So many paper-rulls, in a morem with other manusecuring industries, are substituting steam for water power, that economy in fuel, and the values of differen rut kinds of coal, become matters of very great into portance. In an address on The Combustion of Fuel, delivered at a resent meeting of cotton menuportance tacturers in Boston, Mr. Walter E. Parker, a manufacturer of wide experience, presented some very positions and valuable to to and observations on this subject

"To-day, more than fifty per cout of the herne power employed in the United States is from steam and the various kinds of it I known to commerce. In 1870 there were 20,750 horse power of steam in use. It is bur to say that the census of 1840 will show steam fast becoming the propelling power of cotton factories. Water-mills to-day have out-grown the capacity of the rator of the streams where they are located, and steam is to be the power of the country. The fuel we not for converting heat into mechanical power, the appliances experience has provided for generating and using atoms, which is the conveyor of that power, so as to be looking toward economy, are now receiving marked attention from our most eminent engineers and all those who have to pay for fuel. We believe it an established fact, though not admitted by all, that, with proper combustion, American anthroutic coal is the purest and best form of ruel available at the present The duration of anthracite at a high temperature, its long-continued and uniform heat, and the conequent maintenance of a steady, reliable power, are points in its favor which cannot be said to be counifed by any other kind of fuel now in practical use in our factories. The use of anthracity or hard justious coal as a common fuel in America is recent only a few tons having been inarketed in the year 1820. It did not come into use until properly constructed furnaces were made for it. In England and the Western States bitu-sulmous coal is the common fuel. If we can see the superiority of anthracite coal as fuel, the question then comes up, in what form and at what relative prices do you want it, in order to insure the best results? The cost of fuel in the best kept steam cotton mills is from one to one-half cent per pound, and, as produced, it is highly important that more care should be given to its purchaso. The coal beds with few exceptions, are made up of various strate of pure coal, soft shale, slate, and other impure or earthy matters. Prof. Johnson, in 1844, made experiments for the United States Government to ascertain the comparative value of American coals. Anthracite coal, he found, contained on an average ninety per cent. of fixed carbon, 6 28 per cent. as incision, while the veins meander near the surfactor of earthy matter, 372 per cent, of hydrogen, oxygen, etc. With one pound he evaporated between eight and ten pounds of water in a cylinder boiler. The pressure I am not able to state, and the pressure I am not able to state, and the pressure I am not able to state, and the pressure I am not able to present to you to-day are furnished by two rails of Woonsocket, R.I., which are run almost wholly by steam. The coal used by them for the the animal does nature make provision for its pretections. several years last past has been either grate or pea, and the results to be given have been arrived at by patient watching and careful attention to facts. From he 29th of April to the 20th of September, 1880, the Globe mill used 890.71 tons Scranton coal, grate size, 2,300 pounds per tou; the waste of hundling at d transportation was 14.89 tons, or 1.67 per cent., leaving 675.82 tons, which were used. The total waste for combustion was not determined in the scientific way. The waste of sah was 10 41 per cent.; clinker, 2.34 per cent.; total 12.34. The total cost, based on the average price in New York, for the time given, was \$5 90 per ten. The mill ran 124 days of 11 hours each; average ateam power need, 620 horse power, ascertained by a series of trials by the Bichards' Indi-cator; each horse power required 2.28 pounds of coal per hour, which includes steam for stashers, boiling sim, steaming the filling, and whatever steam was useded for the complete operation of the mill. Bollers are 90 inch upright, Corlies pattern, with a double engine 28 by 60 inches, one quarter condensing; ford water ondensor, 550—leaves the heater for the boilers at 212°. The Bocial mill, for 124.54 days of 11 hours each, used 1938-82 tons of Wilkesparre, Scranton, delphia and Reading coal in per also. The average widte was 18.74 per cent.; largest part was clink-er. Average steam power, 767,62 borse power used. Cards were taken each day since the first of July, recerding 2.70 pounds per horre power per hour. The tesni cost of tuel, including 1.5 per cent. waste, transpertation, etc., based upon the average price of washed pen soal in New York, for the time stated, was \$5.05 er ton. A horizontal tubular boiler, with a double cylinder, geared, horizontal, 30 by 72 inches, Corlise DARLET, BOI iing, v and they have shown a lower rate per horse power per hear than the Globe mill, when both have been run-ning with pea coal. The cost per ton for grate coal was \$5.90 and for pea coal \$5.05, this being the average cost in New York, not at the mill. Pounds used per horse power for grate coal, 2.28; pea coal, 2.70. Cost per hurse power per hour with grate cost, 6.13 mills; with per cost, 6.29 mills. The waste on the grate coal was 12f per coat. In sah and clinker. The waste on the per coal was 15.76 per cont, ash and clinker.

