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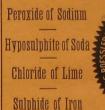
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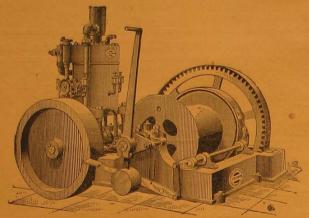
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A	E	M	s
	Eagar & Co. 19 Ellis, H. R. 22		Santa Fe Route
Abbott, W. O	7 Ellis, S. H 30	Machinery and Electrical Co 29	San Francisco Launch Co 2
Agramonte, C. H. M. y	7 Ellis, S. H	Masters I H 6	S. F. Ploneer Screen Works 29
Ainsworth, Wm	9 Eynon-Evans Manufacturing Co 24	Mathison & Co	Schaw, Ingram, Batcher & Co
Ainsworth, Wm. 2 Albuquerque Foundry & Machine Works. 2	F	McDearmon & Co	Simonds & Wainwright 30
Allis Co., Edward P	5 Fauth & Co	Merrill, William B. & Co 2	Silver City Reduction Works 27
Altenender & Sons, Theo	9 Ferrari, Guido	Michigan Mining School 28 Montague, W. W. 25	Smith, S. I
Aubury, L. E	9 Fish, A. L	Montgomery Word & Co 20	Smith & Irving.         17           Smith, Francis & Co.         2
Axelson Machine Co	Flint & Lomax 28	Montgomery, Ward & Co	Smith, Francis & Co 2
B	Foote, Dr. A. E	Moore Chas C & Co	Southern California Lumber Co
	Fowler, G. C	Morris Rock Breaker and Ore Crusher 26	Sprague, Filliotity W
Bailey A. A	Fraser & Chalmers	Murray Iron Works 32	S. S. Machinery Co. 5 Standard Iron Works 18
Baker & Adamson Chemical Co	Prese, Adolf		State Ore Sampling Works 27
Raker & Hamilton	G-		Sterne Bros. 20
Baker Iron Works		Water to the second	Stewart, John 2 Stockton Assay Office
Beam J. Williard	Garbutt, F. C. 2 Garratt & Co., W. T. 27	N	Stockton Assay Office
Bell, Newton M	Gates Iron Works 1	the state of the s	
Ri Metallic Assay Office 2	Giant Powder Co. Con	the same of the sa	
Rorden Call	Glanding Co., James	National Iron Works	T
Boothe & Co., C. B	Goldsmith Bros 27	Nelson & Co, H. I,	AND RESIDENCE OF THE PARTY OF T
Bradley-Ramsey Lumber Co	Goodyear Rubber Mfg Co 4	Carlotte Control of the Control of t	Taylor & Co , John 27
Bradley Pulverizer Co	Graphite Lubricating Co 18		Thomson & Boyle 2
Braun & Co F W	Gutta Percha Rubber and Mfg Co 23	the state of the s	Tomlinson, J. B. 19
Brown, M. E., Horace F.,	H	0	Townsend Bros 26 Tremaine & Froehlich 24
Buff & Berger 22	2 Hallawell, E. L		Trenton Iron Co., The 21
Bullock, M C Mfg Co	Hamlin & Morrison 27	Oblands 9, Co. M. Oc.	Troemner, Henry 24
Burbridge, S. L	Hanford Iron Works	Ohlandt & Co., N	Truax Manufacturing Co
Burke, T. J. 30 Burlingame, E. E. 25	Hanks, Abbott A	Oregon Ramoad and Pravigation Commission	-
Burlingame, E. E	Harrington & King Perforating Co 6		
Byron Jackson Machine Works	Harrington & King Perforating Co		U
Byton Jackson Binemine	Hawley, J. B. & Co		
C	Heckelmann and McCann 27	P	Union Gas Engine Co 2
The second secon	Hercules Gas Engine 17		Union Hardware & Metal Co 25
Caldwell Bros	Hendy Machine Works, Joshua	Pacific Mining Machinery Co	Union Iron Works 4
Cal Bellows Mfg Co24	Hendrie & Bolthoff Manufacturing Co 29 Hersey, Clarence	Pacific Optical Company	
California Perforating Screen Co	Heer, Peter 5	Pacific Tank Co	V
California Vigorit Powder Co 2	Hopping, Roy 23	Paraffine Paint Co. 24	V
Chanman Smelting Works Co	Hopping, Roy 23   Hoskins, Wm. & Co. 22	Parke & Lacy Co	Van Der Naillen, A
Charleson Percy, W 28	Howe, Frank H	Payson & Co I W	Van Osdel, E. B., A. M
Chester Steel Co 22	Hubbard, W. E. & Co	Pelton Water Wheel Co	Voll, C. H
Chicago & Aurora Smelting & Refining Co 28 Chicago School of Assaying 24	Hubbell & Longyear	Penn Smelting and Refining Co. 28 Perkins Pump and Engine Co. 30	
Chrome Steel Works	Hunt, Fred. F 50	Peerless Rubber Manufacturing Co	
Coates, H. P. G	I	Philadelphia Book Co	AND DESCRIPTION OF THE PARTY OF
Coates, H. P. G	Imperial Chemical Co	Porter Gold & Silver Extraction Co	W
Colorado Iron Works 23	Ingersoll, Sergeant Drill Co	Pope, I. B. 24	
Cooley, Geo M		Price & Son, Thos 28	
Compania Industrial Mexicana	J	Fueblo Foundry and Machine Shop 30	Wade & Wade
Conway & Co., P. J	Jardine, J B	Pueblo Smelting & Refining Co	Warren, A. A
Con. Kansas City Smelting & Refining Co 1	Jeffrey Manufacturing Co 6	Pulsometer Steam Pump Co 21	Washington Machinery Depot
Corliss, E. M	Jehu, W. N. 2 Jessops Steel Co. 1		Watson, R. N
	Johannesburg Sampling Works		Weber & Co., F
D	Jones & Jones	a a	Weigele Pipe Works
	Judson, A. F		Western Chemical Co 18
Dame, W. E	K	Queen & Co	Western Forge & Rolling Mills 25
Daniel, C. A 28	Kempton, C. W		Whitney Co
Davis, F. M. Iron Works Co	Kempton, C. W.         28           Keystone Lubricating Co.         6           Kohlbusch, Sr. Herman.         25	R	Wigmore & Sons Co., J
Denniston, E. G. 25	Kohlbusch, Sr. Herman		Wilcox & Rose Co
Denver Fire Clay Co	Krogn manufacturing Co		Williams, F. A. A 24
Denver Public Sampling Wks	L		Wilson, J. Howard 4
Denver & Rio Grande Railway 24	Lassell, L. J	Reed, John T 21	Wimmer Geo
Dee & Co., Thos. J	Leffel & Co., James	Read, Edward B. 2	Winans, J. C
DeSolla Deussing Co	Lexow, Theo	Ready Rock Asphalt Roofing Co	Woodbury Concentrator Co
Dessau, S. D. 22 Dickman & Mackenzie	Little Alaska Gold Washer	Rix Compresed Air Machinery Co	Woodward, E. C. 30
Dixon Crucible Co., Jos	Lloyd B.T 27	Roessler & Hasslacher Chemical Co 1	
Doub, D. M	Lonergan & Calkins	Rogers & Baldwin	The second secon
Doub, D. M	Lord, Geo. W	Rubsch, Geo	Y
Dredging & Mining Machinery Co 28	Luckhardt, C. A 25	Russell & Co	W 70 00
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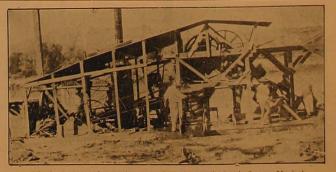
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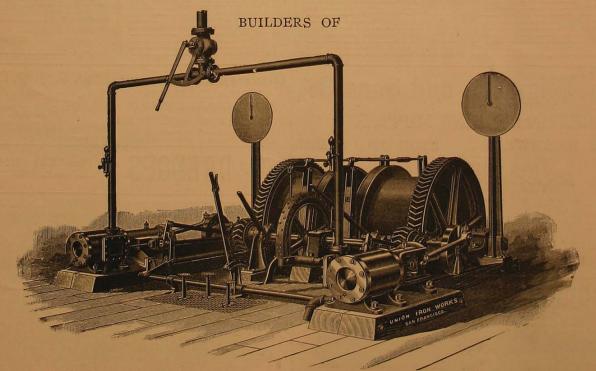
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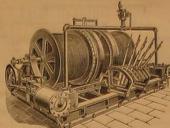
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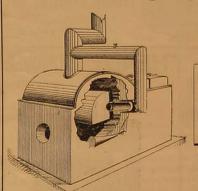
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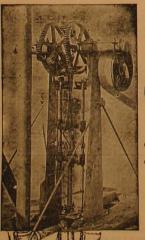
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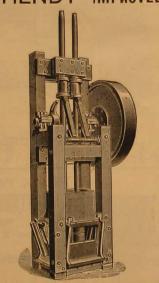
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VOL. XVIII.

MARCH 15

No. 12

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The treasury department in some measure has charge of commercial affairs-it keeps a record of exports and imports, as every ship that leaves our ports is cleared on a manifest of its cargo lodged with customs officials, and all imports are itemized in invoices, whether free or dutiable. Records are also kept of the coastwise commerce, and that carried by ships on the great lakes, and by boats on the rivers and canals. Transportation by rail of interstate commerce is supervised to an extent by a commission.

Next to agriculture, the general govern-ment has most to do with commercial affairs. This is largely because a branch of it yields

revenue, and the enactment and enforcement of navigation laws are necessary to protect our coastwise trade.

Manufacturing is more meagrely dealt with, though there are agencies in the several states through which statistics of production are gathered, and when compiled a knowledge of the volume of manufactures may be acquired. The general government, however, does not

do or supervise this work.

Agriculture and mining chiefly supply the raw materials to manufacturers. They constitute the basis of manufacturing industries, and of commerce domestic and foreign. There are committees in Congress on mines and mining, but their functions are confined to supervising legislation relating to acquisition of mines on the public domain, and in regulating mining operations therein, but there is no bureau or officer whose business is to supervise or aid mining industries. It would be interesting to have statistics of the output of minerals placed side by side with those of agricultural productions. The yield from the soil, and the various minerals which enter into human uses are products of nature and of labor. The cereals in bins or elevators are products completed by the two forces, and if the value of the completed products from minerals were placed alongside of that of agriculture, the comparative importance of the two industries would be made to appear.

Mining is of an immense range. It is an industry in this country of such magnitude that a bureau of mines and mining should be made a feature of one of the great departments of the government. It is an industry of such consequence that it would dignify a bureau more than a bureau would dignify it.

Departments of commerce and of manufactures have been repeatedly urged. If they are worthy of such consideration, mining also is-at least it should be assigned a bureau as we have suggested, and it is appropriate that it should have a place in the Department of the Interior, which has charge of the pub-lic lands and of so many other matters relating to internal affairs.

#### A SMELTER.

There is renewed talk of a smelter for Los Augeles. The JOURNAL is unable to state whether the prospect for one is good or otherwise; but, being devoted to the promotion of mining and metallurgical industries, we are glad even that there is some talk, and hope it will end in substantial results and very

Smelters are successfully operated at Kansas City, St. Louis, and Omaha, which are remote from mining regions, that is to say, such mining as produce ores for smelters.

Los Angeles is near large mining fields. It is accessible and convenient to mines in Southern California, Arizona, Lower California and Mexico; and when a railroad is constructed to Salt Lake City, which must be accomplished at no distant day, it will open a productive mineral region and make it tributary to this city. While Kansas City, St. Louis and Omaha possess advantages in the matter of fuel, Los Angeles has advantages in regard to obtaining ore which more than counter-balance the advantages of those cities in the matter of fuel.

