

I may use that word.—Because it suits you, therefore you believe in it. If there had been an article quite to the contrary you would not have brought it.

I have not written that article, Mr. Phillip.—No; but you have read it.

Mr. Schmitz-Dumont.

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and
tes. You say you would be very glad to reduce the price, in case the railway tariff is lowered, and thereby lower wages, cost of living, etc.?—Yes.

ce of
units I think it would be of very great value to the Commission to know to what extent you could reduce it. In order to arrive at that, we must have an insight into the working expenses of the manufactory. It is as well to point out that, before we condemn a factory like this, and confiscate £600,000, the Commission must investigate whether there is a future before the factory—to deliver dynamite cheaper in the future. To do this it will be necessary for the Commission to learn something about the working expenses?—Certainly, you can do so. I have not got the data here, but I can get them for you. May I make a remark on Mr. Brakhan's statement about detonators. I have got the figures for 1896. I think I understood Mr. Brakhan to say that if detonators were imported in free trade, the mining industry could save £72,000 per year. I can make out for 1896 the mining industry in the whole republic have drawn the supply of detonators from us, amounting to a sum of £7,368. I do not see, even putting the figures at £10,000 for argument's sake, where the mining industry could save £72,000.

Mr. Brakhan.

Those were figures I compiled, so I will look into the matter.

Mr. Smit.

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opean
:dyna- Since Mr. Vorstman has been to Europe, has any material been ordered or received here?—I left in April, and am only here about a month. Since then there has been only one shipment received.

Who received it?—It has arrived at Port Elizabeth recently, and there is another ship on the way out.

It has not yet been delivered here?—Partly.

Who received it?—It was sent to the factory.

Who received the invoices for the load?—They were addressed to Mr. Vorstman and when he is away the company opens them.

Do they call the directors together to open the letters, or does Mr. Vorstman's representative open them?—The representative.

And that is you?—Yes, I open the letters.

And yet you don't know the price of the stuff?—It did not take my attention.

Chairman.

the In-
l Com-
to the
ite fac- You have failed to put us in possession of several details, and you have invited the Commission to pay a visit to the factory. We will discuss that, and the Commission will reply to the invitation later on. There are some points remaining, in which we must have information, and which we should get from you. This we will take into consideration, to consider which will be the best way in order to get information. I thank you for your evidence.

H. Hall's
ice.
of state- MR. WILLIAM HALL was called. In reply to a question, he said:

I am a civil engineer, residing in San Francisco, California, and have prepared a statement relating more especially to the water supply of the mines, the labour pro-

blem as arisen here, and to the general advancement of the agriculture of this country, as tending to make living cheaper, and mining cheaper. I have nothing to say on the subject of dynamite or railway transportation, for these have been exhaustively dealt with. I must first apologise to the Commission for making this statement in English only, as I did not know what was required. I have put it in the hands of a translator to-day, and will remedy that omission as soon as possible. I suppose the Commission's time is limited, and I will therefore wait, if the Commission desires, and read only the opening and closing paragraphs, and then I will attend the Commission, whenever wanted, for cross-examination.

Chairman.

As you say, the Commission's time is limited. You have handed this in as your sworn declaration, but I will expect your Dutch translation all the same. When the Commission think it necessary for you to come to answer questions the time will be fixed.

Mr. Hall's statement was as follows:—

Gentlemen,—Complying with your invitation to me, addressed under date of the 15th May, I submit this memorandum of my views concerning the condition of the gold mining industry in this State, together with some remarks and suggestions as to the Governmental problem springing therefrom, and which you are to report upon. I approach the subject in the same sympathetic spirit for both Government and industry, which your honourable Chairman, speaking for yourselves, representing the Government, expressed for the industry in his opening statement; and I accept, as my limitation, the declaration of one of your members, made on the same occasion—that you “desired the widest evidence” you “could possibly get with regard to the subject” of your enquiry.

In deference to your requirement of those who have thus far given evidence before you, I first record some facts as to my experience which may entitle my statement to your attention. I occupied for 10 years the office of State Engineer of the State of California, United States of America, and, subsequently, was supervising engineer in the United States Geological Survey for several years, and, in these capacities, was charged with duties relating to mining and agricultural industries over a very wide area of country, and thus have had favourable opportunity for insight upon those economic questions which have sprung out of agricultural and mining developments and railway transport practice in the United States of America.

Mr. Hall
engineering
evidence.

I have no interests whatever in the South African Republic, and do not expect to have. My mission here is absolutely disassociated with all industrial controversy or class grievance. I came under engagement to examine and report upon matters of water supply for deep-level mining of the future, should the industry be permitted to expand. I soon go away, probably not to return, except, it may be, for another equally brief business trip. The professional work I have undertaken has brought squarely before me this question: what is to be the extent of mining on the Rand, for much of which I am asked to plan a water supplying system? And with this has come the correlative question: what population immediately dependent upon mining will have to be provided for in water supply estimates?

Possibility
mining
development
Rand.

As the firms and companies to whom I am to report, control or represent the ownership of about seven-eighths of the deep-level mining ground and half of the outcrop mining area, within the central 15 miles of the Witwatersrand Goldfields, besides much other mining property lying east and west of this focus of mining activity and prospects, it may be seen that I have had to look broadly at the future

possibilities of mining developments. You will hence appreciate the fact that my study has, incidentally, been of some matters which enter into the problem now before yourselves. I propose, later in this paper, giving you some results incidental to this study. The general fact is thus mentioned at the opening of my statement by way of showing, I hope, that though a comparatively recent comer to the Rand, I have been thrown into practical contact with the industrial question of the day, and may thus be qualified, as well by some special local knowledge as by previous experience, to speak earnestly on the subject.

It only remains to be added that I have been entirely free and unhampered, by suggestion even, in my examinations; that my work has been done and judgment formed, without the slightest idea of presenting any of its results or incidental thoughts to your Commission or your Government; and that I now do so, on your invitation, without the knowledge even of those for whom I am professionally engaged, and so far as I know, to the knowledge of several personal friends only.

1 of econ- The problem before you seems to me to be one of national economics, and not one merely of class grievance. Every rapidly advancing country has had frequently, to remodel its fiscal system and administrative laws, not only to meet the requirements of its growing Government, but to satisfy the strenuous demands and imperative necessities of its expanding or languishing industries. The present case in the South African Republic is not exceptional in the mere fact of clamorous demand for reform and abolition of industrial burdens. It is singular only as to the form in which it has appeared, and in that it has become so acute as to cut its way into international politics.