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Another gentleman present at this meeting differed from Mr. Parker as to the superiority of had over soft coal, for economy in producing steam, and gave some of his experiences as follows:

"We went through a test some years ago, under petent taken out for burning coal dust. We filled our irrasces up by closing the grate bars and blowing the large fan, and commenced burning pure dust; that is, all the coal down to buckwheat size taken out We burned dust for about 25 cents per ton for a long time, probably a year We burn it to this day. We reduced our expenses more than one half. But like all cities articles of waste, when they become useful the price of coal very soon advanced; and not only the dust, but acreenings, also, within a tow years advanced to such a point that it became more economial to burn the pure coal. In our experience, the first esson brought out the idea that it was necessary to put the water with the blast; and we took the gas burners and forced water through them along the drafts under the grate. The result was very satisfactory, except that the burners would fill up. The idea was, that there being no water in anthracite coal, it would be necessary for a proper combustion to supply it. It seemed, in practice, that was the fact. The consumption of fuel was reduced from \$20 to \$5 per Taking the additional dirt of the boilers, it

quantity in places than it should be to the proper confideration illustrate and prove the economy and combined the proper confideration illustrate and prove the economy and price, that after generations of torpor will cause. England mills would be cheshad coal, but in Fenns is the farmer, the plant r, the shop, the cottenfield and said glorious national exist new, and we have only beckwhood. Our experiments in the remarkable remarks the remarks bituminous coal show that there is 12) per cent more valve in a ton or bitumincus coal thus in a ten of good anthracite, you can set that down as pretty nowly correct. To make authracite coul of the same With bituminous coal the furnace should be at lower down, and also you are compelled to have a larger satural respect in the furnace of the farmace of the furnace of the farmace of the farmace of the furnace of the farmace of the f

PROTECTION-THE PIRST LAW OF NATURE.