No city on the Pacific Coast is as well supplied with transportation facilities as Los Angeles. It is near the sea and accessible from a vast extent of coast, and railroads extend from it north, east and south through a vast extent of country. It is the commercial

center of the southwest, and is growing rapidly, and it is the point to which mining men come from an immense territory. It also is surrounded by a country which produces more largely of the necessaries and luxuries of life than any section of the world. Plenty of labor can always be obtained, and living is by no means expensive.

The city has already gained such a commercial position that it cannot have any near and successful rival. The tendency, since transportation has become rapid and by rail, is to concentration, to the building up of large centers. Those acquainted with the situa-tion, from a mining standpoint, are undivided in the opinion that Los Angeles offers more than ordinary inducements for establishing ore-treating plants. With genius, skill and enterprise, there is no rational doubt that capital invested in a smelter here in brief time would be amply rewarded. The time has arrived when the people keenly realize that industries of every practicable character should be superadded to the commercial enterprise which our merchants and dealers have commendably displayed. Diversified industries mutually aid each other, and promote agricultural and horticultural prosperity without crushing cost of transportation.

#### PATENTING CLAIMS.

A matter of much importance has recently been decided by Commissioner Hermann of the General Land Office in changing or increasing the amount of expenditure required in obtaining a patent to a group of claims. The custom has been to grant a patent for ad-joining claims when only \$500 had been ex-pended on one of them. All claims upon which the work has been done prior to the 15th of December, 1897, will be approved as formerly.

The new ruling, which takes effect from that date, is that there must be expended on the group of claims in work or improvements an amount equal to \$500 for each claim of the group as a whole, and that if an amount in excess of \$500 is expended on one claim it will count as work done for another claim. If two claims jointly owned had \$750 expended on one of them and \$250 on the other it would be equal to \$500 on each.

There has been an abusive use of the old custom in obtaining patents to claims on which no work had been done and the present ruling is intended to check it. In fact, there are today claims which are patented and on which if a stranger in the district is required to examine them alone and unaccompanied by an owner, he will have have difficulty in finding out the location of the unworked claims if he has not got a good plan of the survey of the group of claims. For that reason we hold that all patented claims ought to be fenced or marked it such a manner as to show more clearly than at present that they are private property.

#### MINING ON SPANISH GRANTS.

A bill has been introduced in Congress by Representative Ferguson of New Mexico which deserves the unanimous support of the mining interests of the Territories and States effected. The first section of the bill reads as follows:-

'That hereafter all mines or deposits of gold, silver, tin, antimony, zinc, bismuth and other valuable mineral deposits, situated within the boundaries of any land the title to which is derived from the Government of Spain or of Mexico, by grant thereof made prior to the conclusion of the treaties between the United States and the Republic of Mexico on February 2, 1848, and December 30, 1853, respectively, and now embraced within the Territories of New Mexico and Arizona, or within the States of Utah, Nevada, Colorado or Wyoming, are hereby declared to be free and open to exploration and purchase, and the lands on which they are found to occupation and purchase, by citizens of the United States and those who have declared their intention to become such, under the mining laws of the United States and the provisions of this act."

We have not been able to obtain a complete copy of the act, but the above clause states that the lands in question are to be explored and operated "under the mining laws of the United States and the provisions of this act, so that locations must be made as on Federal lands and under the laws of the State in which they are situated. The Western Mining World of Butte, Montana, is in error in supposing that a location on such land could be taken up and patent obtained without the annual assessment, and necessary expenditure of \$1000 in work for five years or \$500, and \$5 an acre for the land as required by the United States statutes, as the mining laws of the United States and the State laws are to apply to minerals on Spanish Grants the same as on Federal lands. Had these Territories and States remained in the possession of Spain or Mexico, the minerals on the grants would have been reserved for the use of the miners, and it is no hardship or injustice to have this act passed to make it so and to enable the miner to work them. Ancient and modern law and custom in most countries has always regarded the rights of the miner irrespective of the surface or agricultural right, but the Government of the United States of that time regarded these lands as pastoral and of little value and did not protect the rights of the miner as the Spanish and Mexican Governments intended, hence the necessity and justice of the present bill, for protection to home industry is the chief policy of the Government in power. There is one glaring error in the act, if the foregoing extract is correct, and that is in not including the State of California along with the other southwestern States. The first clause ought to mention iron, coal, asphaltum and other hydro-carbon minerals, solid or fluid and non-metallic minerals in the list to make it more explicit.

If there is one more iniquitous and unjust law or custom to the miner than that of granting his birth right to the minerals and giving it for nothing to the agriculturist or surface owner, possibly the Western Mining World can point it out. The Spanish Grant is the worst form of monopoly of minerals of almost all kinds found in the State of California, and this new act ought to be made to apply so as to remedy this evil.

#### THE RUSH FOR ALASKA.

Whenever reports have been made of discoveries of rich gold fields, there has been a rush to them by the adventurous in myriad numbers. Such has been the case as far back as we have any authentic accounts. In our own day, or rather within the time of the present generation, there have been three such rushes: the first was to California, the second was to Australia, and the third to

South Africa. It has never taken a great length of time to exhaust placer gold, at least so far that hydraulic mining ceases to employ a large number of people and to be very profitable. Thereafter, mining is carried on regularly and without excitement. Such will be the result in a brief time in Alaska. There will be no room for immense forces, such as are likely to assemble in that country when gold-getting is through rock crushing or melting. We are of the opinion that there will be more people in the gold fields of that country during the next summer than ever afterwards.

The great numbers who will go there will be in the way of each other, and it is doubtful if gold will be procured as rapidly as if there were fewer engaged in the work. The mass will go there with high hopes, and to but few will expectations be realized. A few will doubtless make fortunes of greater or less magnitude; but the many will experience suffering and disappointment. Such has been the fate in all other cases, but nowhere has suffering been as great as it is likely to be in that arctic region, on account of climate and other unfavorable conditions. Notwithstanding these facts stare people in the face, they will have very little deterring influence. There is a fondness for adventure and risk which is quite inexplicable. Mankind in general are carried away by an ambition to acquire fortune in a day. When the chances to make fortunes in Alaska are fully under-stood, the excitement will disappear. The true character of that region for gold produc-tion will not be established until the mining industry has been developed in connection with lodes from which gold nuggets and particles have been released through the action of the elements. That such lodes exist is beyond doubt, and when they are found, enterprise will be turned to their subjection through organized effort and scientific methods. Then capital will be invested and production will become regular and reliable, and then, too, the riches of that country will not be suppositious or magnified by over-strained imagination.

#### SCIENCE IN METALLURGY AND MINING.

During the whole historic period of the world, there has been progress in the sciences and industries. In early times it was so slow as to barely be perceptible, indeed, at times there seemed to be a standstill, and even retrogression; but though scientific advancement in localities seemed to die out with the disappearance of once flourishing nations, whose arts and industries were buried with the monuments of their achievements and grandeur, new and increased light and efforts appeared in other fields. Thus has progress been maintained in the general current of human affairs.

The metals are among the highly important elements of nature's creation. Next to productions from the soil, they contribute most largely to the needs of the human race. They are numerous in range, but were of inconsequential value, till, through experiment and study, the extent of their uses was discovered. In regard to no other element are there more intricate and interesting laws. As is well known, metals are often treated in combination, or rather in a fused condition. In no field have keener perception been disclosed than in detecting metallic affinities, nor greater ingenuity than in the discovery and application of methods for their separation and amalmation. Through the latter,

more especially, their uses have been vastly multiplied, and which have facilitated the production of wealth and promoted esthetical development. In no branch of science has there been exhibited a higher degree of men-

In the early stage of the growth of metallurgic learning, the chief effort was to convert metals into forms that were curious and ornamental, especially was this true in relation to the precious metals. The study of the use to which the baser metals could be put was neglected. At the beginning there was more inclination to gratify the fancy than to produce the useful. In modern times conditions have been modified if not absolutely reversed, and hence human thought and effort have been more largely devoted to the utilitarian. This is one of the characteristics of progressive civilization. The result is that some of our most important industries are devoted to the fabrication of metals into the multifarious forms which the present day civilization demands. This larger use has stimulated scientific research, which has led to discovery of the laws of matter, and, as a sequence, a tremendous enlargement and diversification of productive industries.

The larger demand for metallic fabrics, both useful and ornamental, has had an important influence upon the mining industry. In this field science has been applied as skillfully as in the conversion of metals into forms for consumption. No finer display of engin-eering ability can elsewhere be found. Old and new methods are incomparable in regard to expenses and magnitude of outputs. very cheapness of mining operations and the magnitude of production have enhanced consumption. To exhaust the gold mines near the Red Sea, on the Upper Nile, at Ormus and Ophir, Abyssinia and Nubia was the work of centuries, but under methods now employed they would have been exhausted in a few Whether in future better methods will be discovered in mining and in the treatment of metals may in a measure be conjectured, but that such will be discovered should be expected. Activity increases as science and art progress. Nature's laws are infinite in their reach, and no intelligent person can suppose that human knowledge of these laws is now extended to the ne plus ultra.

#### UNITED STATES MINING LAW.

In the January issue of the Canadian Mining Review is printed an editorial attack on the provisions and operation of our federal law, regulating the acquisition of mining claims in the Western States. In the absence of the editor of that paper in British Columbia, an apprentice hand at editorial writing undertakes to criticise our United States' law and to draw a comparison between it and the mining development in Canada. The article takes the view of the condition of affairs that existed on the Comstock under the provisions of the act of 1860, and cites the law suits and litigation that were common prior to the amendment of that act, but is in error in saying that "all attempts to amend this system in its radical faults have failed hitherto," but fails to recollect that the act of 1872 amended the errors of the former act, and made litigation a thing of the past.

As might be expected, the writer attacks the law of the apex and extra lateral right, which gives to the prospector and miner in the western United States a larger claim than he can acquire in an Province of Canada or in the Dominion Lands of the Northwest Ter-

ritories, as the vertical side line boundary restricts and prohibits deep mining in Canada, when the vein dips from the vertical position. The writer lacks experience in Canada, or does not want to state the truth regarding litigation and law suits as to boundaries of mines in that country, as they are as frequent as in the Western States. A few may be instanced as follows: In Quebec Province, King Asbestos Co., versus adjoining owner. The Emerald Phosphate mine (Franchot) versus the British Phosphate Co. (Smith). The Canadian Sulphur and Copper Co., of Capleton, whose vein dipped into the Crown Mine property, when a depth of 900 feet was reached, and had to go into liquidition in consequence, with a loss of about \$500,000 to the Scotch shareholders. In the Province of Ontario, the Dean and Williams Gold mine, versus adjoining owner on the west, as the vein dipped to the west. The Walker Gold mine versus Richardson, as vein dipped into the land of Richardson. The Gladstone Gold mine versus the Feigel Gold mine, and many

would be the best way to settle all mining disputes between owners, and take such cases out of the courts of law. Our evil lies not in our mining law, but in our wrong manner of administering justice in mining disputes.

### MOTIVE POWER IN DRY MINING DISTRICTS.

In many parts of the west half of America, rich in mineral wealth but devoid of fuel and water, the question of motive power is an important one. The gas and gasoline engine, using naptha and crude oil were necessary, greatly aids in the solution of the problem. Herewith is illustrated a recent installation of four gasoline engines for Biddle Reeves, on the Fuller mines, in the Squaw mining district, near Canon, Yavapai Co., Arizona.

Fig. 1 represents a 38 H. P. engine in the mill proper, used to drive the 10-stamp battery and electric light plant for the mill. The

has a pumping capacity of 80 gallons of water per minute. This water is delivered into a storage tank a little above the mill, where about 10,000 gallons of water is stored, so that in the event of shortage or breakage the mill could continue without interuption until such repairs could be made. The four engines noted above, aggregating 64 H. P. used in the operation of this plant, consume about 100 gallons of gasoline per twenty-four hours, making the total cost of power for twenty-four hours about \$17. This mill is located at a point where it would be impossible to use steam, owing to the fact that the water now developed is only sufficient for milling purposes; the saving, therefore, in this class of power is practically unlimited. While the plant described above is at present only operating ten stamps, the machinery is so arranged, together with a surplus of power, that another ten stamps can be added at any time. The plant described above was built and erected by the Weber Gas & Gasoline Engine Co., 434 S. W. Boulevard, Kansas City, Mo.