If the local mining industry were in the hands of burghers of the South African Republic, the clamour for relief would be regarded as merely an internal industrial agitation, paralleled by industrial upheavals in other countries, though possibly not equalled by them. In other words, there exists here a great governmental problem outside of any particular complication made by the presence of a more or less troublesome *witlander* population. This problem is primarily a fiscal one—the problem of how to derive a sufficient governmental income, not only without strangling the industries on which it rests, but so as to permit those industries to expand. But, immediately this question is considered, it leads into politics—not partly politics; not *Uitlander vs. Boer* politics, but social politics, in that it is a question of people—of labour.

m of politics: ion. You may expropriate the railways, and operate them at the most reasonable rate which will return a fair interest for a government to receive for the use of a public work; you may throw the dynamite business open to competition and admit the article from the outside world free of duty; you may reduce annual burdens on productive industry by reducing Governmental expenditures in some directions; and you may still further lighten present burdens on industry by raising money for really necessary permanent public works by issue of long term debentures. By the last two steps you may be enabled to very materially reduce Customs tariffs on articles necessary to development of the staple industry, and for the use of those who live upon wages and moderate salaries; and you may do other things which will make living here comfortable, safe and comparatively inexpensive to the burgher, mine worker, and the merchant.

ness of revenue. nsation duction te rev- through 2's re. 1. All these can be done while still providing sufficient revenue for your Government. They will stimulate the gold industry, it will expand, more money will come into the country, a far greater demand for labour will ensue, and then will come the acute stage of the labour problem, which is present in a mild form to-day. If you start on the right principle with that problem now, you will be able to handle it later.

on. If you take the wrong course with it now, it will be very much more difficult to handle then. This problem is altogether aside from any complication as between your Government and any other, or as between your people and any other nationality.

The labour.

There is not only gold in these reefs in immense quantities, which nature put there, but, what is more, there are tens on tens of millions sterling in and on these fields, which men have put there. The problem is to get it out, and it requires a vast army of labour to do so. Where labour abnormally congregates, formidable political questions arise, whether that labour be black or white, free or slave. This is the greater part of the question before you—the labour part. It will bear more discussion than all the rest put together. It is the problem of life on the goldfields, which is the problem of revenue for your Government, and of return of capital invested, and to be invested, here.

Value of reefs:

Nature of problem

The very first result of the existence of your Commission, and following close upon the publication of evidence taken before it, will be the discussion of this problem—your problem—on its merits, all over the civilised world. Those peoples who are interested financially here, will, of course, be most concerned; but, now that the facts have been made authoritatively available, strong thinkers everywhere will take up the topic. The day of outside discussion of Transvaal affairs from the standpoint of prejudice only, if there has been such a day, will now rapidly pass away, and, understandingly, the intelligent world will await the result of the internal handling of the problem you are to report upon.

The crucial question here is one of cost of mining. Capitalisation, too great or too small, has nothing to do with it. The problem is to get the gold out of the ground at the least possible cost. Your Government is more interested in effecting the desired result than any other party concerned. The cheaper mining is made here, the greater may be the Government revenue, from the people engaged in it, without oppressing the industry. Make the cost of mining such that three times the population will be thereby justified on the Rand, and the proper basis for Governmental revenue has immediately been trebled. The Government's dividend, so to speak, comes first, the shareholders afterwards.

Working mines.

Working mines & State re

That it is desirable to stop wild speculation in good shares and wild promotion of bad schemes, is perfectly true; but such wild speculation and promotion have not, and do not, keep, 23s. ores from paying the cost of working them on the Rand, and have not produced the present depression. Disappointment in genuine enterprise is the cause of this trouble, and this disappointment has been brought about by unanticipated burdens now resting on gold production, and by some other causes which have been brought to your notice in statements already before you. A company may have been capitalised for ten times its proper value, but the cost of mining its property, *per se*, is not made a whit greater thereby. Dividends will, of course, be a less per cent. on nominal values, but costs of production are not affected.

Reasons for present depression.

Over-capitalisation.

For the purpose of judgment as to what should be the cost of winning the gold from the reefs of the Rand, the natural conditions and circumstances under which this mining is prosecuted may well be compared with those surrounding and affecting the cost of working auriferous lodes, veins, or ledges in the Rocky Mountains and Pacific Slope States of America. The methods of mining and reducing the blanket ores here are practically the same as those followed in American quartz-mining.

Comparison of working conditions of water-bearing mines, American mines in Rocky Mountains and Pacific Slope States.

Having made such comparisons, from my own personal knowledge I have no hesitation in saying that the conditions—so far as nature has made them—under which the industry is here developing, viewing the Witwatersrand fields as a whole, are decidedly more favourable than those present, and affecting the cost of similar mining, as a general thing, in America.

There are, of course, exceptions; I state this as a predominating, not the unvarying, rule. Not only is gold easier to get out of the ground here, but man should be able to live as cheaply, in as healthful and vigorous a condition, and as contentedly here as in the American mining districts spoken of. The unavoidable conclusion is that this gold should be obtained at less cost, and if it is not so obtained, the reason is to be found in the shortcomings of man, not the obduracy or unkindness of nature. As a matter of fact, it costs from 20 to 25 per cent. more to win the gold of the Witwatersrand reefs than it does to gain that of the quartz lodes of American fields, in cases where circumstances justify direct comparison.

I do not mean to say it is in the power of man to at once bring about such changes here as would reduce the cost of this mining to its legitimate minimum, nor do I imply that any men are yet to blame for the full extent of the difference between the cost as it is and the cost as it might be. But I do mean to say that men alone will be to blame if, within a very few years, this cost is not brought to near its lowest possibility, in the present state of human knowledge. Moreover, the way is clear for very material reducing of costs at once, and very much blame will find its legitimate resting-place, in the judgment of the world, should this initial reduction be not made, and thereafter promptly followed by such other ameliorations as will bring the cost of Rand mining to where it should be.

To make altogether clear, and I hope convincing, that which I have said in a general way above, I ask your attention to several points. On the Rand, as a rule, there is very little water to contend with in mining, and the cost of pumping or otherwise raising water out of the shafts is, by comparison, an insignificant item of the cost of gaining the ores. Data, which have been collected under my direction, for the 15 miles of Central Rand especially, show that, as a rule:—1, The outcrop ground yields an average of about 50,000 gallons per shaft per day—the range of amount being from 10,000 to 90,000 gallons, and there being three or four exceptional cases where the amount runs materially higher; 2, that the first row of deep-levels, as a rule, yields an average of about 45,000 gallons per shaft per day—the range of amount being from 8,000 to 80,000 gallons, and there being two or three cases of very material higher water output; 3, that the second row of deep levels, with one exception, yields from 2,500 to 5,000 gallons per shaft per day only. There is an annual variation in amount of water yield, due to alternation of rainy and dry seasons; and cases where decidedly larger flows, by comparison, exist, are of short life—the amounts soon drop away to parity with other shafts in the range. These amounts of water, leaving aside the few exceptional cases, which in a short time will probably run down to the normal, are all small.

