

Vacuum tube : for electron  
emission for heated filaments.  
Television  
(Conoscopes) : Kinescopes Cathode ray tubes  
series to convert  
light to elec.  
current Elec. back to light

Vulcanization of rubber.

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Protecting sheath of gas in the  
chamber : Coiled coil lamps.

Fluorescent lamp.

CALCUTTA CLUB LTD,  
241 Lower Circular Road,  
Calcutta, 14th November '41.

CAROLINA SINGLES HANDICAP SWEEPSTAKE.

Prize Money to be paid in War Bonds

The special dinner arranged for Friday November 14,  
has been cancelled and the Sweep Auction postponed until the  
House Dinner on Saturday November 29th 1941.

It is hoped that there will be a good attendance to assist  
the effort.

A. K. Basu,  
F. Maitland,

Jt. Hony. Secretaries,  
CALCUTTA CLUB.

new  
An radio broadcast station today  
equipped with quartz crystal controls.

Crystal filters

A mere thread of lead would be sufficient  
if it were kept near Abs. zero, to carry all  
the available elec. energy at - Waigra  
falls to San Francisco with appreciable  
loss.

university: wish to understand better.  
~~Does influence~~ prove useful in economic sense.  
sense: but - Such objective sense not influence  
in made of research:

131  
1.9  
Herbert Hoover while Sec of  
Commerce, gave the warning  
Industrial development was so rapidly  
outstripping scientific discovery, that industry  
ran danger of a shortage of new building  
blocks on which to build.

There is nothing so practical in its values  
as accurate knowledge, and the pursuit of such  
knowledge is most successful when not fettered with  
the initial demand that it be directed towards practical  
ends: - R.T. Compton

"You spend thousands of dollars & best brains of the co in trying to add 1/2% to the efficiency of the generator, & yet this electricity, so carefully generated, transmitted & transformed, is sent into a lamp with an efficiency of something like 5% - or less" Head of the Power Dept. in E.I.C. to Rice Technical Director of E.I.C. [Event about 1920]

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The success of the Research Lab of E.I.C. is intimately connected with the fact that not a word was brooded about "immediate returns on the investment" - yet the returns were so great etc.

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metallized <sup>carbon</sup> filaments: ~~is~~ is specially treated at high temp. - has +ve coeff of temp. Variation of resist whereas ord. carbon -ve.

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gas filled lamp: high power vacuum tube & atomic hydrogen welding. Each the basis of a separate industry.

major revolutions in history. Take  
 again the discoveries of ~~the~~ wire-  
 less waves, photo-electricity, x-rays,  
 radioactivity, the electron and  
 the rare gases, which followed  
 one ~~next~~ another in quick succession  
 at the end of the last century.  
 All <sup>of these</sup> ~~these~~ discoveries made in  
 the laboratory, in response to  
 the creative urge in the  
 scientist, and without any  
 regard to their possible technical  
 applications. These discoveries  
 have not only revolutionized  
 physics — indeed the new  
 physics initiated by these discoveries

bears little resemblance to <sup>the</sup> old  
 physics — but have <sup>also</sup> found numerous  
 applications in ~~the~~ industries. Indeed  
~~there is hardly~~ <sup>Almost</sup> any <sup>modern</sup> industry  
~~which is~~ <sup>is either</sup> if <sup>not</sup> directly  
~~based~~ <sup>based</sup> on some  
 of these <sup>fundamental</sup> discoveries, ~~does not~~ <sup>or</sup>  
 makes use of them in some  
 form or other,

~~Indeed some modern writers  
 on the history of <sup>science</sup> physics, especially  
 in relation to the social back-  
 ground, believe that there is  
 a subtle influence of the  
 environment, ~~which~~ on even  
 the fundamen~~

Indeed one ~~may go further~~  
 may even assert that there is

hardly any branch of fundamental science, which does not ~~first~~ find application first in the branches of science, and ultimately in the industries. ~~The~~ Take for example even some of the abstruse branches of mathematics. It was by ~~an~~ application of spherical harmonics to the analysis of ~~the~~ by a mathematical analysis, based on spherical harmonics ~~that~~ of the distribution of earth's magnetism over its surface, that Gauss was led to postulate the existence of an electrically conducting layer in the upper regions of the atmosphere, which plays such an important part

hardly any branch of fundamental science, which does not find application first in the ~~the~~ branches, <sup>of science</sup> and ultimately in the industries. Take

~~as an example the theory of numbers about whose supreme usefulness a sense of pride Gauss referred with some satisfaction even~~

Take for example some of the abstract branches of mathematics.