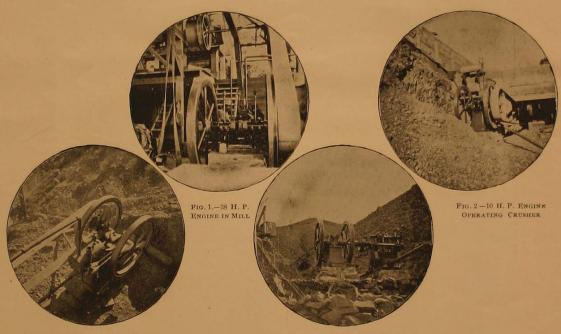


FIG. 3.-6 H. P. HIGH-SPEED ENGINE

FIG. 4.-10 H. P. ENGINE AND PUMP

other cases might be cited, to show that the vertical side-line boundary of Canada does not prevent law suits and disputes, and is an unjust law to capital and labor invested in mining in Canada. From these facts it will be seen that this inexperienced writer on United States and Canadian mining law fails to grasp the fact that mining disputes in both countries ought to be settled by arbitration among mining men themselves, for they understand mineral conditions, and not by lawyers in courts of law, whose business it is to carry on the case for all there is in it. Also, that the apex or discovery point of the vein or deposit, which dips from the vertical, ought to be bounded by lines parallel to the foot and hanging walls, so as to permit of deep mining, for the vertical side-line boundary is not a just boundary for miners.

A court of arbitration, composed of say a commissioner of mines for each state, province or county, as the case requires, and an arbitrator for each of the contending parties, engine is fitted with wiper oilers and indestructible ignition tube, enabling it to make long continuous runs without interruption. Fig. 2 represents a 10 H. P. engine, used to operate a No. 3 Gates crusher, located 300 feet above the millsite at the mouth of the mine, the crushed ore being shot down a chute to the mill. Owing to the nature of the ore, four or five hours' crushing per day suffices for making a 24-hour run at the mill. Fig. 3 represents a 6 H. P. high-speed engine, used exclusively for operating the concentrators, special attention being paid to steady and uniform speed. No other service is required of this engine except the running of the concentrators. This engine is also arranged for long and continuous duty. Fig. 4 represents the isolated pumping station, consisting of a 10 H. P. gasoline engine directly connected to a 5x8 triplex pump. This plant is located 3100 feet from the millsite, where a supply of water is forced to an elevation of 150 feet through 3100 feet of pipe line. This plant

#### RAILWAY FREIGHT RATES.

The possession of mineral wealth by any State is of small economic importance if the Railroad Companies in that state are not liberal in the matter of low freight rates. Gold and silver mines are not so dependent on railway freight rates as are coal, iron, lead, etc., and the long list of non-metallic minerals. In the transportation of the latter class from the mines and quarries to a near or distant market, the freight rates on these cheap ores and products ought to be at the lowest possible figure, to admit of their being worked. When we compare the low rates of freight from the middle States to the Atlantic seaboard on minerals with the exorbitant and in many cases prohibitory rates in some western sections, it is apparent that high freight rates are the cause of so many valuable deposits of economic importance being totally neglected by the prospector and miner. If there is one argument, and a strong reason too, in favor of government ownership of the railways, it is the policy of over-charging on mineral products by some western railroads. This short-sighted policy is the great means of directly retarding mineral development and indirectly the trade and settlement of the

country.

The State of Colorado is, however, a happy exception in the Western States, for there the railway lines have aided, encouraged and even extensively advertised the mineral resources of that State, and to them in a large measure is due the credit of making Colorado mining enterprises of the value and extent that they now hold as industrial undertak-ings and investments. Some people reason that in helping mining they are helping the interests of their road, and it is to be hoped that the directors and officials of all other railroads, outside of Colorado, will come to take

Australia of Riedler Pumps, Riedler Compressors and Blowing Engines.

It is a well known fact that slow piston speed engines are very wasteful of steam; also that this is the case with very long stroke engines running at a small number of revolutions per minute even though the piston speed may be moderate. The loss in such cases is due to the liquefaction and condensation of

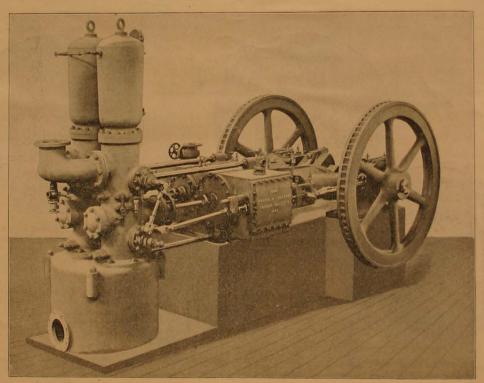
In the Riedler system, owing to the mechanically controlled valves of the pumps, the piston speed of the engine may be regulated to permit the greatest economy in steam consumption.

All machinery ordered from Fraser & Chalmers is set up and thoroughly tested in their works before shipment.

water passing through a large opening of the same total area, he so designed his valve that large quantities of water could be passed through it without undue throttling or resistance. It was further found that slip even though of small per centage has a tendency to increase the hydraulic shocks in pumps. By closing the valve mechanically at the proper time, the slip becomes *nil*. With the mechanically controlled valve the lift may be as great as desired; thus practically all throttling of the water is avoided, and by the closure of the valve at the proper time the

slip reduced to nothing.

The first pumps built in accordance with Prof. Riedler's designs were constructed in 1884, and proved a great success. During the four years following, eight underground Riedler Pumps were built for the Kladow Mine in Bohemia. After this they came in to



Duplex Single Acting Riedler Pump, driven by a Horizontal Cross-Compound Condensing Slide Valve Engine, Capacity 350 gallons per minute against 1250 feet head. Built for the Grand Central Mining Co. of Amarillos, Sonora, Mex.

that view also. If for no other reason than that of self-interest, they ought to give low freight rates on minerals, as mining development more than any other industry causes traffic and other industries to prosper.

Messrs. Fraser & Chalmers, of Chicago, Ill., have just issued their catalogue No. 24, fourth edition, of Riedler Pumps, Compressors and Blowing Engines. This catalogue is the most expensive thing this firm has ever given to the public. Messrs. Fraser & Chalmers are the exclusive manufacturers for the United States, Canada, British Columbia, Mexico, South America, England, South Africa and

#### RIEDLER PUMPS.

HISTORICAL SKETCH.

For several years Prof. Reidler investigated the action of water in pumps, during which time, as a result of his careful study and experimentation, he discovered several important phenomena. Carefully noting the causes and effects of these phenomena he designed a pump valve based upon the data so obtained. The first object was to prevent in as great degree as possible all throttling or resistance of water passing through the valve opening. Noting that the resistance of water passing through a large number of valve openings was much greater than the same quantity of general use in the deep mines of Silesia, Westphalia and Belgium.

In the year 1888, the system having come into greater prominence, was applied to large pumping engines for city water works, sewerage pumping and chemical plants. Shortly after this it was found that the same principal of valve gave great efficiency when applied to gas and air compressors, and a large number of Riedler Compressors were built in Austria, Germany, Belgium, France, Spain and England. Among the most notable of the air compressor plants, is that of the famous power station at Quai de la Gare in Paris.

Since 1884 more than twelve hundred Riedler Pumps have been built in this country, Europe, Mexico, Australia and South Africa. A large number of these pumps are being used, used, under the most severe conditions, such as handling dirty and grity mine water against very high heads. One of the largest of these pumps was recently installed by Fraser & Chalmers at the Iron Mines of the Chapin Mining Co., Iron Mountain, Mich., described in another part of this article.

#### DISCRIPTION.

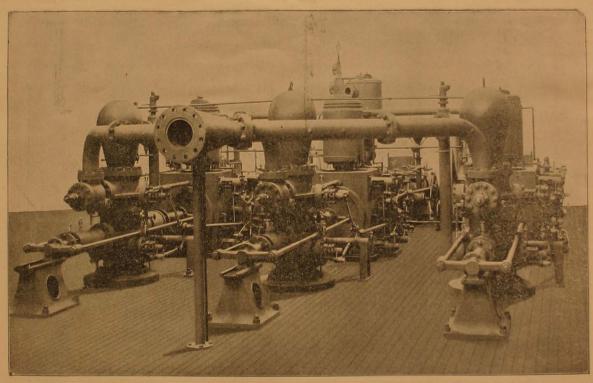
The principal feature of the Riedler Pump is its mechanically operated valve. The valves and valve seats are circular in form and made of high grade bronze. The valve has a lift of from 1 to 2 inches, and an area of such an amount as to reduce the speed of the water flowing through same to but a few feet per second. In other words the valve area is figured entirely on the basis of plunger

but little, but, when the large number of valves and the many times, they operate are taken into consideration, the loss will be found considerable. The lift of an ordinary valve is but from one-eight to five-sixteenth of an inch. Owing to the large number of valves, the water is forced to flow through a great many separate and contracted valve passages. This largely increases the friction due to partial throttiing of the water. In other words there is less loss by friction in water flowing through a single pipe of large area, (as is the case with the Riedler) then there is in water flowing through a large number of smaller pipes of the same total area as the large pipe. The valves and springs are invariably getting uot of order, necessitating frequent repairs with consequent stoppages; or, if the pump is not stopped for repairing a single valve,

to run about 200 revolutions per minute. The electric motor must therefore be designed as a slow speed motor. The first cost of slow speed motors are greater than those of ordinary speeds; at the same time all gearing and other means of transmission with attendant evils must be avoided. The greater convenience and greater economy as regards fuel consumption and durability, in a very short time more than make up the slightly greater first cost.

#### INDEPENDENCE MINE PUMP.

The pump recently sold W. S. Stratton, owner of the Independence mine at Victor, Colorado is running 200 revolutions per minute, without noise or shock, although it was not designed for a greater maximum speed than 140 revolutions per minute. The normal capacity of this pump is 400 gallons



Triplex Differential Riedler Pumping Engine. Capacity 2,200 gallons per minute, against head of 1,700 feet, when running 74 Revolutions per minute, driven by a Horizontal Triplex Tandem Compound Condensing Corliss Engine. Built for The Chapin Mining Co, of Iron Mountain, Michigan.

displacement. At the beginning of the stroke the valve opens automatically, controlled however by a very simple and effective mechanical device. It remains open practically the entire stroke. When near the end it is positively close at the proper moment by the controller.

The valve opening being large all throttling of the water through the valve passage is avoided. The mechanical controller closing the valve at the proper moment, prevents all slip and allows the pump to be run at any desired piston speed.

In ordinary pumps there are from 10 to 1000 valves for the suction and as many more for the discharge. Each valve is generally backed by a spring. The loss of power due to compression of a single spring amounts to

when out of order, it means a large loss by slip which is of considerable amount in the ordinary pumps even with good, working valves.

In the Riedler System however there is but one valve for the suction and one for the discharge. This greatly simplifies the pumpend. When working against high pressure, the ordinary rubber valves, are soon pounded to pieces. In the Riedler System on account of the mechanical controll the valves work equally well under all pressure.

#### ELECTRICALLY DRIVEN.

When driven by electric motor the power may be transmitted either by gearing, belting, rope transmission or direct connection. In case of direct connection they will be designed per minute against a head of 600 feet when running about 100 revolutions per minute. By doubling the revolutions the capacity is increased to 800 gallons per minute.

This is one of the most convincing statements that can be made in regard to the great advantage of the Riedler Pump, where electricity as power is used.