Most of the mine managers and engineers here think that, by comparison with their experience elsewhere, they have no water in their shafts at all, and my own observation confirms this view. In American lode or vein mining the rule is the other way. The pumping plant is almost always a prominent item of initial cost. The volumes of water encountered are seldom insignificant, as here. The cost of operation and maintenance of the pumps is a material and notable item in the cost of gaining the ores.

On the Rand, the "ground" or rock over stopes and drives, as a rule, stands safe without timbering—blocking up with waste rock being found all sufficient to prevent subsidence or dropping masses. In this, also, nature has peculiarly favoured the Witwatersrand miner, and those who are familiar with mine workings in America cannot but be struck by this fact in going underground along the reefs in Johannesburg. For in American lode or vein mining, it frequently happens that the workings

become vast labyrinths of heavy timbers, necessarily used to support the overhead, "creeping" ground, or to prevent rock masses from falling.

As a rule, in American mining for gold, mine timbering is a heavy item of expense. Huge piles of immense logs from 1 to 2½ feet in diameter, and covering an acre or more of land, are collected alongside of mine openings, and are dropped underground for the purpose stated. These logs are frequently hauled on wagons from points half a day's journey away, for the country is often so extremely rugged and precipitous that the cost of railway construction from the mine to the timber belt is prohibitive. The Rand miner is spared this logging and timbering expense, by comparison, almost entirely.

On the Rand the banket ore and the rocks which enclose it, are, as a rule, more easily drilled than the gold bearing quartz veins and their enclosing rocks in American workings. Less labour and less steel should accomplish equal results here. Although the Rand advantage in this respect is doubtless less marked and material than on the points of mine water and timbering, it is an advantage which should tell in costs.

On the Rand there is practically no local heat in the rocks. In a matter of temperature a Rand mine should be, and generally is, an ideal place for underground hard labour, and artificial ventilation is not an item of cost. In American mining underground temperature is not infrequently a consideration not to be overlooked, and artificial ventilation of mines often constitutes a material class of running costs.

Here, then, I have enumerated four points incident to underground mining conditions proper, wherein the Rand miner has material advantage over his *confrère* in America. If we consider conditions not incident to the gold mine itself, we find that the Witwatersrand miner is even yet peculiarly favoured. Within 23 miles of the very centre of Rand mining operations, within five miles of some of its extensive workings—and a practically level country intervening—lie vast beds of fairly good coal, as easily worked as almost any in the world.

This coal is actually so abundant, and so easily won that, under any possible degree of gold mining expansion and consequent coal demand on the Rand, yet ought power here to be cheap—very cheap. I have personally inspected some of these coal beds and mines, and I am familiar with the working of the coalmining industry. The conditions here are such that these gold mines ought to have as cheap fuel as almost any ore mines in the world. For American gold mining, fuel is often brought hundreds of miles by rail, and, over portions, at least, of such distances, climbing heavy gradients and rounding obstructive curvatures of track alignment. Or, in other cases, hoisting, milling, pumping and other machinery is driven by the burning of wood as steam-making fuel, and this wood is hauled by wagons over steep and rough mountain roads, from points further from the mines than the coal output is from the centre of the gold industry on the Johannesburg Rand.

As in the case of mine timber hauling, the cost of railway construction to meet this fuel transport demand is often prohibitive in America, so that hauling has often to be done by wagon. There are, of course, exceptions to the rule I have stated for American workings. Some few mines are fairly well situated with respect to fuel supply, but no gold mines are nearly so well favoured as those of this Johannesburg range. Some American mines, too, are operated with power derived from water pressure, obtained at more or less, but often immense, outlay of capital in bringing water, by means of canals, ditches or pipes, to advantageous points for the mine supply; and operative power is delivered at still other mines by electric currents conducted from points where cheap water power generates it. But, as a general thing, American ore mining is prosecuted by the use of power generated as steam on the spot of application, and by consumption of fuel brought from afar.

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In this respect the American cases would be paralleled on the Rand if the coal had to be brought from over the Drakensberg Range in Natal, from some point in Portuguese territory, or even from Rhodesia, were there rail communication from Buluwayo to this point.

and. Again, the climate on the Rand is an ideal one for mining industry—never very
of cold nor excessively hot, and free from snowfall. There are very material items of cost
from which the Rand miner is exempt, but which the American miner is obliged to
Am- meet. There are no heavy snows to shovel off from about the Rand surface works;
old there are such snows about many American mine openings, and for several months in
some years. The Rand miner does not have to lay in a great stock of fuel for winter
use; he can get it as well one time as another throughout the year; but the American
miner not infrequently has to lay in a four or five months' fuel stock, and sometimes
he has to house it to make it available for handling under heavy snows.

The mine worker on the Rand does not have to burn much fuel to warm his home in winter. With the American mine workman this fuel item is often a very material element of living expense. This Rand climate is at times invigorating without being rigorous is at other times relaxing without being enervating, and is always favourable to vigorous exertion.

Men should live here as healthfully as in almost any American mining region, and decidedly more so than in many of them. There is typhoid fever here for nearly half the year, but that is man's fault, not nature's, and is almost wholly preventible by man. There is pneumonia here for much of the other half year, but that also is largely man's fault, and is in no small degree preventible.

Proper sanitation in matters of sewerage, water supply, and municipal and premises cleanliness, and proper supply of water in, and health regulation about, the mines, will prevent typhoid fever; and, with such street and road improvement and maintenance as would keep down the poisonous, irritating dusts of winter, that class of colds which result in pneumonia here would be much less frequent. At its worst, though, pneumonia is not as prevalent here as it is every winter in the famed Cripple-Creek mining region of America, or as it has been, and is, at Bodie and other districts of that country; and there it is due to the extreme cutting cold, which man cannot ameliorate.

labour While the white man should be able to live here in health and vigour, and be an efficient worker, on a wage comparable to that which he receives for a like service elsewhere, nature has provided in adjacent parts of South Africa a vast and reserved labour crop in the native negro population. If more highly civilised man does not reap on the goldfields a full benefit from this provision of nature, while at the same time benefiting the kaffir, it is the white man's fault. American mining enterprise has the benefit of no such bountiful labour supply, which, by all rules of reason, should be cheap, and in the exercise of good judgment, should be made efficient as well.

advan- I have now called your attention to four marked advantages—the small amount
of Rand. of ground water, freedom from heavy timbering costs, tractability of ores, and freedom from oppressive ground heat—which the mining field itself affords here; and I have also presented three points wherein nature seemingly has intended to favour mining industry on the Rand—namely, an abundant fuel supply close at hand, an abundant labour supply at no great distance, and a good working climate.

are. There is one other point worthy of note in this connection. The climate and soil of the Transvaal are favourable to agriculture, and the cost of living ought to be, most, moderate on the Witwatersrand fields to those who are content to live, or by their earnings do live, on ordinary plain food, such as the country should produce.

