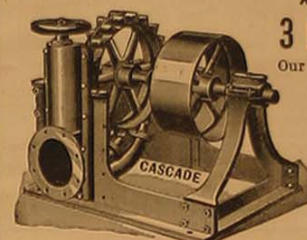
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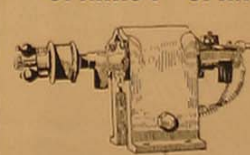
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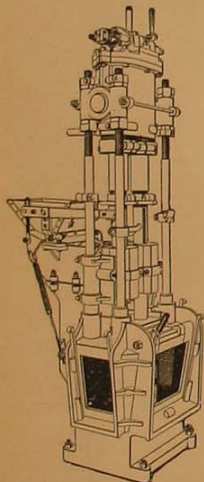
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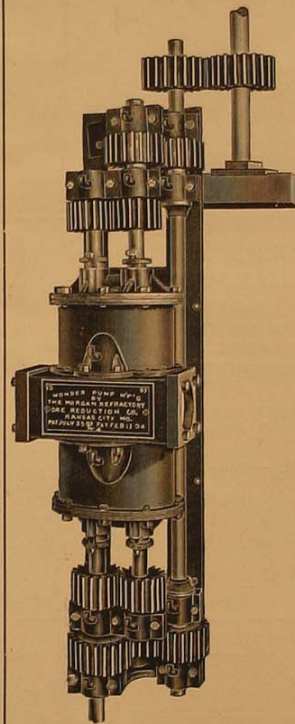
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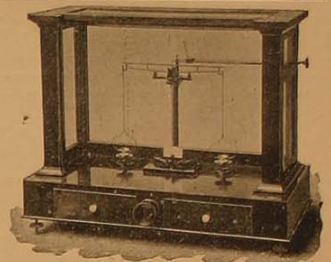


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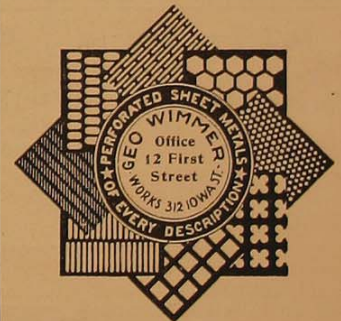
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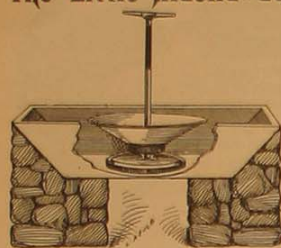
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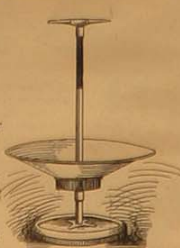


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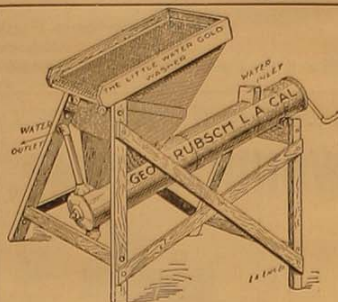
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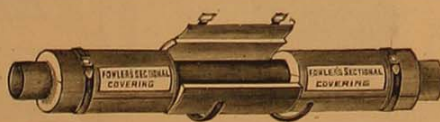
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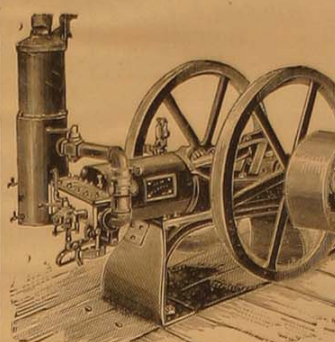
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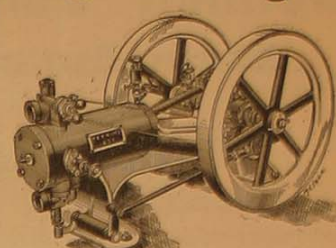
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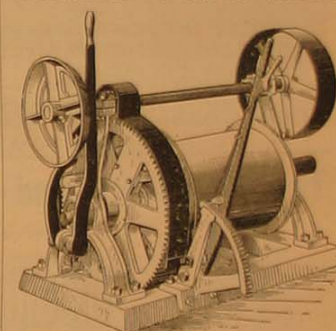
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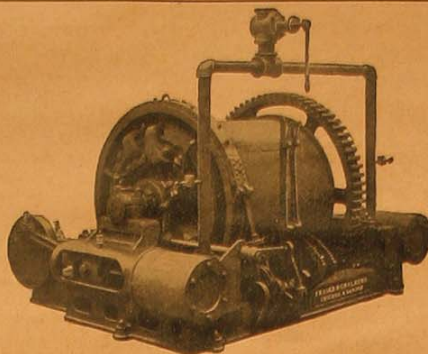
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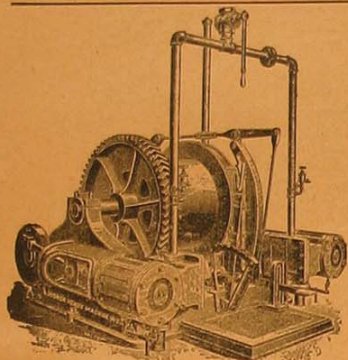
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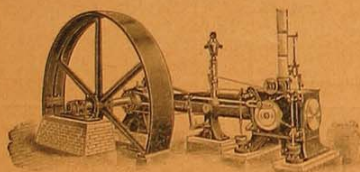
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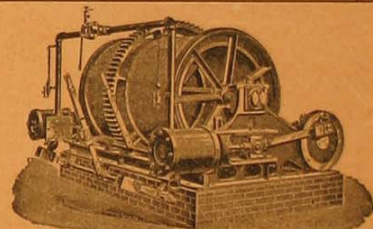
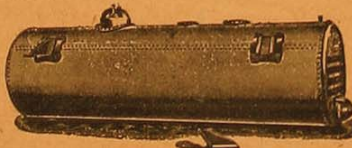
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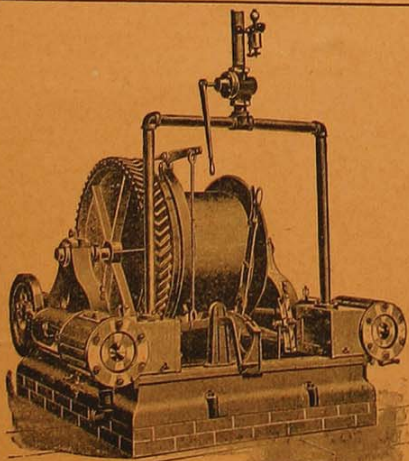
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