#### THE GRAND CENTRAL MINE PUMP.

The pump built for the Grand Central Mining Co. (limited), as a Duplex Single-Acting Riedler Pump driven by a Horizontal Bross-Compound Condensing Slide Valve Engine. The capacity fo this pump is 350 gallons per minute against a head of 1,250 feet. The pump is so arranged that it can be run by steam or compressed air as desired. By a

very conveniently arranged system of piping the change can be made from steam to air or the reverse in a few minutes time. This pump has given especially high results, when running with compressed air.

#### THE CHAPIN MINING CO'S PUMP.

The large pump built by Fraser & Chalmrie large pump built by Fraser & Chalmers for the Chapin Mining Co., Iron Mountain, Michigan, is a Triplex Differential Riedler pump, plungers 6% in. and 95% in. diam. and 30 in. stroke, driven by a Horizontal Triplex Tandem Compound Condensing Corliss Engine, steam cylinders 22 and 36 in. diam. and 30 in. stroke. It has a capacity of 2200 gallons per minute against a head of 1700 feet when running 74 revolutions per minute. It is designed to run economically with steam pressure at engine of 110 lbs, per sq. in., or by compressed air with a pressure of 60 lbs. per sq. in. at engine.

and it is so arranged with full cut off gear that it can be economically run by this means.

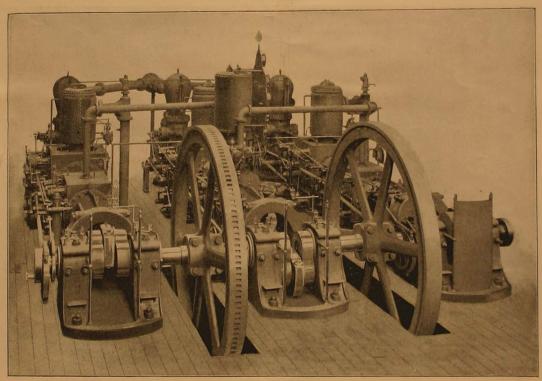
At the present time the pump is working on the 1310-foot level and raising 1,200 gallons of water per minute but later it will be lowered to the 1700 foot level. It is not expected therefore to receive the fullest economy from the pump at its present level, but it has nevertheless reduced the fuel consumption at the Chapin Mine from 30 to 8 tons in 24 hours; that is, the pumps previously used for the duty consumed 30 tons of fuel per day, while the Riedler pump requires only 8 tons per day. Everything has been done by Mr. MacNaughton to make this an economical plant. The steam pipe which is 7 inches in diameter is covered 3 inches thick with carbonate of magnesia, Column pipe is 13 inches O. D., the lower sections of pipe being 5% of an inch thick.

The station is cut in solid rock and is so

ed with mercury-pockets and perforated platee extending over the pockets, and riffle-plates project up above the pockets and also toward the front over the perforated plates.

598,721. Feb. 8. Process of Extracting Precious Metals from Rebellious Ores. James Woolford, London, England. Filed Aug. 21, 1896. The ore is mixed with oxid of antimony and pulverized fuel, is then fused, thus producing an alloy of antimony with the precious metal; the alloy is treated in a furnacs whereby the antimony is oxidized and driven off as fumes, leaving the precious metals on the furnace-bed.

598,709. Feb. 8. James Kennedy, Allentown, Pa. Filed Sept. 1, 1897. A smelting-furnace comprising a fire-chamber, a flue chamber, a plurality of distinct ore-chambers James Kennedy, Allenintermediate of and connected with the fire-chamber and the flue-chamber, an uptake compartment, a pan located in said uptake



Triplex Differential Riedler Pumping Engine (Crank end view), Built for the Chapin Mining Co.

The pump is provided with two Jet Condensers, air pumps being driven by direct connection with crank-shaft of main engine.

The arrangement is such that any one, any two, or three pumps may be run as desired with either one or both condensers. James MacNaughton, general manager of this company having had large experience in the handling of water in mines, ordered a pump with ample reserve capacity; he expected that nominally but two pumps will be required, this will leave one pump always in reserve and which can be cleaned, repacked, and re-paired as may be necessary. This means that there is practically no danger of drowning out the mine. As the Chapin Mining Co. has a very large compressed air plant this pump will eventually be driven by compressed air

arranged that the engine can be entirely shut off from the main shaft. A small shaft will be sunk from above to connect with this pump station; thus again entirely preventing the flooding of the mine and providing for the safety of the pump. The above described pump it is believed, is the largest underground mining pump in the world.

#### Patents of Interest to Mining Men.

Townsend Bros., Solicitors of Patents, 9 Downey Block, report the following list of recent patents of interest to mining men.

No. 598,543. Feb. 8. Combined Reciprocating Concentrator and Amalgamator. Rob. Taylor, Adelaide, South Australia. Filed Jan. 2, 1897. A reciprocating table is providcompartment, and a chamber common to said

ore-chambers and leading to said pan. 598,963. Feb. 15. Dry Separator for Auriferous Material. Ephraim C. Sooy, Kansas City, Mo. Filed May 2, 1897. An exhaust-chamber is provided with an inclined bottom having slots therethrough; an exhaust-fan draws air through the slots and carries away the tailings while the concentrates drop downward through the slots.

599, 104. Feb. 15. Dredging and Mining Pump. Leon D. Libbey, Duluth, Minn., assignor to De Witt Clinton Prescott, West Duluth, Minn. Filed March 27, 1895. This pump is provided with rotary blades and the claims are particularly upon the secretarion. claims are particularly upon the construction of the pump and the peculiar curve of the blades.

#### 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, 15th and March 1st.]

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 Watzr and Fuel. Auxiliary Arrangements.

Dies.

V. THE MILLS IN DETAIL.

Grizzlies.
Rock Breakers.
Ore Bins.
Feeders.
Battery Foundations, Frames and Guides.
Battery Frames.
Guides.
Mortars.

Screens. - Both diagonal-slot and wire screens are used in the district. With the exception of the Father de Smet mill, which uses partly No. 30 brass-wire screens, all Homestake mills use diagonal-slot screens made of heavy Russia iron. The needle number is 7, corresponding to a 30-mesh wire screen, the width of the slot being 0.024 in. The thickness of the iron is No. 24½ (American wire-gauge) and its weight 0.987 lbs. per sq. ft. The slots are ½-in. long and there are eight (formerly only seven) to the inch. The punched surface of the screen is 4887 in there is a margin face of the screen is 48x7 in.; there is a margin of 1-inch, making the entire screen 50x9 in. A screen lasts two weeks. The wooden frame is 4 ft. 4 in. long and 11½ in. deep, and has a strengthening rib, 6½ in. long, down the center. In fastening the screen to the frame, the lap is first tacked on, to hold it in place, then a piece of rubber cloth, 2 in. wide, is placed over it, small holes are punched through the rubber and lap of screen and both are nailed to the wooden frame The screen is placed on the frame with the rough side facing the mortar. On the outside of the frame are fastened, by means of two screws, three iron facings, ½ in.x9 in. and 3-16 in. thick, which protect the wood from the one horizontal and the two vertical keys that serve to wedge the frame against the chuckblock and the planed flanges of the discharge.

Some time ago, experiments were made with sreens of aluminium-bronze, which proved extremely satisfactory. The bronze contains, according to a letter from the Cowles Electric Smelting and Aluminium Co., 5 per cent. aluminium, 95 per cent. copper and a trace of silicon, and is furnished in unperforated sheets at 45 cents per pound. When new, it has a golden color, which it loses with use. The width and length of the slot are the same as in the ordinary screen, but there are nine slots to the inch instead of eight. The sheet is 0.035 in. thick. The screen lasts six months and does not break (while the Russia-iron screen breaks in two weeks). The wear is uniform over the entire surface, the slots enlarging to No. 5½ needle. The screens are then past use. The bronze, however, is not lost, but can be melted down and made into new screens.

The Caledonia mill uses No. 24 brass-wire screens, the thickness of the wire being No.

26, and the screening surface 48x53% in. The screen lasts one week. It is fastened to a simple wooden frame 53x121/2 in., the horizontal sides being 3½ in. wide, the vertical sides 2½ in. Three wooden ribs 1 in. wide, divide the screen-surface into four panels and thus prevent it from bulging out. The fastening of the screen to the frame and the wedging of this against the mortar are done as at the Homestake, except that there the screen frame is placed on the chuck-block, and here it is keyed against the lower rim of the mortar discharge. The Caledonia uses wire-screens because, although its stamps drop 3 in. farther than those of the Homestake mills, the splash is not so great, by reason of the greater witdh of the mortar and the space taken up by the amalgamated copper plates below the feeding-The force of the splash in the narrow Homestake mortar is thrown entirely against the screen: that of the wider Caledonia mortar is divided between the screen in front and the recess at the back. Thus the slot-screen would clog, while the wire screen allows the pulp to pass through free.

The upper part of the discharge of both classes of mortars, above the screen-frames, is closed either by an inch board or by a canvas curtain, or piece of belting, suspended from a lath. This curtain or belt hangs down and meets the screen in the mortar. It has the advantage, over the board that the amalgamator can readily pass his hand into the mortar and remove any chips of wood, etc., floating on the water or adhering to the inside of the

screen.

We have seen that in the Homestake mortar the pulp is driven with some force against the screens. In order to break its fall upon the apron-plate, a splash-board is fastened to the frame of the latter, thus preventing any amalgam collected there from being washed away. The Caledonia mortar has no splashboard, as the pulp does not pass the screens with sufficient force to endanger the amalgam collected at the head of the apron-plate.

Stamps.—The stamps used by both companies are of the ordinary pattern. They weigh 850 lbs., about 16 lbs. to the sq. in. of crushing-surface, and their centers are 934 to 10-in. apart. For dimensions and other particulars as to the different parts, see the table already given.

The stem tapers 6 in. at both ends, so that when it breaks, usually where it enters the head it may be reversed. At the Homestake mills, a stem lasts about three years before new ends have to be welded to it. The Caledonia requires for its 60 stamp mill five stems

yearly.

The though cast-iron head is without the wrought-iron rings which are often used at the upper or lower end. It has the usual keyways for the removal of stem and shoe. These are parallel instead of being at right-angles, as is usual. To fasten the head to the stem, the latter is let down through the guide-holes and the socket of the head placed directly beneath it. The stem is lifted and dropped and driven with a hammer, if necessary. Then the stem and head together are dropped several times on a piece of timber placed beneath, until they are quite firm. At the Homestake mills, a head lasts five years, after which the socket has become so enlarged that the stem cannot be securely fastened in it any longer. The Caledonia mill requires one head a month.

Both managements buy their shoes from outside foundries. To fasten the shoe to the head, the shank is surrounded by small wooden wedges tied around it with a string; the shoe is put in place; and stem and head are allowed to drop. Thus the shank is wedged into the recess of the head, and by raising the whole and allowing it to drop several times, the shoe becomes thoroughly fastened it. To prevent it from injuring the die, a piece of planking is placed on the latter. At the Golden Star mill, a very neat arrangement is in use for fastening the wooden wedges to the shank of the shoe. After the wedges have been placed around the shank, a strip of canvas is wound around them and tacked to each wedge, forming a sort of collar, which can be easily slipped over the shank of a new shoe. This simple arrangement saves a great deal of time and labor on clean-up days, when a good many shoes have to be replaced.

After being some time in use in the battery, a shoe becomes slightly concave at the base, but wears, on the whole, more evenly than the die. At the Homestake mills, a shoe lasts two months, crushing 270 tons of rock. It is then worn down to 2 inches from the base of the shank and weighs 40 pounds. This corresponds to a consumption of 37 pounds of iron for every 100 tons of rock crushed. At the Caledonia mill, a shoe lasts three months and crushes 300 tons. It is replaced when worn down to 1 in. and weighs 35 pounds, which corresponds to a consumption of 35 pounds of iron for every 100 tons of rock. It may be asked why the Caledonia mill, which buys both its shoes and dies, does not use steel, which is so much more durable, and consequently cheaper, especially if the heavy freight charges are taken into consideration. The answer is that steel lasts so much longer than iron, steel shoes and dies would continue in use after they had become uneven. This would reduce the crushing capacity of the battery, and thus in the end would be no saving at all.