By comparison with the American miner, the Witwatersrand worker should be able to live as well and as cheaply, and would be able to do so, were the agricultural resources of this country brought to the stage of development they might be. I know there are peculiar drawbacks here, and special ones recently or at the present time—locusts and the rinderpest. But the American pioneer agriculturist has had, and has, scourges to contend with also, and very often in the neighbourhood of mining regions he has not nearly such favourable conditions to work under as the Transvaal presents.

Cost of living
miners in
Africa as
the Witw
rand.

The development of the Transvaal goldfields can never reach the stage which in all human reason it should reach, until the agriculture of the Transvaal is measurably advanced beyond where it is to-day. I do not say this lightly or with intent to disparage the farmers or people of the Transvaal, and certainly not with the intent to belittle the praiseworthy result which they have brought about in making a civilised country out of a most savage and barbarous one within the span of one generation's life. But it is a material point in the economic problem which the present condition of the mining industry has brought to your doors—that the cost of mining is largely what the cost of living makes it, and the cost of living is in the greatest degree dependent upon local agricultural production.

The mining
industry at
agriculture

The miner has brought into your country the most perfect mining machinery and appliances, the most refined methods of work, and some of the best trained and experienced experts on earth, and he has by these means brought his industry from the crudest to the most advanced stage, within little more than half a decade. Has the local agriculturist kept pace with him? For, mark you, they must go abreast for the best results.

If it were not for the exceptional perfection of mining and reduction machinery and plant, if it were not for perfection of method and process, in the present state of human knowledge which have been brought to your doors, and if it were not that many of the best men in various departments of mining work have been called from other countries to the advantage of the Witwatersrand, there would not be a dozen working mines upon it to-day, and there would be no prospect of increase in the number.

By these means has the miner attained a certain success, which has made a market for the produce of the farmer. Has the farmer, meanwhile, brought his methods to a comparable degree of perfection, enabling him to supply the miner at the lowest profitable price, so that he may make still other mines pay for their joint benefit and the advancement of the country?

I am professionally and practically familiar with the agricultural resources and workings of vast American regions adjacent to or supplying mining districts. I have looked into this matter in the Transvaal, and I regret to say that for myself I answer the last above query in the negative.

Agriculture.

The Transvaal agriculture is crude, its methods are wasteful, the farming results are poor, and the market price of produce is excessively high. How is it possible, under such conditions, to bring the cost of mining on the Rand down to what it should be? The point is a vital one in the economic problem before you, if it is to be treated other than in the most superficial manner. At least, it should be considered, when a bill is made by those representing the farmer on the miner, to still more perfect his methods, to yet further improve his machinery and to cut down the salaries of those who have virtually made these mines and the past prosperity, or else, as an alternative, not ask for relief from your Government.

It is no purpose of mine to invidiously reflect on the farmers of the Transvaal. I should have no possible object in so doing; and to criticise them unjustly or un-

necessarily would be repugnant to me. I have found much to admire in them. But this is a case wherein the truth should be pressed home to the minds of all.

ing in- and ag- ure. You cannot have the best development of the mining industry here in the midst of a woefully backward agricultural development, except you make such free and open communication with, and cheap transport from, the outside world as will enable it to supply the wants of these mining people almost as cheaply as they could be supplied by home-raised produce under good agricultural practice.

of griev- on Rand. You cannot expect the mining industry to pluck the mote out of its industrial eye until your farming population removes some, at least, of the beam in its industrial eye, except your Government, representing your people, come to the rescue. It is just this state of things which has made the trouble on the Rand. The deficiencies caused by these conditions, under the circumstances, it is the province of the Government to fill. It is for this reason there are and have been "grievances" here; and it is for the same reason that they will continue until very substantial relief is granted, and the cost of living is brought to a reasonable figure.

ing in- and the nment. Conditions are such here that the mining industry cannot work out its own salvation; and, just as it would be asking too much of the Transvaal farmers to immediately change their methods, as a whole, and at once step into the first rank of agricultural economists—bringing living expenses down to old country rates—so is it asking too much of the mining industry to try to go materially further in reducing its running costs until it has had such relief as the Government, representing the exceedingly backward agricultural industry, can grant.

living an to wages. The cost of living must ever be a fair index of the wage to be paid, in order that the workman remain contented in whatever capacity he may be serving. Those who labour only with their hands receive but small margins over living rates, while those who have some specially valuable professional or managerial ability demand and get wide margins. Nevertheless, living expense is an index to the wage or salary in each grade of service, separately, for each locality.

ative of living miners, officials, engineers, on Rand, California. Being familiar with wage rates and salaries and the cost of living in some of the mining regions and towns and cities of the Pacific Slope States of America, I have enquired into the subject here, with this result (I give you comparisons in percentages, and not actual rates, because I can thus more briefly convey the lesson which the figures would show):—

The ordinary miner, single, and living at a boarding house, pays 13 to 17 per cent more here for his board and bunk and other necessities of life than at California mining towns. If he is married and attempts to keep house, his expenses will be 22 to 27 per cent greater here to support himself and family than in Californian mining districts. In the case of the mechanic, receiving better wages and desiring better food and accommodation generally, I place the differences at 18 to 25 per cent. if single, and 28 to 32 per cent. if married.

And so on, as we mount the scale of wage and salary earners, the cost of living here, as compared to California mining towns and cities, increases alarmingly, until when we reach the highest paid consulting engineers, general managers, and managing directors, I am satisfied that it costs them from 150 to 200 per cent.—from two to three times as much as it would cost to live in the same style in the city of San Francisco, California.

Take a few items of which I know. House rents are from two to four times greater here than in San Francisco, or in any mining district in California. Water costs four to 10 times as much as in San Francisco and Californian mining regions. I have compared the rates per volume supplied, and also a number of monthly water bills here, with my knowledge of what similar service would be rendered for in

San Francisco, or in any mining region in California, where there is an independent company (selling water). To keep a stable of two to six horses, costs three to four times as much in Johannesburg as in San Francisco, or as it would in any mining district in California.