(Clicam Journal of Commerce) Vegetable, animal and apiritual life is conceived,

kind. In every step of the series nature covers, of the future will need timber, they will need farm-warms and shields it. Deprived of this protetion the link lands which are not carren; they will need a sup-seed would seldom if ever produce perfect fruit. The ply of the whole list of minerals. To rob the earth seed would seldom if ever produce perfect fruit. The ply of the whole list of minerals. To rob the earth germ of life in the seed is enveloped in many folds, as of these now to buy foreign goods with them, thus well as covered by a hard tough skin; it is thus pro- giving half of their value into the hands of those who tected. This germ must then have the influence of are already too rich, is at the same time to rob the moleture, warmile, light and a sultable soil before workingman's children and his children's children vigorous life and its true character shall become Would it not be better by means of a protective vigorous life and its true character shall become apparent. During its early growth it must be prolected from the extremes of both cold and heat Watch the beautiful bud and the fragrant flower! The outer coverings are haid, rough and tough. As you half could be saved for the future? become softer, thiuner, more delicate and beautiful. The author of all life has thus demonstrated that back of all that is visible, there is an intelligent mind adapting means to ends Indeed seed, twig, back, leaf, blossom, trunk and limb, as well as the fruit in all its stages of progress—such and all—have had apread over and around them the broad ægis of protection. Remove any one of these and good, mature fruit were impossible. Study the mysteries of animal lif from the oram to the elephant and the protection of the most vital parts-from conception to maturity -is apparent to every student of nature. The brain is encased in the hardest bone. The arteries are in many places flanked by double bones and pess through hints where least exposed to pressure or the danger of an incision, while the veins meander near the surfacare common place facts known to all advanced pupils even in our public schools. Teachers invariably call special attention to these previsions of nature, to guard brain, heart, nerves, arteries and other vital parts of the animal system, especially the higher order of animals; for just in proportion to the value of the animal does nature make provision for its pretection. Of spirituat life we can, in this paper, make but a passing remark, lest we trench on theological ground; but this is not necessary either to the proof or illustration of our proposition. Gods are never latioduced upon the stage until there is a work for a god to do! Our subject is mundane. Here we have both proof and lliustration of our aftirmations. In passing, however, we merrly say that to save men from aln and death, and to give them a happy life here, and an unending one hereafter, a wonderful system of protection, sacrifice, isolation and environment has always characterized Divine Providence. Determination, on the part of man, to be freed from the obligations of law—to be a law unto himself—has been the fruitful source of all human sorrow. The tap-root of free trade is selfi-huess. Its stebeing in the present. The protective principle is that fuel and clothing were much cheaper in the old factory, etc., in the best possible condition. Wise men are unwilling to elevate to stations of honor, trust and places of responsibility the man who has never given proof that he knows how to acquire pro-perty, and to take care of it. What is true of indivi-duals is true of communities and nations. Those who securities attaining a solid and very high position. have protected their own intercets and have developed their natural resources, and are charged by free tra-ders with being solfish and isolated, are the people who are now doing the most to develop humanity and to bless the world. What are Turkey, the South American republics and other free trade nations doing for themselves or for the rest of the world? Mext to nothing. In the light and prosperity of the nineteenth century, where are the evidences of their progrees and prosperity? They are not apparent. But American advocates of free trade point to Britain and her wonderful power and riches But every men who knows anything of her bistory knows that her iron trade-her ascendency in the woollen trade-in the manufacture of cetton goods-in the carrying trade-indeed, in every department of business by which she has enriched herself—the foundation was laid under a distinctive-almost a prohibitive tariff. No Russian or Swedish from was permitted to be brough into Britain unless it paid a duty higher than Americans have ever leyled. Under this policy she so theroughly developed her resources as to be able to compete with these nations. The same is true in relation to all the staple manufactures and Industries, in which she leads the world. Her bi-tory is the conrest and fullest demonstration of the value of a protective tariff. To it she will return within a few brief yours. So soon as Belgium, French and German goods, and contemporary complemently observes, in any other require and the better wages they are willing tep especially American, are sold in British markets country. The new States and Territories lead the way them. The explanation of this seeming parabit cheaper and of better qualities than similar classes of in railway building. Dakotah with 680 miles; Texas, British goods, England will be compelled to protect 650 miles; Ohio with 525; New Mexico with 510; large as Indiana and a fourth larger than Illient better wages they are willing tep them. The explanation of this seeming parabit that Missouri is a large, half settled State—twice British goods, England will be compelled to protect form miles; Ohio with 525; New Mexico with 510; large as Indiana and a fourth larger than Illient here. The progress of control manufactures in our lowest farming the miles; Colorado, 401; Nebraska 335; Kanasa 340; Sanasa 340; San cheap labor of the cotton manufacturing districts of wast amount of grading that has been accomplished in Britain, to furnish the world cotton goods cheaper and 1850, of reaching the magnificent result of 10,000 better than can possibly be manufactured in Kurope. miles of new track for the year 1881. The building Southern planters would hall with joy the colonization of those 7,200 miles of railway represents an expendition its agricultural conditions that we shall need set thought thought the state of these 7,200 miles of railway represents an expendition its agricultural conditions that we shall need set thought the state of these 1,200 miles of miles of dollars, for nearly its agricultural conditions that we shall need set fow thousand English cotton manufacturers. Much every dollar of which the American people have cause manage the task in the next ten task. The tens

So many paper pulls in a super-pulls in a super-pull in

FREE TRADE.

(Philadelphia Trade Journal)

properly consume the east, or rather to prevent exhaustion of mittee, in one country, to inmish raw intends in struggle is about to be respected by the diagonal another. And the only excuse for such waste is that nature has provided these materials so generously that the woodman, the farmer, and the miner, by thus House of Deputies. In 1869 Napoleon Insuger today robbing the earth of its timber, its fertility, and its new system, by abandoning the protective principal new by the manufactured woods more of his predecessors and entering into a serie of one cheaply than they can make them themselves. Now, born, nurtured and perfected by an obvious series of tuese resources belong by natural right to the whole protective laws. Trace any truit—the apple, for people. They belong to the generations of the fature instance—from its seed to the reproduction of its as well as the generation of the present. The workers tariff to encourage manufactures in the vicinity of those resources where on shalf of them would buy the same quam of finished products, and the other