In order to secure the tappet to the stem, the wrought iron gib is first put into the recess. The tappet is then slipped over the stem, and when it has reached the desired place, is secured by keys which pass at right angles between the gib and the iron shell of the tappet surrounding the stem. All the tappets of the Homestake mills have two keys; those at the Caledonia have some two and some three.

Both faces of the tappet are used as working faces. In wearing down they become uneven and ridges are formed. The tappet then has to be removed and planed off on a lath before it is fit for further use. Once in three years when the two faces have worn down 1¾ inches, the tappet is replaced by a new one. A tappet rarely splits. Case-hardened tappets and cams have been tried at the Homestake mills in the expectation that the hardened working surfaces would last longer; but the tappets cracked and became useless, as they could not well be planed off. Steel tappets and cams have not been tried. It takes from six to eight hours to change the tappets and cams of one battery.

At the Homestake mills, the drop is 9 in., the number 85 per minute, and the order 1, 3, 5, 2, 4. At the Caledonia mill the height is 12 inches, the number 74, the order 1, 3, 5, 2, 4, and 1, 4, 2, 5, 3. The Caledonia mill has such a hard rock to pulverize that it is forced to have a higher drop and consequently a smaller number of drops per minute. That the Caledonia mill has two different orders of drop is quite unimportant, as they both comply with the same requisition, viz., that no stamp shall be immediately followed in falling by either of those next to it.

Cams and Cam-Shaft. - The stamps are lift-

ed by cams fastened to a shaft which rests in boxes. These are supported by shoulders in the front of the battery posts to which they are bolted. Ten cams are keyed to one camshaft, which is set in motion by the cam-

pulley.

The cams are double-armed. They are of though cast-iron and have the form of the involute of a circle (slightly modified at the end), the radius of which is equal to the distance from the center of the cam-shaft to the center of the stamp. The hub of the cam, which is at the off-side of the stem, is not strengthened with the wrought-iron band shrunk on it, which is often used, but is cast sufficiently thick to stand the strain. At the Homestake mills the cams have a working face 2 inches wide and 31/2 inches deep. The strengthening rib, beginning at the end of the cams, gains in depth towards the hub, where it is 9½ inches deep. The hub itself is 3½ inches thick. The distance from center of hub to end of cam is 17 inches. A cam lasts three years. The cams of the Caledonia mill differ only slightly from those of the Homestake mills. The face is 21/2 inches wide and 2 inches deep, the strengthening rib at the hub 10½ inches deep, the hub 3½ inches thick, the distance from center of the hub to end of cam 19 inches. The cams, being made of car-wheel iron, last over four years. From ten to fifteen a year are required.

The cam-shafts are of though wrought-iron, turned down in a lathe. They have one longitudinal key-seat. The keys with which the cams are fastened to the shaft are of steel and are hand-fitted. Wrought-iron keys lose their shape too quickly and machine-fitted keys get loose very easily; a great disadvantage. It takes ten hours to replace a broken cam-shaft, supposing that the keys have been already fitted. This ought always to be done, as the fitting of each key-seat takes one hour. A well-appointed mill always has on hand several cam-shafts, with the necessary cams and keys ready for use. The cam-shafts of the Homestake mills were formerly made 4½ and 4¾ in. in diameter and lasted about five years. Now the tendency is to make them stronger. The largest in use at present are 5¾ in. in diameter and good for ten years. The distance between center of cam-shaft and stem is 5½ in. The cam-shaft of the Caledonia is 4 3-16 in. in diameter and its center is 6½ in. distant from the center of the stem.

The cam-shaft pulleys, at the ends of the camshafts, vary slightly in the different mills. At the mills of the Homestake they are 6 ft. and 7 ft. 5 in.; at the Caledonia mill 7 ft. 4 in. in diameter; the face is ussually 15 in. wide. The pulleys are of wood. Iron could not stand the continuous shocks caused by the dropping of the stamps and would also be too heavy. The pulley is built on a cast-iron hub with flanges, and keyed to the cam-shaft. When put in place, the shaft is made to revolve and the face of the pulley turned off to the desired form, that it may be perfectly true. The cams are lubricated with axle-grease. To prevent any of this dropping on the apronplates, hindering amalgamation, a curtain is stretched out beneath the cams to catch any particles of grease that these may throw off while in motion.

(To be Continued.)

A Tuolumne exchange publishes the following item under the heading of Real Estate Transfers:

Albert Otto Viertong to M. W. Viertong—All gold mines he now has in Calaveras and Tuolumne counties; con. love and affection.

### CORRESPONDENCE CALIFORNIA.

Greenhorn Mining District.

Placer mining has been more or less active in the Greenhorn mountains, in the northern central part of Kern County, for the past twenty-five years, and during that time there has been at intervals prospecting for quartz and a few ledges worked by arrastras; but, until the last two years, there has not been enough work done on the ledges to demonstrate their value, the first one developed is what is known as the Wagaman mine, forty miles northeast from Bakersfield, on which the Wagaman Brothers erected a five-stamp mill last summer, and have produced over \$20,000.00 in bullion, running the mill in day time only. The pay shoot is quite ex-tensive and the ore free milling and high grade, running from \$50 to \$100 per ton. They are down to the 200-foot level, and have just drifted into a body of very rich ore. Their next clean-up is expected to eclipse all former ones. It is current talk that they are negotiating a sale of the property at \$40,000, and it is quite probable that the sale will be consummated.

Wm. Boon is developing an adjoining property on the same ledge, and is down 165 feet, has milled some very good ore, but has not yet struck any extensive pay shoot. He is now drifting to find ore.

There are several other claims in the immediate vicinity with more or less development and with encouraging prospects.

The Blue Chief mine, about eight miles north, is owned by Walter James, Gus. Kratzmer and Mrs. Canfield, all of Bakersfield. They have just completed a 5-stamp mill with McGlew concentrator, commenced crushing on the 16th of January. The first run was from the dumps of two shafts, the better ore having been shipped before the mill was completed. The ore shipped ran something over \$80 per ton. I do not know how much was realized from the ore milled, but presume it did not run very high, as a large part of it is refuse. They are now running on ore from the 80-foot level. This is much better ore, and the owners will undoubtedly realize a handsome profit over cost of mining and milling. Wood and water are plenty. does not cost, delivered at the mill, to exceed \$2 per cord. Fifteen men are now employed, and as soon as the levels are run, the force will be increased and the mill run day and night. The ore vein is from eighteen inches to four feet wide. Besides the free gold, there is from one to three per cent sulphurets in the ore, which are very rich.

The Queen, a few hundred yards south, owned by Kratzmer & Sanders, is a promising prospect. It is a sulphuret ore, and assays well in both gold and silver.

The Silver Bill, close by, owned by Tracy, Harden, Kratzmer and others, has quite an amount of development work on it, and shows some very fine silver ore and carries some

Taylor and Murphey's mine, about four miles east, and on the other side of the summit is showing a good vein of free milling ore of high grade. The development work is going ahead without cessation, and they are confident of showing up a good property in a short time.

There are a large number of other prospects on which work will be done this season, and it now looks as though Greenhorn would

(Br. FILLITY.

#### TUOLUMNE MINES.

(From our Special Correspondent.)
East Belt.

THE GRIZZLY MINE
is cross cutting and sinking. They have a
large ore body, which shows gold frequently.
THE DEAD HORSE

is contemplating sinking the shaft to further depth. The mill is running day and night.

THE PROVIDENCE'S
new machinery works well, everything running smoothly and rich rock is being taken
out.

THE MOUNTAIN LILLY GROUP.
Another rich vein has been struck in a tunnel entered 50 feet—vein 2 feet—shows free gold in the breast from roof to bottom of tunnel. The vein is rich—(No. 6 vein).

#### Mother Lode,

THE HANCOCK MINE, just below Rossland, has struck a body of ore that prospects well.

THE RAGLE AND SHAWMUT.

The owners are going to add 20 more stamps to their plant, which will make 40 in

THE ALAMEDA MINE.

Main shaft over 600 feet. The company have decided to erect a 20-stamp mill. The levels from surface downwards are opened up. Every 100 feet, good rock is found in all of the levels, improving as depth is attained.

THE RAPPAHANNOCK.

Shaft is 750 feet and still sinking, which will be continued until the 1000 foot level is reached, when the mine will be worked from below up.

A NEW WATER COMPANY has been formed. Surveys are made to take water direct from the lakes and main rivers, which will supply the whole of the county with sufficient power, so that the mines now existing, and those in prospective, will have a never-failing supply; further, for irrigation, the ranches will be able to obtain all they may need. The old Tuolumne Water Company have been building extra storage reservoirs, so, with the two water companies, Tuolumne county will be the best supplied section in the state; and, henceforth, no mines will have to shut down for need of this valuable and indispensable adjunct to mining.

The bountiful rains that have been, and are now falling, will prevent any dearth of that element, and also give large supplies of free water to those that are fortunate enough to own special privileges that are located on the river and creek banks.

ARGUS.

#### COLORADO.

(From an Occasional Correspondent.)

BOULDER, Col., March 3, '98.

EDITOR JOURNAL: It has been sometime since I have written you of Boulder county's mining operations, and the improved condition of this great industry during the past six months.

Intense excitement prevails in a new mining camp named El Dora, and hundreds of mining men, speculators, and real estate sharks are flocking into the place for the purpose of booming it, and fleecing the suckers who are always anxious "to come in on the ground floor," and be in the swim from start to finish

The boom is in the real estate rather than

the mines, as nothing of a startling nature has been discovered in this section up to date, but great hopes are entertained that it will eventually, by development, equal the mar-velous gold camp of Cripple Creek.

A grand excursion to Wall Street camp and picnic was given by the Boulder County Mining and Promoting Company on Febru-ary 12th, over the new Colorado and North-western Railroad that is in course of construction from this city to Ward mining camp, with a possibility of crossing the snowy range into Middle Park, and through to Salt Lake and California. Among the excursionists were Governor Adams and his staff, ex-Governor Prince, of New Mexico; General Irving Hale, and other celebrities, mining, business and professional men, and members of the press and a large delegation from this city were headed by Mayor C. Ricketts. After looking over the new town, and admiring the the beautiful landscape which is exceedingly picturesque, the excursionists were invited to a sumptuous repast. Toasts were given by the Governors, General Hale, Hon. W. N. Byers, Mayor Ricketts and others. The party returned to Boulder, in time to meet the 4 o'clock train for Denver, feeling delighted with the trip.

There are numerous rumors regarding the establishing of a rolling mill and smelting works in this city by the Pennsylvania Milling Co., composed of members of the Colorado and Northwestern Railroad Co.

A 50-stamp mill is now in course of construction, for treating custom ore from the mines of Ward and other camps in the trend of the railroad, at much reduced rates. smelter is also proposed for Ward City, by an eastern company, at a cost of \$100,000, with all the recent appliances for treating the mineral of this prosperous camp.

The Dew Drop Company has offered to furnish 200 tons of ore per day to the Pennsylvania mill, and other mines will do likewise. There is exposed in the Dew Drop tunnel a wonderful amount of mineral, through which the huge tunnel passed in its trend on the vein. Estimates have been made by experts giving the value of ore in sight as \$500,000

ready for the stopers.

At Jamestown a new process has been in operation for several weeks on the ores from that section of the county, which is claimed to be the best yet tested for saving the values contained in the ores. The ore is thoroughly roasted in large crucibles, of 250 pounds capacity, then pulverized and passed through an 80-mesh screen before entering into the final process of extracting the precious metals.

The Woody Mining and Milling Company

will erect a process for extracting the gold and silver from the ore produced from the several mines owned by it. The capacity will

be 100 tons a day.