I might enumerate other items of expense which make drafts on the salary and wage-earner's purse—all showing costs ranging at 50 to 200 per cent. higher here than in American mining districts and neighbouring cities, but the above are enough to illustrate the point I seek to make.

The following table shows in a general way the result of my enquiry. The figures do not, of course, purport to accurately represent the facts, but I venture to say that if a detailed enquiry were made on the subject its results would not much differ from my illustration.

TABLE SHOWING APPROXIMATELY, THE PERCENTAGES OF HIGHER COST OF LIVING ON THE RAND AS COMPARED TO LIVING COSTS IN PACIFIC COAST MINING DISTRICTS AND CITIES:—

AMERICA.

Class of Employment, graded from Least to Greatest Pay.	Percentage of Excess of Cost of Living on the Rand over Costs in American Mining Camps and Cities.		Percentage excess of of living Rand cost of li in Amer mining ca and cities
	Single Man.	Man with Family.	
Miner	13 to 17	22 to 27	
Mechanic	18 " 23	28 " 32	
Foreman	25 " 30	35 " 40	
Captain	30 " 35	45 " 50	
Clerks	40 " 45	55 " 60	
Surveyor	—	60 " 70	
Accountants	—	80 " 90	
Managers and engineers	—	100 " 120	
General managers and consulting engineers	—	150 " 200	

Two points are prominently apparent from this tabulation:—(1) The comparative excess in cost of living on the Rand falls more heavily on the employees of the higher grades than in the lower grades; (2) The percentage of excess is far greater for married men with families attempting to keep house, than for single men living at boarding houses in rooms.

I submit that this exhibit strikingly illustrates the reason for the point made by Mr. Goldman in evidence before you, as to the remarkably small proportionate part of the white employees on the Rand who are married, and the still more remarkably small number who have their wives and families here with them.

But, if the results of my enquiry are near the truth, the above exhibit illustrates another point, namely, a greater proportion of the highly-paid employees having families resident here with them, than of those of lower pay. Those of higher pay, as a rule, unless their salaries are proportionately very much in advance of those of lower grades, are the greatest sufferers financially by the burdens of Transvaal living costs. I think this I believe to be the case.

I turn to the rates of pay for the employees of various grades on the Rand, as put in evidence by several witnesses—commencing with the cheapest white miner at £14 per month, and advancing through the roll to mine managers at £1,500 to £3,000 per annum—and I find that, whereas the wages of the lowest grades of white mine employees are 15 to 30 per cent. higher here than in the older and more settled mine regions in Western America, the employees of highest grades, up to the managers and engineers,

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receive salaries not more than the same 15 to 30 per cent. higher than they would command in the same American mine centres for like services.

If we compare these latter percentages, as to wages and salaries, with those of the illustration just given you, as to relative cost of living, and remember the rule—that cost of living must be an index of the wage—we find that it is not the higher paid white employees on the Rand who are reaping the harvest, if one is being garnered at present rates. I take up the more direct application of the foregoing to the problem which you have in hand.

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You have in evidence, so far as I have observed, the cost of mining and reduction of ores on the Rand, varying from about 24s. to about 29s. per ton milled. I have collected some data, which show a higher range, namely, up to 32s. per ton; and the result of my enquiry is rather to the point that there is more ore mined and reduced on the Rand at costs over 29s., than under that figure. Next, it appears that the proportionate part due to white labour, of the total cost, ranges from 28 to 35 per cent. And, again, I assume, upon the basis of my own enquiry and comparisons, that the average cost of living of all white mine employees is 25 to 35 per cent. greater here than in the American mining countries spoken of.

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If, upon these rates and ratios, we estimate how far wages might, without affecting the employees' profits, be cut down, and how much cost of production would thus be lowered, if the cost of living here were reduced to the American standard, and the wages proportionately lowered, we would have a result somewhat as follows:—Cost of mining and reduction, 24s. to 32s.; part due to labour, say 32 per cent., 7-68-10-24; part due to excess cost of living; if rates here are 35 per cent. higher, 2-69-3-58s.; if rates here are 30 per cent. higher, 2-30-3-07s.; if rates here are 25 per cent. higher, 1-92-2-56s. From this it appears that the difference in cost of living here, as compared to American mining regions, may account for between, say 2s. as a minimum, and 3-58s. as a maximum; that is, if cost of living for the white man were reduced here to what might be considered a reasonable basis, all wages and salaries could be cut, without diminishing the workers' profits, so as to reduce the cost of producing the gold from 2 to 3-58s.

This reasoning is based, you will observe, upon the assumption that the cost of living, at the mean of the wage scale, is a correct index of the fair average wage rate.

If, now, we consider the application of this conclusion to the present wage rate, we have an interesting result, and that is, that the higher cost of white labour of all kinds, engaged in mining and for the mining companies, is accounted for, or somewhat more than accounted for, by the difference in the cost of the necessaries, and the amounts of expenditure, of life.

nus system.

And, now, I come to a matter as to which I speak with confidence, because of my personal experience in the management of labour, both skilled and unskilled, and my wide opportunity to observe and hear the results of different systems of handling labour. This is the bonus system of rewarding extra exertion on the part of mine workers. There appears to be here a leaning towards an opinion that the system is unfair and extravagant. I desire to testify, not only to its equability and economy, but to its wisdom for other reasons, and to illustrate my testimony by some facts I have collected here, and by results of experience elsewhere. At the outset I desire to explain that I use the words "bonus system" as expressive of all forms of extra payment, whereunder a premium is set upon extra exertion, as evidenced by exceeding results over the normal, due to simple day-wage results. In this category would be included the graded-rate contract system, as well as the bonus system proper.

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The higher grade American contractors on heavy engineering construction, as well as managers of great manufacturing works, have long recognised the justice

the underlying principle and the value to them of its application in management of their labour forces. Special rewards, extra pay, advances of rates of pay, made voluntarily to those men who prove specially active on arduous and dangerous duty, led to the more orderly bonus system, which is quite common in some branches of engineering construction, and in great iron and steel working establishments, to my own personal knowledge. Certainly, high-grade contractors and managers whose work is systematised, and the costs and relative costs known to a penny, would not adopt a system which did not pay them. If it would pay a contractor to follow that system in driving great tunnels, as I know from experience it does, it would pay him to adopt it in sinking a shaft. And if it would pay him to adopt it in shaft work, it should equally pay a mining company to do the same. That it does pay here you have had illustrated to you in the testimony of Mr. Catlin.

