

Fuel of the Past, Present and Future

by

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Synopsis.

Importance of fuel question; early condition of man and surroundings; first use of fuel; - steps taken in the use of fuel. Periods in the use of fuel; - prior to coal; - Era of coal. - What the use of coal has done for progress. - will there be an age of gas? - desirability of gas as a fuel.

Our fuel supply; - coal; - wood; - gas and petroleum. - possible exhaustion; - what exhaustion would mean.

Smoke consumers; - smoke nuisance; - waste of energy through unburned gases. - Luminous gas producer compared to coal stove; - combustion of sulphur in coal; - products formed etc; - effects on vegetable and animal life.

Conversion of solid fuels to gas for use as a fuel; - Desirability of gas as a fuel, is the scheme possible and practicable; - economy of gas as a fuel and other desirable features.

Petroleum as a fuel; - water ditto; - artificial fuels; - Value of different fuels; - appliances for consumption of fuel; - Need of further improvement in appliances.

We must agree that the fuel question is one of great importance, when we consider that only a small percent of the energy stored up in our fuels is utilized by us in their consumption and that the principal one, coal, is by no means inexhaustible, also that other sources now available, may sooner or later fail us.

However before we imagine our machinery at a stand still, or portray the miseries of a fuel famine, let us go back and notice a few of the influences it has had as a factor in human progress. Let us begin when nature was in her youth, as it were, when man in his primitive state roamed through the forests ere the visions of his future dawned upon him and when the eternal peaks of the mountain ranges were wrapped in the first soft swaddling cloths of snow.

Inhabiting the warm fertile regions man no doubt found it comparatively easy to obtain a subsistence; but in the course of time changes in climate, demands and wants compel some other aid for his advance. About him are the various animals, which have been his associates all through the evolutions which have gone on

through the ages which have elapsed since he first appeared and begun his conquest. Other associates of his, crafty and cunning are possessed of remarkable instinct. Some lay up stores of provisions against future wants, birds construct upon the branches the curious abode to shelter and protect the young. The higher animals as the apes, monkeys and gorilla use such weapons as clubs and stones in battle and are thought to have a language; many animals effect organization for offensive and defensive purposes and in general the habits industries and characteristics of animals show a gradual gradation up to man.

Some of the apes will cluster about fires left by hunters in their native haunts, to enjoy the grateful warmth, but none have ever been observed to display the sagacity and foresight of replenishing the supply of fuel for the continuance of the flames. So, the art of using fuel is entirely and exclusively human, man only it is that utilizes this force of nature and may we not say that it is by this means that he has been able to reach the supremacy and extend his possessions and powers. While we can thus see that it is

by the ability to use this form of energy that man has risen above his fellow creatures; we can see as plainly the effect among the different nations; - indeed we can almost affirm that the civilization of a nation depends upon the ability and the extent of the utilization of the fuel.

The subject of fuel is as broad as it is important and links with it in practical interest, chemical and other industries, with the still wider considerations of political economy. It is also of interest to the antiquarian for, by the remains found, he can trace the history of man back, back, away into the dim long ago, until time loses itself in remote antiquity, and he finds only in some deep, dark, cavern; covered by thick strata of soils formed by the sediments or settling dust of ages; the ashes and charcoal from the fires of prehistoric man intermingled with the remains of animals which were extinct when man had learned but few of the lessons which nature taught and before he thought to write a book.

Many and interesting are the means that man has employed to kindle his fires. First

it was probably obtained by friction in the long laborious rubbing of one stick upon another. Improvements came slowly but the steps in our history pass from one method to another, from flint and tinder to the lucifer match, and finally from the disagreeable sulphur match to the parlor match of today which adds so much to our conveniences. Similar are the changes which have been made in the fuels employed and also again in the manner of utilizing them.

We might divide the time of mans fuel using career into periods somewhat as follows; first, prior to the use of coal; second, an age of coal using, which today seems to be shading gradually into an age when gaseous fuel promises to take the supremacy. In the first period the use of wood was chief but the fats and oils of animals were not unknown as fuels and later charcoal was a concentrated and valuable form of fuel. With the use of charcoal probably first came the working of metals and with this there would be the many new industries before impossible.