The Standard Company will build a 20stamp mill, to utilize the immense quantities of ore from its group of mines. The mill will

be ready by the first of June next.
Supt. Frank W. Davis has purchased an engine, and will take the water out of the Chief mine at Ward, which is one of the Rose-Ward group. The Rose is doing splendidly, producing an ore that runs about \$200 per ton from a large vein, and at the 90-foot level of the Chief, the ore is large and of excellent quality.

From the Golden Age mine, one of the leasers shipped a ton of rich mineral, also 28 pounds of ore that yielded a little over 24 ounces of gold. The streak of this very rich ore is small, and requires care in selecting and saving it; but it certainly pays to exercise much care when taking out ore that yields \$20 to \$30 per ton, as is often the case in the Golden Age and other telluride veins.

There are many Boulder people staying at Los Angeles, Cal., who will be pleased to hear of the new railroad through Boulder and Four-Mile canons to Sunset and Ward, which will take the place of the Greeley, Denver & Gulf narrow guage road, and to realize the fact that the Utica, Columbia, Morning Star, Ruby, Rose-Ward and many other mines are turning out fine ore, and that Colorado is now enjoying a state of great prosperity such as the oldest inhabitant never knew in the good old times. The State University is growing rapidly because of its excellence, and students are here from all over the country, to take advantage of the grand opportunity offered at this great institution of learning. Colorado is the banner gold state of the Union, and excelled her best efforts during the present year.

WILLIAM M. RULE.

### Miscellaneous Mining News.

#### ALASKA.

It is stated that the United States Coast and Geodetic Survey will send out four parties, not later than June 1st, numbering altogether about 100 men, the greater part of whom will be employed about the mouth of the Yukon, taking soundings along the whole length of the bar at its mouth, some 170 miles, in the endeavor to find a channel for the passage of deep sea vessels. Another party will explore the branches of the delta, while a third will survey the river from its mouth to the Canadian boundary, and a fourth will, if possible, continue the exploration of the Copper River.

#### ARIZONA.

Conkey & Tyler's Lady Bug, at Mineral Park, is improving rapidly with development. They are turning out rich ore.

Walter Burkhart located an old mine, Jan. 1st, near Mineral Park, and has developed it into a bonanza.

Work at the Golden State's copper property, located near Tombstone, in Cochise county, is being pushed ahead with vigor. The smelter will have been blown in by March 10th. Twelve men are at work extracting ore and developing the mine.

#### CALIFORNIA.

CALAVERAS COUNTY.

Articles of incorporation of the Spanish Bar Gold Mining Company have been filed for record. The capital stock of the concern is \$50, with 200,000 shares. John Hey, H. J. Grauerholz, John Daisley, Joseph Klein of San Francisco, and W. T. Robinson, of Mokelumne Hill, are subscribers to the stock. The purpose of the company is to mine the Spanish Bar.

KERN COUNTY.

A well is being put down at the Visalia mill in Garlock.

Col. Brooks is sinking to bed rock on his Chicago placer claim, just east of Johannes-

Heavy machinery and timbers from Mojave have gone to Slate Range. A 5-stamp mill is being built there.

At the King Solomon, on Bull Hill, a new 600-foot cable has been put in, and the engine has been enlarged so as to work the deep shaft. The main shaft is down 350 feet.

High grade ore is being bagged daily at the W. J. Bryan mine near Shirt Tail Hollow. Grass roots ore runs \$50.

The St. Elmo mine has been leased by Revnolds & Co., of Victor, and a carload of ore was shipped to their Victor mill last week. Mr. Walker is in charge. - California Rand.

LOS ANGELES COUNTY

Mr. J. La Dow, of the Puritan mine, has opened a fine three-foot ledge that shows free gold to the top of the ledge, and the ledge can be traced for 200 feet. No doubt, this is one of the coming big mines. There is talk of organizing a stock company and putting in a good mill at Acton.

#### SAN DIEGO COUNTY.

Cave J. Couts is in San Diego from the Ranchita for a few days. He says the Ranchita is booming right along. The ore veins are growing larger and the rock richer as the shaft goes down, and the bottom of the shaft is now in a body of ore no one knows how large, as the walls of the shaft, 6x7 feet, are lined with the rock on all sides. The output of the Ranchita is now about \$5000 in bullion per month, which is considerably more than the entire Julian-Banner camp was producing one year ago.

#### SAN BERNARDINO COUNTY.

Mr. Kimball, (who has been prospecting in the Silver Mountain district) is enthusiastic over the prospects of Victor, and believes it to be the richest camp in this section.

Mr. Kimball is of the opinion that 100 stamps will soon be required at Victor, because that belt is the best he has seen in the state. -Free Press.

#### COLORADO.

At the Gaston mine, in Russell Gulch, Mr. John Best says that the main shaft will be sunk 100 feet at once, its present depth being 400 feet. The Gaston is the adjoining property on the west end of the Saratoga, and is well equipped with a good plant of machinery. A small force of men are at work on the upper levels, and some ore is being taken out, which is being shipped to the Denver smelters for treatment.

A new plant of machinery and shafthouse are being put up on the west half of the Gold King, now worked under lease. The hoist is a double-friction Hendrie & Bolthoff lightning hoist, with cylinder 9x10 inches. The shaft is 150 feet deep, and a contract for another 150 feet has been let. The claim is near the Anchoria Leland.

#### IDAHO.

The Chloride Queen people are happy, for while they have not cut their lead in the cross-cut tunnel they started last summer, they have found a stringer 18 inches wide which carries considerable ore, and are confident the lead from which it springs cannot be far off. The ore brought down shows grey copper, and is believed to carry gold, although an assay has not yet been made.

#### MINNESOTA.

The Minnesota Iron Company expects to handle more than 2,000,000 tons of Mesabi ore, while the Rockefeller line will have probably 2,500,000 tons from the Oliver mines, and the Biwabik alone, besides what its own mines at Eveleth and Hibbing may ship. The Duluth & Western will forward, perhaps, 900,000.

It is announced that the working option on the Section 26 property, near Ely, now held by the Oliver Mining Company, will be closed and the property pass into its possession. Developments made since the option was taken indicate a better prospect than was claimed by the sellers. The mine, however, will de little in our chimnest this will do little in ore shipments this year.

#### MISSOURI.

Missouri Lead and Zinc Company has taken an option on the lands of the Bankers' Land and Mining Company for \$750,000. company controls about 1,500 acres of land about Joplin, most of it belonging to the Bankers' Company. J. F. Campbell of St. Louis is the promoter of the new company. It has a capital stock of \$3,000,000, in 300,coo \$10 shares.

#### MONTANA.

The capital stock of the Basin and Bay State Mining Co. has also been increased. A certificate increasing it from \$500,000 to \$600,000 was filed.

It is stated that the owners of the Amber Mine, situated in York district, have begun the construction of a large concentrating and cyanide plant. Electric power will be used.

The War Eagle Mine, near Clancy, has been sold to Michigan parties for \$35,000, E. S. Delamaer, of Detroit, taking over the property for himself and associates last week. It is the purpose to immediately put up a steam hoist on the mine and sink the shaft to a depth of 600 feet without a halt.

### NEVADA.

Dr. W. J. Nelson, of Boston, has bought from Johnson, Lund & Campbell, for \$200,-000, a group of 24 claims, in the Eagle Valley mining district, seven miles east of State Line district, Lincoln county, Nevada. Dr. Nelson is at the head of the Boston Copper Co., which is operating a smelter in Lyon county.

### NEW MEXICO.

Output of Hillsboro gold mines for the week ending Thursday, March 3rd, 1898, as reported for *The Advocate*:

TT7:-1 -	Tons
Wicks	30
K. K	15
Richmond	. 45
Happy Jack	5
Snake Group	. 100
Opportunity	. 100
Sherman	
Proper	5
Prosper	5
Eighty-five	. 5
Rex (silver-lead)	5
m	
Total	0.10

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

The Santa Rita Copper and Iron Company has 14 men employed taking out ore above the water level on the Romero.

Captain J. P. McCarthy of Denver, has bonded the Log Cabin Mine, formerly known as the Alamo, for the Picher Lead Co. The mine is located about two miles from Central near the line of Central and Hanover districts. Julius Welgehausen of Central is owner of the property.

The Confidence Mine, owned by the Helen Mining Co., is running with a full force of 70 miners and producing 80 to 100 tons of ore per day, which is reduced at the company's 30-stamp mill at Whitewater.

#### OREGON.

The Ashland mine is now contributing 100 tons of ore to the Hick's mill at Ashland for treatment

Work on the Hammersly mine is still suspended, owing to the disagreement between Judge W. H. Reed, the lessee, and his men touching payment for their services.

B. Lawler, who secured an investment of \$307,000 in the Anidem mines, Santiam district, left last week for Salt Lake. The ores from these mines yield only from \$3 to \$6 per ton and are very base. Mr. Lawler is engaged in looking up a process that will enable him to save his values.

The parties building a bed rock flume, in Rich Gulch, Galice Creek, work night and day to keep it clear, the gulch being Alexander & Bent's dump. Considerable time and money have been expended on the flume. It is estimated that 40,000 feet of lumber has already been used in two flumes, each four feet wide.

#### SOUTH DAKOTA.

Samuel Scott, of Custer, has shipped 500 pounds of spondumme and 100 pounds of bismuth to Paris, France, for treatment. Both metals are found nearly in the city limits of Custer. If the returns are as rich as expected, there are parties ready to put up works suitable for the treatment of each, at Custer. Both are found in large quantities.

The machinery for the new 10-stamp mill of the Drummer Group, situated about six miles west of Custer, will be in working order very soon. Work is being done in a 60-foot shaft. The company is calculating to put in a cyanide plant before spring.

#### WASHINGTON.

It is very satisfactory to report that Mr. Del Harte, while in Chicago, organized a new company to take over the Bull Frog group, and also the cyanide plant of the Wyandotte Mining and Milling Company. The capital stock is \$3,000,000, divided into 3,000,000 shares at a par value of one dollar each. The officers are as follows: Theo. Wilken, president, Chicago, Ill. Rev. Paul Sperka, vice-president, Oskosh, Wis. Chas. C. May-Harte, general manager, Golden, Wash. The group consists of thirty-six claims on Palmer Mountain, in Okonagan county. The quartz tested at the mill proved it to be of such quality that, if values hold out as depth is attained, it insures for the company a very rich prop-

### FOREIGN MINING NEWS

### BRITISH COLUMBIA.

#### Ore Shipments via Nelson.

The ore shipments of 1898, via the port of Nelson, up to the 18th February, come to 15,-507 tons of ore, valued at \$1,845,225, figures which indicate a large advance, ere 1898 closes, over the aggregate shipments of 1897, certified at and through Nelson, which were valued at \$7,613,324. At the present rate of progress the returns of 1898 should exceed \$11,000,000 in aggregate value.

#### Big Receipts.

The enormous return which the Dominion is making by one item alone of the many which make up the Yukon revenue is well illustrated by the fact on one day recently at Victoria nearly 1,000 miners' licenses, at \$10 each, were issued. Most of the buyers were goldseekers from the States. Meanwhile, at Vancouver the like receipts-mostly from Canadian and British goldseekers outfitting in the city-often exceed \$1,000 a day.

### PERSONAL NEWS ITEMS

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.

C. T. Mixer of the firm of Mixer & DuBois, of Ishpeming, Mich., has left Colorado, where he has been a short time past and has started on a second trip to Nicaragua.

been a short time past and has started on a second trip to Nicaragua.

Col. A. M. Ellsworth, M. E., of Los Angeles, Calif., has been making a tour of Mexico, visiting among other places, Tepic, Estado de Tepic, San Luis Potosi, Estado de San Luis Potosi and Parral, Estado de Chihuahua.

C. S. Drummond, the English managing director of the Duncan Mines Ltd., accompanied by Capt. T. J. Duncan, of Nelson, B. C., local director, has been inspecting some mines in Calaveras county, Calif.