I endeavour to give some further illustration of its advantages, not alone on account of the direct benefits to be derived from the working of the system itself, but because there are very important correlative benefits which have not been brought to your notice, and because it embodies a principle whose application is indispensable to the solving of your entire labour problem—the great problem for the Rand and for the South African Republic.

The mining industry has appealed to Government for relief of burdens. Representatives of Government say that there is a desire on the part of Government to foster the industry: It only wants to see its way clear to that end. And they ask what the industry proposes to do to help itself. Members of the industry's staff point out that one way is to extend the bonus system. Whereupon, there are those in prominent positions who imply or say, that the system, so far from being economical, is extravagant. To entertain this latter assertion, to adopt its idea, would be a fatal mistake for your Commission to fall into, for the reason above given.

I therefore ask your indulgence to present the matter somewhat more fully than Mr. Catlin could do, owing to his being on the eve of going away on vacation, when he appeared before you. First: Completing Mr. Catlin's figures as to the Catlin shaft. Passing over the first two or three months, when the work was not yet running regularly, there came two months, whose average rate was 60 feet per month, at a cost of £21 15s. 8d. per foot. Then the next five months, during which work was regular, the mean monthly progress was 128·3 feet, at an average cost of £19 5s. 6d. per foot. Now, it is well-known that such shafts had never before been sunk by the ungraded day-wage system, at a faster rate than 80 feet per month, or a lower cost than about £24 per foot. The far better result attained in the Catlin shaft—running the cost down in one month as low as £18 6s. and, in another month, the rate of speed up to 142 feet—is due to the incentive of the premium on extra production. It does seem that there can be no disputing the lesson taught by such figures.

I ask your attention to a business simile pointing this lesson. If a mercantile house makes a shipment of goods over a long voyage route, its manager considers not only cost, interest, insurance, meeting of demand, and profit. A question with him is whether he will order shipment by sailing vessel or by steamship, which will take less than half the time, but whose freight rates are greater. The world's experience shows that it pays the merchant to employ the quicker mode of transit at the higher freighting cost. The story is told by figures of the capital account in his books. An exactly similar story, only with far more favourable results, would be told of the capital account of a mining company engaged in sinking or developing work, if the books kept so that the point might be brought out, and if the bonus system were operated as the fast-rate steamship line against the one-grade-wage

system representing the comparatively slow line of sailing packets. Sinking a deep-level shaft is, in this way, an exact counterpart of freighting over a long voyage. I attempt to illustrate upon a basis of the experience on the Rand.

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The Simmer and Jack East Company has a working capital of £186,000 subscribed for the purpose of putting down to the reefs three shafts, with probable depths estimated at 2,400, 2,500, and 2,700 ft. As these are nearly the same, we may say that £62,000, one-third of the above total working capital for them, may be charged against each in capital account, and against that amount interest at, we will say, 6 per cent. should be charged in such account. If, now, the shafts are put down at the rate of 60 ft. per month, it will take 40, 41 $\frac{2}{3}$, and 45 months respectively to sink them, and the amounts of interest which the capital account will show against the cost for each will be £12,400, £12,916, and £13,950 respectively. Adding these amounts to the principal in each case, the shafts will have cost the shareholders who put up their money originally and waited for return, £74,400, £74,916, and £75,950 respectively. But if the shafts are driven at double the rate of speed (120 ft. per month) the work would be accomplished in half the time, and half the above amounts of interest would be saved to the shareholders, because the mine could be brought into paying condition with the saving of that amount of time to which that amount of interest on shaft working capital would be due.

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In the above instance the saving to the Simmer and Jack East capital account and to shareholders, would amount to £19,633—a very handsome amount, you must admit, to be saved by good management. That this is an actual saving, every business man who keeps a capital account, will testify. And, be it remembered, it is entirely aside from the saving in actual cost of the shafts themselves, due to the lower rate of cost per foot attained, with the higher rate of speed in driving. The high speed bonus system is thus seen to operate both ways.

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I next note what the total saving might be by it in the above illustrative case. Sunk by day labour, unencouraged, and at the rate Mr. Catlin found it cost to sink similar shafts in the same neighbourhood—say, £24 per foot—the 7,600 feet aggregate footage in depth of these three shafts, would cost £182,400—a small margin only, less than the working capital £186,000, provided for them. Sunk under the bonus system at, say, £20 per foot (which is nearly 10s. more than Mr. Catlin's rate under it) the cost would be £152,000. The direct saving in money would be £30,400; which with the saving of £19,633 to the Company's capital account and to shareholders, makes £60,033, which amount is nearly 40 per cent. on the actual cost of the shafts, or 33 per cent. of the working capital provided for them.

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But this is not all; there would be a saving of 20 to 22 $\frac{1}{2}$ months' time; and the time in the full development of the enterprise is worth money to the shareholders in other ways than in saving interest on the working capital provided for the shafts. For instance, to shareholders who hold their shares, say, for the 20 to 22 $\frac{1}{2}$ months as the mine commences to produce, the saving of that length of time in the shaft sinking is worth their *pro rata* of all the net product in that time.

It may be said that I have calculated interest on a capital which is greater than required for the shafts. And so it would, in such a case, prove to be, but the estimate of capital required for the shafts was based on previous experience and rates for work here. That it is possible to do the work for a less sum, and thereby save, not only interest on the whole sum for a very material length of time, but also a good part of the capital itself, is due to the operation of the bonus system. For construction is uncertain in incidental difficulties as shaft sinking, a liberal margin of capital must be provided in the estimates.

shaft sink-

The above case is a hypothetical one, and no deep-level shaft has been complete

sunk at as great an average rate of speed as 120 feet per month, with as low an average cost as £20 per foot. But experience thus far warrants my using these figures for the purpose of illustrating a principle. Mr. Catlin's best speed was even much higher, 142 feet per month; his average for five months was 128.3 feet, at a mean cost of £19 5s. 6d., as we have seen. The actual costs of, and rates in, the Simmer and Jack East shafts themselves show figures ranging from different groups of months, as follows:—

Shaft Depth.	Mean depths of two months each.		Total times at rates. Months.	Total costs at rates.	Total interest on costs.	Cost of, as of spe sinking mer an shafts.
	Feet.	Costs.				
2,400	90	£23 14 2	26½	£56,900	£7,681	
2,400	112	20 9 3	22	49,120	5,403	
2,500	82	23 13 2	30	59,146	8,872	
2,500	98	22 4 1	26	55,510	7,216	
2,700	62	28 1 0	43	75,735	16,288	
2,700	84	25 3 8	32	67,994	10,878	

The figures which I use in this statement were made up by the resident secretary of the company, Mr. Roberts, and have been furnished to me by Mr. Webb, consulting engineer to the company, arranged at my suggestion, so as to illustrate the point I make, namely, that with increased speed comes decreased cost per foot, decreased time necessary to sink the shaft, decreased cost of the work as a whole, and, of course, proportionately less interest to be charged in the capital account. Examination of each couplet—one for each of the three shafts, separately—tells the story. The cases are fairly selected. The incentive of the bonus produced the favourable result in every case.