It was from a detailed analysis based on spherical harmonics, ~~of the distribution of the constants~~, of terrestrial magnetism, ~~on the surface of~~

the surface of the earth, ~~based~~ that Gauss was led to infer

*[Faint, mostly illegible handwritten text at the bottom of the page, possibly including the word 'infer' and other fragments.]*

In view of the exceptional elastic properties of crystalline quartz which make these natural frequencies of oscillation quite sharp, ~~and~~ ~~and~~ almost temperature-independent,

for passing sound waves of high frequency

such quartz plates can be used as reliable standards of frequency, for controlling wireless transmitters, and ~~also~~ for stabilizing oscillatory circuits. The

During the last war these quartz oscillators were used extensively in submarine signalling

use of such quartz plates is very extensive in ~~the~~ electrical engineering. That it is at all possible for different <sup>wireless</sup> broadcast stations to ~~broadcast~~ <sup>use</sup> wave lengths ~~for~~ which do not differ much from one another, and still avoid mutual interference, is due to the

but - today

in the propagation of wire-less waves  
 over ~~the~~ ~~surface~~ long distances on  
 the ~~surface~~ surface of the earth. This  
 postulate ~~of~~ Gauss is all the  
 more remarkable when we  
 remember that at the time it  
 was made, the atmosphere was  
 known to a ~~very~~ bad  
 conductor of electricity. Take  
 again the theory of numbers,  
 to whose supreme uselessness  
 Gauss referred with some pride.  
~~At a recent conference of~~ ~~At~~  
~~In opening a discussion of~~  
~~on nuclear physics~~  
 The modern practice ~~of~~ ~~me~~  
~~of~~ splicing of long distance  
 telephone cables is based on a

~~exceptional~~ performance of these

In view of the exceptional elastic properties of crystalline quartz which make these natural frequencies of oscillation quite sharp, and almost ~~temperature~~ independent of temperature, such quartz plates can be used for a variety of purposes: for producing sound waves of <sup>constant</sup> high frequency, and also as a reliable standard of frequency, for controlling the frequencies of wireless transmitters, and again for stabilizing oscillations. ~~Since these~~ During the last war these quartz oscillators were used

Rev. of Job

Samuel  
Ph.D. R. I.

Work up Search: Science + Science-

Naval research laby. Michelson.

Electron: vacuum tube of radio set  
Cathode, Duchman, Hull.

Photoelectric cell.

X-ray tube

Utilization of solar energy.

- 1) Art of -
- 2) Autocells.
- 3) Photosynthesis  
When we know as much  
 phy. + chem. as a plant.

Automobile: ~~give~~ <sup>give</sup> ~~intense~~ <sup>turbulent</sup>  
of water every day.

Subject  
for Atomic  
Society  
of Prof  
Dance  
Radio

Br. from sea water

Same electronic laws that govern electron power  
use them. Rich outlook on life.


Freedom of thought: not only the life  
of democracy but also of the sciences.  
Scientific spirit

K. R. Ramanathan, D. Sc.,  
 Meteorologist,

Observatory,  
 Colaba, Bombay.

Pres. occasion Age of the Earth:  
 Death into the radioactive and regard  
 age of rocks = ~~10000~~ ~~1500~~ mill yrs  
 Earth should be about 1500.  
 3000  
~~10000 mill~~  
~~1500 mill~~

Gravitational Contraction  $22 \times 10^6$   
 Sun  
 hot = ~~10000~~ mill  
 5000  
 1/2 freeze  
 4 to 5 billion  
 5000 billion  
 2 billion  
 few billions  
 a few thousand billion  
 1000 billion

There are a few in  
 Created some time.  
 Super dense Super hot  
 a few thousands of millions.  
 0.01  


Die 20-sec.  
Modern  
Radio  
Engineering

The telephone, the automobile, motion picture & radio & plastics: Rayon

Electron - optics

Cathode ray: oscillograph: television.

Electrons for planes: vacuum filaments.

Electron  
Diffraction

Engineering tool = for investigating surface properties.

Quantum mechanics: in understanding alloys into extraordinary properties.

Electr. industry of today is the result of 1/2 century

Research  
Vatt + Farad have done more to reduce the working hrs for you work to 44 hrs than all the laws & organizations.

Gloomy prophesies of Malthus.

pure and disinterested research

directed towards the discovery of the unknown  
no electrical industry of today would exist - had it not been for the discoveries of Volta, ampere + Faraday.