GRAND TRUNK RAILWAY COMPANY

(Pall Mall tlazette, January 11th.) The rapid and unjuterrupted development of this rallway has been one of the most remarkable features of the Stock and Share markets in recent times, and and industrial interests of the country, thus affords; the greatly enhanced values of the various securities them the opportunity, long desired, of placing the at once testify to the wonderfully improved position grievances before the public in a strong light. To of the line and the favor with which they are regarded examination revealed a state of affairs which prompts of the line and the favor with which they are remained led the commission to advocate quite a green; by investors. Its history, under the present enlights led the commission to advocate quite a green; encet management, literally comprehends one long increase in the duties and a distinct return to grote. ence management, literally comprehends one long series of successes, and in taking a retrospective survey of what has been accomplished within the past eighteen months, the proprietors must see that not only have they abundant reasons for rejoicings on the position already attained, but they have ample justification for looking forward with hope and confidence to the future. The changes already carried out have been manifold and various, and it may safely be afdrmed that in every instance the company have largely bouchtted. The best evidence of this inafforded by the fact that it has gained an accession of financial strength which has enabled it to attract and lease tributary lines on very selventageous terms, to red-em prior charges of Six and Seven per cent. Rouls by the issue of Five per cent. Debentures at a premium, and, further, to take up for the first time its proper position in Canada as a powerful corporation, backed by a large and wealthy body of shareholders. All these facts, however, though highly interesting in themselves are forgotten in the one more prominent feature which is constantly being brought to the notice of investure. viz, the astounding growth of the traffic receipts. Week by week, without intermission, the current has been upwards. Thus for the twenty-six weeks of the past half-year just clused the gross increase has reached the immense sum of £165.873, or an average of £6,380 per week. There can be no doubt that the The tap-root of free trade is selfishness. Its stonet surplus will enable the directors to pay the full rectyped maxim is, "Buy in the chapest market and sell in the dearest." It lives and moves and has its whole year and a satisfactory dividend on the Third Preference. Walle this progress has been going on everything great, good and enduring is the result of the position and prospects of the road have been accare, toll and sacrifice. The time was when food, sailed in many directions by speculators and others, fuel and clothing were much cheaper in the old and warning notes have been uttered of impending states than in the new; but by a judicious use of disappointments, if not measurers, are constituted that in the new; but by a judicious use of ladeed, has been subjected to such a fusilade of attacks means and a few years of labor all the accessaries and ladeed, has been subjected to such a fusilade of attacks means and a few years of labor all the accessive every and the very fact of its securities with-tanding these man's dwelling. If men active they there they must influences affords acrong evidence of their inherent first gain the power by helping themselves. However soundness. For a long time past a stondy process of philasthropic we may feel, we have an admiration for absorption of the various stocks has been going on, philanthropic we may reet, we may note, manus and the merits of the property are become a same who keeps his ewn house, farm, store, manus feet (except to captions critics) that totally new and feet (except to captions critics) that totally new and the manufacture of the property are been are attracted to them. The highly influential classes are attracted to them. The area of the proprietary is thus an ever-widening one, and this fact, with the concurrent progression of the

RAILWAY DEVELOPMENT.

(Shareholder and Insurance (lesette.)

While a section of the people of Canada are doing heir little all to defeat the lofty aims of the government now in power to build up our great North West territories by means of one of the greatest railway enterprises the world has e-er seen, our American neighbors are quietly and unestentatiously nursing their great schemes of railway enterprise and demonstrating to the world their confidence in the future of their giorious country. It is about time that canadians removed the represelt of slowness which fifteen years of indecision have brought upon us. From an enterprising exchange we loarn something of the development of railways in America during the year 1889, and his estimates will probably be found below rather than above the actual facts. It appears that during 1880, 7,200 miles of new track were laid on 234 different lines; a mileage of 54 per cent, more than in 1879, and greater than in any year since 1871. Probably when fuller returns are made it will be found that the mileago constructed in 1880 would reach 500 miles, a greater mileage than has ever been prelously constructed in the United States, or, as our

PROTECTION IN FRANCE.