Coal marks the beginning of a new era. When man first discovered natures locked up

treasure of fuel and first kindled upon his hearth the fossil stores of former ages. He little realized its importance; probably scarcely thought of its future; certainly never dreamed of the part it would play in later civilization. Yet what a history it has and what a wonderful work and transformation it has accomplished - the arts, the processes, the products, the comforts, the conveniences the civilization. It revolutionized the means of transportation and has led to the use of things innumerable which formerly were discarded as waste products. By its use the expansive steam was cheaply made to turn the mighty wheels of the world's machinery and through its use the reduction of ore and the manufacture of articles of iron and steel have been rendered comparatively easy and inexpensive.

But science, never idle reaches out to something better though not new in the form of gas. Although we have really just begun to use gas it was known to the ancients who in their early writings speak of the blazing gases which issued from the earth. The present day finds gas as a fuel rising rapidly in favor and another contemporary of gas in the form of

oil promises to be of importance as a fuel. Although as yet we cannot affirm that in the near future gas is to supersede coal as a means of running our engines and heating our homes, we do know that in a comparatively few years great strides have been taken in this direction and it bids fair to become more and more important in the future. Already the chemist uses gas exclusively for his purposes and in the manufacture of glass and numerous other articles gas has come to be the desirable form of fuel.

Let us turn to a consideration of our supply of fuel. Our present coal beds will one day cease to furnish the sufficient amount of coal even at our present rate of consumption but when we consider the fact that the more we advance in civilization the more purposes there are for which we need fuel, we see our coal supply diminish still more rapidly. One investigator says that England's coal supply will be exhausted in one hundred and seventy years. Imagine the world in this condition where would we turn to seek for means of furnishing heat to supply the multiple needs

of today increased as they would be then. We cannot think of wood for already the fearful inroads upon our forests have almost destroyed them while we have had an abundance of coal; then the supply must be in the natural gases and oils. These are thought to be sufficiently abundant to last for untold ages, however this can be only an approximation, a mere opinion, and in view of the fact that a failure of the fuel supply means, the sweeping away of all modern conveniences; and that civilized life would practically come to an end; it comes to us as a duty to economize in the use of the fuels at our command. Now is this the only plea to be offered for our very health and comfort demand a reform in this line.

So called smoke consumers have been invented to do away with the smoke nuisance which is so disagreeable and injurious in ~~our~~ large manufacturing cities. These might just as fairly be called fuel consumers for it is by making the combustion more nearly complete that they do away with the smoke. The smoke escaping from the chimneys and smoke stacks all over the land is not merely the unburned fuel that is lost to us as such for it comes back to us pervading

All of our coals contain more or less sulphur which by combustion forms SO_2 which in the air is readily converted into sulphurous and sulphuric acid. We who live here upon these broad busy lands of the west where little coal is used compared to the area have not had occasion to feel or notice the effects of this product which is not only destructive to plant and animal life but which is also active in the disintegration of many inorganic substances. The effect is unmistakably apparent and most disastrous in and about large manufacturing towns especially of England, where trees or fruit can not be made to thrive. If such is the effect upon vegetation we would expect it to be detrimental to man and so it is plainly seen to be for not all other causes are sufficient to explain the miseries of the residents of such a place. The poet would probably say; What a year without a summer? What a sky without a sun? What is earth robbed of its verdure? What is life when health is gone?

As a matter of fact we first distil our coal and then use more or less of the gases but often it is rather less that we utilize. This fact has rise to the idea of generating the gas

at some central station and supplying it to all in order to avoid waste. By so doing the waste would be reduced to a minimum for the only loss would be that required for the generation of the gases and as most of the heat required is, for the raising of the temperature to the point at which the gas is liberated - this once attained in the generator would require but little fuel for its continuance. Besides in so doing the small coal and even the dust now wasted in mining could be utilized. It is also probable that almost any carbonaceous material even straw or sun flowers might be readily converted to gas and thus turned to good account.