Future  
Solid  
State.

easy to realise look backward

Internationally Known engineer; who  
 is an executive of one of the top  
 industrial concerns: Made a plea  
 for research in pure sc., saying  
 that his industry was "Scraping  
 the bottom of the barrel" for new  
 basic principles upon which to make  
 engineering advances.

Establishing link =

Physics will help build them.

Medic. Engineering	} Illumination Geophysical
Elec.	
Radar	
Aeronautical	

Electron diffraction in metallurgy.

of mixed industrial Research: in E.R.C. etc  
 since its founding.

Future  
 jobs  
 state

theorem concerning prime numbers.

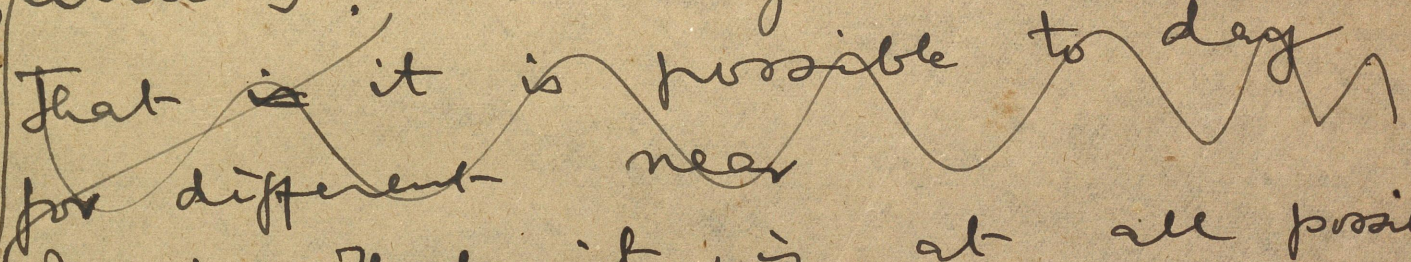
~~It was the brothers Curie who nearly~~  
~~60 years ago studied the~~ ~~device~~

The brothers Curie discovered nearly  
~~60~~ sixty years ago that a ~~crystal~~  
~~plate~~ parallel plate of quartz cut  
 in a particular ~~plate~~ manner, and  
 placed between ~~the~~ ~~plates~~ parallel  
 metallic plates connected to  
 an alternating circuit  
 and placed in an electric field  
~~was~~ was com

theorem concerning prime numbers.  
 Nearly <sup>sixty</sup> years ago  
 the brothers Curie discovered  
 that when a parallel plate of  
 crystalline quartz, cut ~~of the~~ in a suitable  
 manner, was placed in an electric  
 field it contracted in thickness, and  
 that when <sup>direction of the</sup> the field was reversed, it  
 expanded to the same extent.  
 When placed in an alternating  
 electric field, <sup>the</sup> expansion and  
 the contraction <sup>naturally</sup> will ~~follow~~ follow in  
 alternation in the field; ~~and~~  
 further this oscillation  
~~when the frequency of mechanical~~ this  
~~oscillation of the crystal plate~~  
 will be maintained ~~in a unit~~  
 in <sup>good</sup> sufficient strength ~~when of the~~  
~~frequency of this~~ oscillation ~~is~~  
~~coincides~~ closely approximates to the  
<sup>in correspond</sup> natural frequency of the  
~~oscillation~~ vibration of the free plate. \* Since quartz

~~In view of the~~ ~~exceptional~~ ~~elastic~~ ~~properties~~ ~~of~~ ~~quartz~~, which make these natural frequencies very sharp, such quartz plates can be used as standards of frequency, and for controlling the frequencies of wireless transmitters, and also for stabilizing circuits. ~~To day no high~~


There is hope  
any precision  
high frequency  
work which  
does not



That ~~is~~ it is possible to do for different ~~wireless~~ ~~stations~~, ~~at~~ ~~all~~ ~~possible~~ ~~for~~ ~~different~~ ~~broadcasting~~ ~~stations~~, which are near one another to broadcast in wave-lengths which differ only very little from one another, ~~but~~ without ~~causing~~ mutual interference, is due to the exceptional performance of these

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 history of the  
 world.

~~On this may be based first a method for conversion of electrical into mechanical oscillations, and also in view of the exceptional  steady elastic properties of quartz,~~

~~as of~~  
 In view of the exceptionally ~~constant~~ elastic properties of quartz ~~such~~ which make the natural frequencies quite sharp, such quartz ~~oscillators~~ plates can be used ~~as~~ in the first place as standards of high frequency, or as stabilizers for oscillating circuits and for controlling the frequencies of wireless transmitters. ~~The latter~~