Jesse A. McDonald has been appointed agent for the Gold and Silver, Extraction Company of America (MacArthur-Forrest process) in Arizona, with headquarters at Phoenix.

C. F. Karns of Los Angeles, well known in mining

C. F. Karns of Los Angeles, well known in mining circles, has just left for a tour of the northern mining sections of California.

E. R. Woakes, engineer for the Darian-Panama mines and consulting engineer of the Duncan Mines Ltd., has returned to Panama from a visit to the northwest.

SAM NEWHOUSE of the United States Explora-

SAM NEWHOUSE of the United States Exploration Company, is again in Utah, giving attention to his interests in the Highland Boy mine in Bingham.

T. L. Stringham, well known in Los Angeles, Cal. is now developing some good properties in Kern county near Glennville, Cal.

CAPT. C. H. THOMPSON of Spokane, Wash., has been appointed by the Governor of the State of Washington as commissioner of the mineral department in the state's representation at the Paris exposition in 1900.

Frank I. Lewelly v. president and the Paris exposition in 1900.

Frank J. Llewellyn, president and chief en-gineer of Gillette-Herzog Manufacturing Company of Minneapolis, Minn., is in Chicago on business for his

Minneapous, Ainhi, is in Chicago on business for his firm.

J. F. Holden of Congress, Arizona, was a caller at the Journal office March 7th. Mr. Holden is an oldtime Idaho mining man. He is on his way to British Columbia, where he is interested in some good mining properties.

John J. Case, assistant superintendent of the works at Great Falls, Montana, has resigned in order to accept a position in Michigan.

Thomas McNaught, president of the Golden and Fort Steele Development Co., Ltd., of British Columbia, has gone to England for a month or two.

C. S. Herzig, mining engineer, who left New York recently to take the position of head assayer at the smelting works of the Great National Mexican Smelting Company in Monterey, Mexico, has accepted the position of assistant superintendent of mines for the same company at its large properties in Sierra Mojada, State of Coahnila.

### THE MARKETS.

New York, Feb. 28th, 1898 The following are the Silver, Copper and Lead quotations for the last two

	511	VER.	COFFER.	LEAD
Feb.	28	5514	10 90	3 60
Mar.	Lancer	5514	11 00	3 70
- 0	2	5436	11 25	3 80
11	3	54	11 50	3 75
	4	541/4	11 50	3 60
11	5	55	10 90	3 60
11	7	561/6	11 25	8 60
- 11	8	565%	11 25	3 60
- 11	9	5514	11 50	3 60
u	10	56	10 85	3 60
- 11	11	5616	11 25	8 60
- 0	12	551/4	11 25	3 60
- 11	HILL PROFES			
			100000	

There is not much business reported in the silver market and prices are barely steady at current rates. Mexico has created a demand for several hundred thousand ounces from the United States or coinage into Mexican dollars.

The market opened dull and business black until the close of last week, when both home consumers and export has advanced. Lake Copper is quoted at 11% although at first quoted at 11% and only a limited quantity now is obtainable. For Electrolytic 10%. In Casting content it was dull against at 10%. copper it was dull going at 101/2c.

#### LEAD

A much better feeling seems to prevail. This is on account of producers slowing down on high prices. We quote it at

#### SPELTER

Consumptive demand is much better although prices have hardened somewhat. We quote for St. Louis \$3.75 and for New York \$4.00.

#### ANTIMONY.

No change of any note has occurred. Quotations for Cookson's 8c.; Hallett's 7½c; Japanese 7½c. and U. S. Star 7½c.

#### NICKEL.

Business still continues on unchanged lines and no alteration in prices can be reported. We quote for New York ton lots 33½c, and 36e per lb and for smaller orders 35½c, and 38c.

Prices have advanced slightly and hold good. Quotations for spot and Febru-ary are \$14.00 @ \$14.05 and for futures 5 points higher.

#### PLATINUM.

Prices are now quoted at \$15 and \$16 per oz., New York. The London quotations are 58 @ 60 s per oz. Supplies are not large and prices are firm. For chemical ware, best hammered metal, Messrs. Eimer & Amend of New York furnish the

following quotations, the prices given below being respectively for orders of over 250 grams; for orders of over 100 and less than 250 grams and for orders of less than 100 grams. Crucibles and dishes, 57c., 58c. and 59c. per gram. Wire and foil are 55c., 56c. and 57c. per gram.

#### QUICKSILVER.

The New York quotation areat \$39.00 per flask.
San Francisco quotations are \$39 for domestic consumption.

#### POWDER.

The market at San Francisco is fine with the current quotations.
The quotations are as follows:
For Hercules No. 1, from 1134c. to 174c., according to strength and quantity. No. 2, from 9c. to 11c., according to strength and quantity strength and quantity.

#### COKE.

The market at San Francisco, Cal., is	
quoted as follows: English, spot, in bulk\$11.00	
" in sacks 12.00	
Cumberland 10.00	

#### BORAX

The San Francisco market in Borax is firm with a good demand.
The market is quoted as follows:

Refined, in carload lots, in barrels... Refined, in carload lots in sacks..... Powdered, in car lots..... Concentrated, in car lots...

#### THE MINOR METALS.

Quotations are given below for New

Aluminum:	
No. 1, 98 per cent. ingots, per lb 346	BADE
No. 2, 90 " " " " " " " " " " " " " " " " " "	
Rolled sheets, "	
Alum.—Nickel, "336	019C
Bismuth, per 1b	1.80
Phosphorus, per lb456	BSOC
Tungsten, per lb	70C
Tungstic acid	45C
Ferro-tungsten, 60 per cent	6oc

Variations in price depend chiefly on the size of the order.

#### CHEMICALS.

There is absolutely nothing new to report, but it is expected that before the current month goes by there will be higher prices and a more active demand from buyers.

Ouotations generally are as follows:

#### CAUSTIC SODA.

Quotations for Caustic soda domestic high test are \$1.60 @ 1.70 per hundred

ALKALI. Domestic, 58 percent., 50c. @ 55c., for-ign 55c. @ 60c. carload lots.

#### CARBONATED SODA ASH.

48 per cent., 90c and 95c. per 100 lbs. 58 per cent.

#### BI-CARBONATE OF SODA.

7 674 English, \$2.12½ and \$2.25 per 100 lb. American, bulk \$1.50 and \$2.20 per 100 6% lbs. according to brand.

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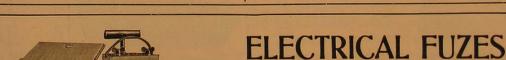


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#### SAL-SODA.

For domestic, 55c. per 100 lb., less usual discounts; English, 60c, for spot and 65c. to arrive. Concentrated sal soda, \$1.40 and \$1.60 per 100 lbs.

#### CHLORATE OF POTASH.

Chlorate of potash is quotated at \$8.75 and \$9.00 per 100 lbs.

The Market has opened with an im-provement as compared with last year and taken as a whole, the trade looks

and taken as a whole, the trade looks promising.

Prices are per 100 lbs. in New York and vicinity in lots of 50 carboys or over. Quotations are as follows: Acetic acid, commercial No. 8 \$1.40 @ \$1.55; redistilled, 28 per cent., \$2.00 @ \$2.15; Muriatic acid, 18 per cent., \$1.00@\$1.50, 20° \$10@1.75; 22°, \$11½ @ \$2, according to make and quantity. Nitric acid, 36°, \$4.1½@\$4.1½; 40°, \$3.1½@\$4.1½; 42°, \$4.1½@\$5.00. Oxalic acid, \$6.50 ex-dock and \$6.75 ex-store. Mixed acids, according to mixture. Sulphuric acid, 66 per cent., \$100@\$1.75. Chamber acid, 50° \$6.50 @\$7.50 prton at factory. Blue Vitriol, \$3.25 @ \$3.50 according to grade and order.

Quotations at present are \$20.75 @ \$21.90 per ton for best unmixed seconds, and \$20@20.50 for thirds.

#### MURIATE OF POTASH.

We quote New York and Boston, 1.75@\$1.78c. Philadelphia and Norfolk, 1.76@1.79½c.; Charleston, Savannah, Wilmington and New Orleans, for 80@ 85 per cent. basis of 80 per cent., \$1.78½ @\$1.81c in lots of 50 tons and upward.

Invoice weights as taken at port of shipment per ton of 2,240 lbs. testing 12.4 per cent. actual potash, equivalent to 23 per cent. sulphate of potash, \$8.80 @ \$8.90.

#### NITRATE OF SODA.

Business on spot has been good and the market appears to be rising in values. At one time this week \$1.85@\$1.90 per 100 lbs. was asked for spot nitrate, but but sales were made at \$1.75@1.85. To-day \$1.85 is mentioned for spot, \$1.70@\$1.75 for near arrivals and \$1.55 for future shipments.

#### FINANCIAL NOTES.

The statement of the United States Treasury, on Thursday, March 10th, shows balances in excess of outstanding certificates as below, comparision being made with the statement for the corres-ponding date last week:

Gold Silver Legal Tenders	17,817,028 30,050,645	Mar. 3. \$167,947,557 13,886,238 35,811,260	D.	Changes, \$745.8 0 3,930,790 5,760,615
Treas'y Notes,		5,880.047	I.	146'015
Totals		\$228,525,102	I.	\$2,721,650

\$2,354,283 during the week.

The Treasury Department estimate of money in the United States on March 1st is as follows:

The second second	The same of the sa	700	
	In	In	
	Circulation	Treasury	Totals.
Gold coin	\$558,884,882	\$151,609,155	\$705,494,037
Silver dollars		399,079,443	458,100,347
Subsid, silver	64,270,811	11,900,092	76,280,903
Gold certifict's	36,440,789	1,574,360	38,015,149
Silver certific's		11,621,077	391,908,504
Treas. nts.1810	98,464,430	6,201,850	104,669,280
U.S. notes	264,164,186	82,516,830	346,681,016
Currency cert.		2,230,000	50,660,000
Nas, bnk. nts	221,413,230	3,417,842	224,881,072

The United States Treasury reports for February receipts amounting to \$28,572,259, of which customs furnished \$15,040,081, and internal revenue \$12,003,319. The expenditures were \$26,599,255, showing a surplus of \$1,973,103 for the month. Receipts and Pacific Railroad account

The coinage executed at the mints of the United States during the months of January and February, 1898, is reported by the Burcau of the Mint as below:

FI	BRUARY.	
enominations ouble eagles agles alf eagles	200,070	\$4,000,1 \$5,0
Total gold	217,099 1,032,225 40,225 460,817	\$4,085,30 1,032,2: 25,1 115,2
Total silverve cent	1,533,492	\$1,167,56 64,42 28,1
Total minor otal coinage		\$92,5°
		_

### TWO MONTHS 404,099 Total silver. Total minor 8.444.150 .17,165,741 \$10,474,451.25

As compared with January the total coinage in February was greater by \$216,431.

#### Gold and Silver Exports and Imports.

At all United States ports, December, 1897, and years from January 1st, 1897 and 1896:

	Coin and Bullion		In C	res	
	Exp.	Imp.	Exp.	Imp.	
Gold-					
lan.	\$2,684,289	\$5,662,546	\$2,468	\$776,688	
1898	2,684,289	5,622,546	2,468	778,638	
1807	371,944	556,621	70,411	386,685	
Silver-					
Tan.	4,262,396	542,315	89,424	1,993,959	
1898	4.262.396	542,315	39,424	1,993,959	
1597	3,997,554	877,067	156,903	1,907,479	

This statement includes the exports and imports at all United States ports, the figures being furnished by the Bureau of Statistics of the Treasury Department.

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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 metal
lurgical operations. Good references.
Address, T. K. JOHNAL OFFICE,
Stimson Block, Los Angeles, Cal.