Gaseous fuel is more manageable in every way than any other form and for ordinary purposes is much more easily conveyed from place to place. Our coal could readily be converted into gas in the pits from where it would rise without farther effort on our part, to be conveyed by pressure through pipes for use wherever wanted. The only waste would be in the converting of the coal to gas and as this would be done on a large scale the loss of energy would certainly be less than the combined losses from the various single ap-

pliances. Gas is the ideal fuel, the combustion is easily made complete and the greatest effect obtained at the time desired. Greater or less heat may be obtained at the will of the user and the instant it is not needed it may be shut off instantly while with a coal fire not only is there the waste because of improper or incomplete combustion but the fire is usually heat can not be obtained at the time and as desired, much more coal is always used than is necessary and especially in summer the fire has only reached a proper condition for use after the time for its use is passed.

In the making of the gas it would be an easy and simple matter to rob it of its sulphur, phosphorus and other undesirable properties thus ridding ourselves of this undesirable feature in the products of combustion, besides obtaining them for use in the manufactures and arts. Thus this plan would seem to be practical and practicable in all of our larger cities. The added expense for equipments for a few years would be counterbalanced by the comfort and conveniences that would ensue.

Another factor which enters into the considera-

ation of future fuel is the tremendous output of petroleum which important now, is destined to become more and more so in the future. Its use as a fuel has been crowned with success as if properly regulated it produces neither cinders nor smoke and also gives a much greater efficiency than coal. Moreover it has the advantage of being a concentrated fuel and for use in locomotives and steamships where tested it proved to be superior to coal. The combustion is easily made complete and the amount of heat readily regulated it also has the advantage of self adjustment so that in case of accident the fire simply shuts itself off thus saving loss from a probable explosion or fire.

Water has been spoken of as the great and inexhaustible storehouse of fuel for the future but we must remember that our waters are the product of a combustion which took place in the misty long ago when earth had not yet become the settled steady going body that she now is and while water is plentiful and can be obtained without price the wresting asunder of the bonds between the elements is a task which requires no little expense. Could we inexpensively control

such a power as Niagara falls to the separation of water's elements we might store away some of its power for use as a fuel but such a project is not thought of seriously by us when fuel is as plentiful as it is to-day. Niagara pouring her immense volume over the precipice and dashing to the rocks below annually wastes as many horse powers of work as could be produced by steam in the burning of the coal output of the whole world and she will continue to do so unused for this purpose until the grand old falls of Niagara exist only in history and the shallow beds of Lake Erie become the fertile banks of a stream.

Numerous attempts have been made to manufacture an artificial fuel which would have the advantage of using up waste products and at the same time supply a fuel desirable in form. For this purpose various mixtures of coal-dust or peat with clay and meal or sand-dust or other constituents mixed intimately, formed into bricks pressed and dried. The result is a very good quality of fuel but cannot profitably be employed at present.

The value of the different fuels compared with each other is an extremely variable quan-

ality even fuels of the same kind differing widely because of difference in density composition and moisture. Moisture in the fuel forms a part of the waste in all our fires as - the heat required for its evaporation becomes latent and is lost to us in usefulness. However this loss in this direction is comparatively small when considered with the loss by imperfect draft, loss by chiming or by smoke. The value of a fuel also depends largely upon the contrivance for its consumption. There was a time when our hard coals could not be utilized even by the worker of iron but improvements in appliances the introduction of air blasts and other improvements have made it possible to use them to great advantage as well as such products as coke now so important and necessary in the manufactures.

Thus while we are constantly finding new uses for fuel we are gradually learning to better utilize what fuels we have and are also learning to use new products and forms and in emphasizing the need of still further and more perfect utilization of fuel it is not fear of the supply that is the prompter nor is it merely economy; - our very wellfare and happiness are

concerned. The question is not merely the consideration that one fourth the value of an article is not a sufficient recompense for its destruction but added to this is the fact that the products and forms of this unused portion become a nuisance to humanity and injurious or destructive to plant and animal life.