I beg to submit another illustration of the economy to be attained by rapid sinking of deep-level shafts. The nominal capital of the Simmer and Jack Proprietary Mines, Limited, is £5,000,000. The shares have actually been taken by the public and the vendors at rates up to £7 10s., but to be entirely conservative, I adopt the nominal rate of £5, which produces the capitalisation above quoted. Now, the shareholders are waiting for returns on their investments; the outcrop part of the property is being worked, and paying, but three deep-level shafts are being sunk, upon the completion of which the opening of fully one-third of the property necessarily depends. When these are producing ore, it is expected that the monthly returns will be doubled. These shafts, to open one-third of the producing area of the property, properly represent one-third of the company's capital, or £1,666,667, which, running at 6 per cent. per year (not a high rate for mining capital), properly has charged against it £100,000 interest per year in the capital accounts of those who hold the shares. This is at the rate of £8,333 per month.

If the three shafts are driven at the rate of 80 feet per month each, the maximum interest consumed without bonus rewards (or 240 feet total), the interest being consumed is £38. If they were driven at an average of 110 feet each month (a rate which it is believed could be maintained over considerable periods, or until some untoward circumstance, such as a temporary inburst of water, should happen), the total footage per month would be 330 feet, and the interest running would be, say, £25 per foot. This more rapid rate of driving, hence, would save to the shareholders, in interest on their investments, £13 per foot of shaft, which is materially more than 50 per cent. of the cost of the work thus far done on these particular shafts, and is over 60 per cent. of the least interest per foot attained in them.

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This is a conservative example, which may well find its counterpart in practice if matters in future run smoothly, and the bonus system is operated to best advantage. The data for this illustration were furnished me through Mr. Webb, consulting engineer to the company, by Mr. Watson, manager, who has made some even stronger deductions in the same line of argument, showing economy and advantage of the bonus system in shaft-sinking. I submit these figures as illustrating, locally, the advantages of a system, which I have proven in the construction of canals and driving of tunnels in other countries.

I now ask your attention to a point as to actual comparative costs. You may be told that some shaft or shafts, wherein labour was paid by the day, without the extra incentive of a bonus, have been put down at less rates per foot than those where the bonus system was adopted. Having enquired into this matter, I suggest that, before you hesitate to fully appreciate and accept the advantages of the bonus system and its underlying principle, you make enquiry: First—As to the comparative size and character of the shaft or shafts alleged to have been put down more cheaply; Second—As to the nature of the material through which sunk; Third—As to whether it was not an incline shaft sunk on a mine already operative, and from which drifts or levels were at the same time being driven either way on the reef.

You will see immediately that in the case of a company sinking deep-level shafts only, all the hoisting expense on surface work, and all the office, management, professional and other costs, have to be charged proportionately against each foot of shaft sunk. There is no other work being done to charge part of them to. But in the case of a shaft being dropped down the reef on an operative mine, all this is quite different. In the first place, there is charged to that shaft, or incline, only its proportionate part of all the general expense of the mine—the mine office, the Johannesburg office, and London office expense, the management, professional service; and such items as in their entirety went against the shaft or shafts alone in the deep-level instance, are in the operative outcrop mine instance, divided and charged against a number of faces being driven in developing the mine, and against the stoping for ore output through other inclines. Then, again, as soon as drives commence to be made from the new incline, the general expenses and hoisting costs are again distributed against the footage made on all these faces for each month.

Thus, I think you will find, on careful and complete enquiry, that there are many cases where nearly as cheap work has been done in shaft-sinking by day labour without the incentive of a bonus, as has been done under influence of rewards for extra exertion.

And now we have seen that the bonus system operates greatly to the shareholders' benefit, what are the objections to it? That it enables common miners to make very much higher wages than miners usually do or should; and that it has again may again enable a common miner to draw from a company as much money in a month as high-grade professional men can earn in like time. This is alleged to be a extravagant waste of company money. In the face of the facts and deductions which have been shown you, this ground of objection is untenable.

The primary conclusion from the facts must be that the company saves money and the shareholders make money under the operation of the bonus system. Notwithstanding the miner receives a higher wage, taking time and work done into consideration, the bonus system is the cheapest. Even if the cost per foot, or other unit of work, were as much under the bonus system as by the day wage, yet it would save the time and the interest and the mine profit due to the time, which are very handsome considerations for the shareholder.

But beyond this, even, there is the benefit to the entire force on a property, which reward of merit on fair competition among members of that force produces; and the bonus system, properly applied, is not only a money maker to the shareholder, but a reward of merit to the miner. Where labour is graded in classes by mere naming of trade, and all individuals in each class or trade are paid alike a standard wage for that class—as all carpenters, all miners, the same for each in each calling—there is absolutely no reward for industry, extra intelligence, or special skill.

It is nonsense to say: "If a man does not come up to the mark, discharge him." What mark is meant? Men in all callings are graded, as to result they will produce, from very bad, bad, indifferent, fairly good, good, better, best, and extra. What is the standard? The mediocre? That would be an injustice to all above, and when so graded in reward, the best men drop to that plane, while those below, being paid as much as any, have no incentive to do better than their ordinary inefficient doing.

The true way, therefore, is to grade men on the pay-roll according to their deserts—their industry, good faith, and skill. This makes active-brained, industrious men of them, and none but the stupid dolts or the incorrigible loafers will fail to be benefited by recognition of special merit in some members of their class. The result is the greater amount and better quality of work all round. If some men are chosen by reason of their ability or push, and are given a job where they may win a very substantial bonus, all the fairly good men in that force will strive to merit the same favour at the hands of the manager.

Moreover—and this is a point which I desire to bring specially to your attention—the principle of this bonus system is that which goes by the common name in America, and probably elsewhere, of "Let the best man win." That is the principle underlying the republican form of Government. It works as well in industrial matters as in national affairs, and no republic can long stand which resolutely turns its back upon it, either as applied to national affairs or to industrial affairs within its borders.

Principle of bonus system republican principle.

The very reverse of this principle is that which dictates the grading of men's wages simply by trade. One trade, one wage, results in classifications of men which breed discontent and uprisings, such as monarchical forms of Government can best cope with. The principle of this grading is an autocratic one, not a republican one.