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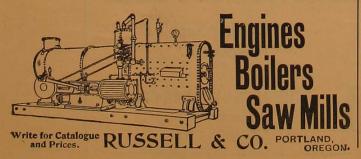
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Aetna Con	25 00 50 50	Illinola Kearsa Lake S Mercei Napa ( New Id Old De Osceoli Pionee Quincy Ridge San Ys Tamar Tamar Tecum:	oldt Steel. rge up Iron Cons ria Mg minion a r abel ack Jr ack seh	40 17 4 8 20 34 5 110	
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COLORADO SPRINGS STOCKS	
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Alamo 031/6 Isabella Anaconda 48 Iowa Argentum Juanita 20 Jack Pot Bankers 094/6 Ieferson Ben Hur. 092/6 Mollie Gibson C K & N 0081/6 Mount Rosa C C & Manltou 02 Pharmacist Creede & C C — Portland C C C Consolidated 03 Peoples Garfield Grosse. 04 Sacramento Golden Fleece 30 Star of the West. Gold & Globe — Union Gold Gold Standard 03/6 Viginia M Insley 300 Work	30 05 08 23 09 70 02 02 02 02 02 05 05

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Andes	24	Hale & Norcross.	1 65
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Bodie	-	Ophir	80
Bullion	10	Overman	
Challenge	26	Potosi	46
Chollar	50	Savage	28
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Alice 25 Little Pittsburg 0	136
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Buckeye 02 Maxfield	
Bull, Beck 3 85 Mercur 8 1	0
Cent. Eureka 20 00 Morgan 1	21/4
Chloride Point 39 Northern Light . 5	0
Dalton 3/80maha 1	5
Daly 95 Ontario 4 0	0
Daly West 3 25 Overland	-
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Eureka Hill Silver King 15 0	0
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Big Three			right Templar	05
Bluebird	0	K	otenay- London	10
Bruce	1	Le	Roi	00
	0	116Li	lly May	18
Caledonia	Con 0	MAM	abel	15
	Acres 1	5 M	ayflower	10
Camp Bir		5 M	onita	18
Celtic On	een 0	5 M	onte Christo	11
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	Aetna	0031/4	Elkton.
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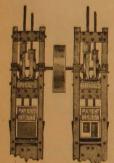
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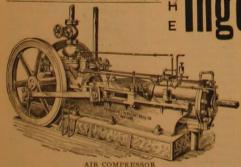
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NAMES OF MINES	LOCATION	No. of Shares	Capital Stock	Par Value	Amount of last Dividend	Date of Last Dividend	Total Amount Paid in Dividends	Kind of Mineral Produced
Aetna Cons	California	100,000	\$ 500,000	\$ 5	\$ 10	Sept 1897	\$ 110 000	Q. S, L, C.
Adams	Colorado	150,000 200,000	1,500,000 5,000,000	10 25	04 35½	October 1895	693,500 3,250,000	S, L, C. G.
Alaska, Treadwell	Alaska	200,000	1,000,000	5	10	Oct., 1897	297,031	G.
Alice	Montana	400,000	10,000,000	25 25	1 25	Oct 1897	1,055,000 3,750,000	G. O.
Angeonda	Montana	1,200,000	30,000,000 600,000	1	01	May 1897 Oct 1897	84,000	G.
Anchoria Leland	Colorado	300 000	3,000,000	10	02	Aug 1897	273,000 740,000	G. S. L
Atlantic	Michigan	40,000 250,000	1,000.000 250,000	25	1 00	Feb. 1897	512,500	S. G. C. S.
Bald Butte	Montana	600,000	600,000	î	01	July 1896	107,510	S. L. C.
Big Six	Colorado	500,000 150,000	500,000	25	3 00%	April 1897 Aug 1897	5,000 6,275,000	G, S. G, C, S.
Boston & MontanaBullion Beck and Champion	Utah	100,000	3,750,000 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	324,000 156,965	S. L.
Dariboo	British Col	50,000	800,000 500,000	1	02 01	May 1897 March 1896	25,000	G. G.
J. O. D Dalumet & Hecla	Michigan	10,000	2,500,000	25	10 00	Oct. 1897	50,850,000	C.
Dentennial Eureka	Utah Missouri	30,000	1,500,000	50 100	1 00	Mar 1897 Oct 1897	2,010,000 16,000	S. L. L.
Central Lead	South Car	10,000	1,000,000	100	1 00	Feb 1897	150,000	
Champion	California	34,000	340,000	10	25 25	Aug 1897	278,200 3,592,800	G. G. S.
Consolidated, California and Virginia Copper Queen Consolidated	Nevada		21,600,000	100	25	March 1895 June 1895	1,910,000	C.
Drescent	Utah	24,000	600,000	25		July 1897	280,000	**********
Daly	Utah		3,000,000 5,000,000	20 25	25 40	Mar 1897	2,925,000 1,320,000	S, L. G.
Deadwood Terra De Lamar	Dakota	400,000	2,000,000	5	25	Jan 1897	2,250,100	S, L.
Della S	Colorado	1,000,000	1,000,000	100	10 50	Jan 1897	60,000	G.
Doe Run Dalton and Lark	Missouri Utah	2,500,000	500,000 2,500,000	100	0016	October 1897 August 1896	87,500	L. S. L.
Elkton Consolidated	Colorado	1,250,000	1,250,000	1	03	Sept 1897	361,960	G, S.
El Paso	Colorado	650,000 500,000	650.000 2,500,000	5	01	Aug 1897	5,393 132,530	G. S. S.
Florence Galena	Utah	100,000	1,000,000	10	05	Jan. 1897	71,000	G, S, L
arfield Grouse	Colorado	1,200,000	1,200,000	1	01	Feb. 1897	24,000 54,000	G.
Reyser-Marion Rolden Eagle	Utah	1,000,000	1,500,000	5	03	Nov 1897 Sep. 1896	10,000	G.
Golden Fleece	Colorado	600,000	600,000	1	01	Feb. 1897	569,179	G. S.
Hold Coin	Colorado	750,000	1,000,000 750,000	5	05 3-10	Ang 1897	150,000 51,625	G,S. G.
Hold and Globe	Montana	30,000	1,500,000	50	50	Feb 1897	2,175,000	8, G, L, C.
Ielena & Frisco	Idaho	500,000	2,500,000	5	04	August 1896	475,000	S, L.
Highland Holy Terror	S. Dakota	100,000 300,000	10,000,000	100	20 03	Oct 1897	3,424,918 18,000	G. G.
Iomestake	Dakota	125,000	12,500,000	100	25	Oct. 1897	6,431,250	G.
Iope	Montana	100,000	1,000,000	10 25	10	Nov 1897	782,252	S. L.
Jorn Silverdaho	Brit. Col	400,000 500,000	10,000,000	1	05	January 1896 Mar 1887	5,080.000 152,000	S, L.
owa,	Colorado	1,000,000	1,000,000	1	001/2	Oct. 1897	65,000	G.
ronMountainsabella	Montana Colorado	500,000 2,250,000	5,000,000 225,000	100	01 0016	Sept 1897	497,500 270,000	S. G.
Cearsarge	Michigan	40,000	1,000,000	25	10	Aug 1897	160,000	C.
ast Chance	Brit, Col	500,000	500,000	5	04	Jan 1897	42,000	S. L. G.
e Roi dinnesota	British Col Minnesota	500,000 165,000	2,500,000 16,500,000	100	1 50	Oct 1897	625,000 3,240,000	I.
Iontana Ore Purchasing	Montana	40,000	1,000,000	25	01	October 1897	640,000	
Ioose	Colorado California	600,000	600,000 240,000	100	8 0016	January 1896 Sept. 1897	186,000 558,600	G.
It. Rosa	Colorado	1,000,000	1,000,000	100	0016	Oct. 1896	30,000	G.
Mercur	Utah	200,000	5,000,000	25	12	Oct 1897	825,000	G.
fammoth	Utah	400,000 600,000	10,000,000	25	051/2	Nov. 1896 Nov 1897	1,150,000 63 000	G, 8, 0. G.
lew Elkhorn	Colorado	300 000	1,500,000	5	24	Sep. 1896	72,000	G
lew York & Hon. Rosario	Central A California	150,000 100.000	1,500 000 700,000	10	10 20	Oct 1897		S, G.
lew Idria Quicksilver	California	100,000	500 000	5	10	Sept 1897	20,000	Q.
Intario	Utah	150,000	15,000,000	100	10	June 1897	13,445,000	S, L.
errot	Michigan Montana	50,000 280,000	1,250,000 2,300,000	25 10	1 00 06	June 1897	2,172,500 1,656,122	C.
ennsylvania Consolidated	California	51,500	5,150,000	10	05	Sept 1897	20,750	
ortland. rincess.	Colorado	3,000,000	3,000,000 1,000,000	1	0112	Oct 1897	1,168,000 45,000	G, S. G.
uincy	Idaho	1,000,000	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	
tecoacramento	Brit. Col	1,000,000	1,000,000 5,000,000	5	00	May 1897 March 1897	187,500 22,000	S, L. G.
mall Hopes Consolidated	Colorado	250,000	5,000,000	20	10	Mar 1896	3,275,000	S.
outh Swanseatandard	Utah	150,000 200,000	150,000 20,000,000	100	05 10	Oct 1897 Sept 1897	59,960 3,757,868	S, L. G, S.
t. Joseph	Missouri	250,000	2,500 000	100	15	Oct 1897	24,000	L.
ilver King	Utah	150 000	8,000,000	.20	25	October 1897	1,237,500	8, L, G.
locan Star	Brit. Col Colorado	2,000,000	1,000,000 5,000,000	100	1.00	Mar 1897 Oct 1896	350,000 150,000	G. S.
wansea	Utah	100,000	500,000	5	05	Oct 1897	61,500	8. L.
om Boyamarack	Colorado	200 000	2,000,000	10	20	March 1896	410,000	G.
	Michigan	1,250,000	1,500,000 1,250,000	15	3 00	June 1897	4,950,000 73,000	C. S.
BIOD	Colorado.				W. W.	The second second second second second	101000	
Inion	Arizona	300,000	3,000,000	10	25	December 1893	562,500	C.
Inited Verde	Utah	300,000 100,000	3,000,000 1,000,000	20	02	December 1893 Feb. 1897	562,500 175,000	C. G, S.
Inited Verde	Utah	300,000 100,000 30,000 200,000	3,000,000			December 1893	562,500 175,000 3,000 765,000	C.

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G, Gold

L' Lead.

C, Copper.

Q, Quicksver.

I, Iron.

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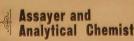
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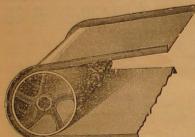
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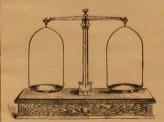
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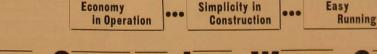
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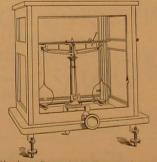
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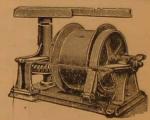
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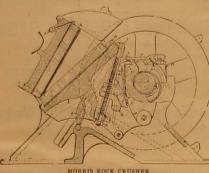
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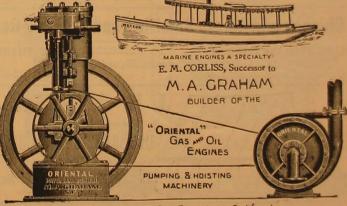


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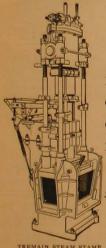


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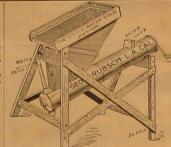
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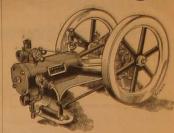
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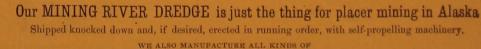
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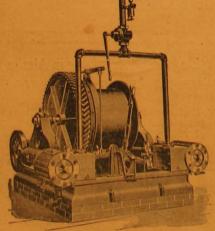
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