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The course taken by the government and on once. legislative bodies of krimes on the facul gowing and passed in a somewhat modified shape by the mercial treaties with various countries. The enger cles of a growing state debt, and the proster on industry and commerce after an unfortunate was teto a closer - xamination of the existing system 1 1873 the government was authorized to su-fend one mercial treaties as soon as their limitations won, permit, and M. Thiers and other prominent procession to press the clause. many industries for measures calculated to pla them on a fairer footing with foreign competies. While one party urged the adoption of a faill tase upon the laws established in 1460, with a sub-titeter of specific instead of ad valorem duties, the goremont, in auccomive drafts, presented for the discusion of the Chambers proposals in which the right, Industrial enterprises to protection was distinuited recognized Meanwhile a short period of action after the Franco-German war was followed by a lot, and disastrous depression. This called forth a saction in public opinion, which had until then some but little more than a passing interest in the gree questions favoived. Tue senate of 1877 appoints a commission to inquire into the status of the agricultur. tionist principles. White accepting the proposition of the commission in many respects, the government presented a tariff considerably meddet Notwithstending the efforts of the supporter of the measures of the commission, the chember of deputies so coted the lower demands of the Gurer. ment, and in some instances even called for furthe reductions. While thus, in a certain degree, the who represented the industrial interests of the our try had been victorious, their efforts were not creens; with that complete success which would guarante them a full protection against foreign competums. This was due partly to the organised opponer notably of Paris export and import merchant, by partly also to a lack of unity in following a counci-end. In bringing forward the claims of one special industry, it occurred too often that a want of hermony gave ties to conflicts on the part of rinke dependent classes of manufacturers. This was a seous mistake, which naturally discredited many state meats of fact that might otherwise have ted mad weight. In France, as in many other countries there is a large and influential class-who are prepart to accept the doctrine that considerations of action. interest may make protective measure advishing But they are awayed by the argument, too ottes st vanced, that the application of the system is profetive of so many and such grave abuses, inconvenient and injustice that they entertain very serious ossion. as to the policy of accepting it. An exhibition by that which took place repeatedly before the Chapte of Deputies during the discussion of the mesers, not calculated to allay these auspicions, and French protectionists desire to prevail in their coing arguments before the Senate, they must been dissentions from their ranks. The opportunit offered to thom is the last for some time to come The country is by no means so strongly in their to as to permit them to blunder, and the intent arrayed against them are well organised and use good leadership. The impending struggle will be watched with much interest by Americans, who sympathics are in the main with them.

MACHINERY AND LABOR.

(Missouri Ropublican.)

The report of the Missouri commissioner on the statistics discusses among other things the everlate esting question of the effect of machinery is isom-ing or reducing the demand for manual lalor. The commissioner addressed a number of letters to ferers asking for information on the subject, and recurs eighty-three replies to the effect that the use of a proved farm machinery had increased the demand's laborers and thirty-three to the effect that it be decreased the demand. In answer to the quant Has improved machinery reduced wages? entity four replies say " no," and sixty-two say "yes." The weight of evidence, therefore, goes to show that it employment of agricultural machinery, so far too turning farm laborers out of employment, has actually lucres, ad the demand for them and lucresed the vages breides. Title is a gratifying fact in a 5.00 like ours, whose leading interest is agriculture has been asserted that one explanation of the preserv of large gange of tramps along our highways at railways two yours ago was that the respect mount sulky-plows, com-planters, harvesters and stee them and turned them out to bog. But the tre seems to be just the contrary. The more agricultamachinery our farmers use the more laborers W machinery and more hand labor too. There U be done to bring our State up to Illiads brought down the expenses about one-last. In going few thousand English cotton manufacturers. Much through these experiments we found that a large taken and expense would be saved by the removal, the immense future in store for the American people have cause the saved by the removal, the immense future in store for the American people have cause the immense future in store for the American people have cause the saved by the removal, the immense future in store for the American people have cause the interior; because the Atlantic, and the bandling has induced this enormous development and expenditure. There is a lesson for Canada in this. When the makes an increased demand for isbeen's the fire. It was a difficult matter to keep the fire and adiptment to the interior; broker ge on both sides. There is a lesson for Canada in this. When clear from that We have now adopted buckwheat of the o an. These items add at least 25 per cent.

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