I respectfully submit that, whatever action this Government takes with relation to mine labour matters, it should do so with the idea of encouraging application of this principle of "Let the best man win."

Nor should this idea stop with the handling of the white labour problem. It should be carried into the management of kaffirs as well. There should be some system of grading according to skill or proficiency, or some system of bonus reward for amount of work done, and with this should go some gradation of pay due to length of service in one employ. The boy coming anew to a mine should not be permitted, no matter what his skill, to take pay equal to those of the same grade who had been working on the property for, say, three months or six months.

Principle of bonus system applicable in mines in white labour.

If this idea could be carried out—if the good boys knew that, on deserting from the mine they could not under three or six months get an equal wage on another—they would not desert. It may be said that this is human nature, but is not kaffir nature. I simply submit that the kaffir is working for money, and it would not take long to become altogether "human" in this point if it were faithfully enforced. And this, in my opinion, is the key to the kaffir labour problem on these mines. It is said that the kaffir is by nature a child, and must be treated as such. Well, there are vast families of these children here, and they have as many fathers and mothers looking out for them as there are mine managements. Each such pair of parents

Native labour.

spoils these children for all the other fathers and mothers, by taking the wayward runaways into their mine families on application, on an equal footing to that held in the family they left. If the deserting boys could not get into other mine families without sacrifice of standing, they would not desert.

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ments In short, the mine managements must work together in this matter. For that purpose they must be organised as one institution, and every mine management must be in it. This could only be effected under a law of the Republic. The details of the law should be presented by the representative Chambers of Mines. The operation of it should be wholly in the hands of the organisation created by it, under general supervision—not absolute dictation—of the Government. By some such means only, can I see the way at all clear to handle the kaffir labour problem of the future of the Rand.

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is, For purposes of my water supply study here I have, with several consulting engineers of the large mining managements, made a study in detail of the possible extent to which mining may be developed on the Rand, should the industry be relieved of undue burdens, and be permitted to expand under entirely favourable conditions. The general result is that within the fifteen miles of the Central Rand somewhat over 6,000 stamps could advantageously be supplied with ore and brought into operation.

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Rand. This estimate takes into consideration the development of the two tiers of deep-levels, an increase of stamps on some outcrop properties, as well as the entire working out of other outcrop properties. There are now within this fifteen miles of territory 2,550 stamps, of which 2,330 are believed to be working. The study has been very carefully entered into for this central part of the Rand, and an approximation has been made for the extension west to and including Randfontein, and east to and including Modderfontein.

popula-
central I conclude that the population directly dependent on mine work, and almost wholly living on or closely adjacent to mine properties, for operating, not construction work, might be expected to reach, under the most favourable conditions, for the fifteen miles of Central Road, 12,000 whites and 100,000 kaffirs, and as many more for the two extensions combined. On top of these figures would go the general mercantile and business population, and some labour yet employed on surface constructions, though most of this latter would, by time of full stamp development, have been finished.

Aside from the city of Johannesburg, under these most favourable conditions, there is a possibility for employing, therefore, say 30,000 whites and 250,000 blacks on the Rand. It is not, for purposes of my point, necessary to assume the full figures. We might accept 25,000 whites and 200,000 blacks outside of the city population as a not unreasonable probability if very substantial reliefs are granted; and this, within 10 years: always provided that the black population can be made to come, stay and work faithfully at the lower wage necessary for development of this state of things. Besides all this population, there would be the city.

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ed. If the present system of administering Government affairs should be kept up, it would then take a very large proportion of able-bodied burghers of the Republic simply to administer the laws. This could not be, and at the same time establish a revenue system which would relieve the mining industry and permit the development contemplated. The expense of administration would advance proportionately to the development, and that would at once arrest all progress. Moreover, the advanced agriculture necessary to advance the mining industry, could not itself be accomplished were the burghers nearly all occupied in public service.

The conclusions are unavoidable—(1) the burgher population must increase, proportionately, even more rapidly than the mining population; (2) the administration of laws on the Rand must be greatly changed; or (3) there can be no very great advance, no matter what reliefs be granted in the way of cheaper dynamite and cheaper transportation, and grievances will continue to exist.

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The administration of kaffir labour, and of all mine labour matters at the very least, will have to be left to the mine managements under some Government law, which would make all of them come in and stay in it for their own good and that of the country. The anomalous condition of 50,000 to 70,000 white people and 250,000 blacks, including city populations, massed in a limited area, and wholly governed and kept in order, even as to local matters, by guards and administrative officers drawn from a sparse agricultural population, cannot be made to work. It would be in every way unnatural and repugnant as a condition within a republic.

I refer to this merely as a labour question; not a political one outside of that immediate connection. It is facing this inevitable condition, gradually growing more acute,—no matter how good-natured and well-disposed all the people, burghers, *witlanders*, and kaffirs may be—which presents the real problem of your country to-day, a problem which will come up for solution as a fiscal one—one of revenue. It need not come up in any other form to force you to solve it effectually, and you cannot possibly do so without the close co-operation in public affairs of those who are *witlanders* to your land, but producers of its wealth.

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The problem can only be solved by making the *witlander* feel at home here, as a *bona fide* resident, under, and participant in Government, at least of some sort, local or district. As to the kaffir, he cannot be made to become a progressive and efficient miner and reliable employee under the unnatural condition in which he is now held. That he should have at least a temporary home within no great distance of the mine centre, to which he could inexpensively retire after his engagements on mine service are over, and with the view of returning to mine work, seems to me to be absolutely essential to the end in view; or else he must be carried by rail, at a merely nominal rate, practically, to and from the country of his home. As I have tried to impress upon you, your problem is a very serious one, altogether aside from the political and *witlander* grievance form, in which it has heretofore come up. This mining, for reasons which already appear in evidence before you, is to be ranked in matters of Governmental economy, with the staple industries in other countries.

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It has been said in evidence that there is no competition in gold mining. This is true in a sense; but not true as applied to the gold mining of the Transvaal at the present time. It is yet a question of capitalisation for the deep-level mines and those others not already advanced to near the paying stage, and the Transvaal fields, in the money markets of the world, must compete for that capital as against other regions, for speculative venture. Moreover, there is and must be competition among cliques of financiers to secure for their properties the capital which is willing to come here, and the most successful and best managements will command the strongest financial support.

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Thus all the elements of great industrial problems are here present, and your question is an industrial one of the highest order and most intricate complications, and to be dealt with accordingly.

The sanitary condition of Johannesburg and the mines, and the system of water supply and refuse disposal, are not such as will admit expansion of the industry as hereinbefore estimated. There will be disaster here if these subjects are not taken strongly in hand for the public good. You only have to look at what is happening in

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