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## WORLD'S DEBT TO THE ENGINEERING GENIUS OF JAMES WATT INCALCULABLE

Improvement Former Crude Steam Engines Basis  
of All Modern Mechanical Progress

James Watt, the famous improver  
of the steam engine was born at  
Greenock, in Renfrewshire, Scotland,  
on Jan. 19th, 1763. He was the elder  
of two sons, his brother, John, be-  
ing drowned on a voyage to America  
at the age of 23.

Owing to Watt's extremely delicate  
health, he was able to attend school  
only at intervals, and received most  
of his elementary instruction at  
home. His mother taught him reading  
and his father writing and arithmetic.  
In this way, Watt in early years ac-  
quired much of that general informa-  
tion for which he was remarkable  
in after life.

As he advanced into youth, Watt  
began to occupy himself with the  
sciences. Before he had entered his  
nineteenth year he had acquired and  
digested a vast mass of miscellaneous  
scientific information.

Watt chose the profession of instru-  
ment-maker. To perfect himself in  
this art he went to London in 1755  
and placed himself under Mr. John  
Morgan an instrument-maker in  
Finch Lane, Cornhill. Thus the man  
who was about to cover England  
with colossal engines commenced his  
career by making with his own  
hands, fine, delicate, and fragile sex-  
tants for navigation.

After a little more than a year in  
London he returned to Scotland and  
commenced business as an instru-  
ment-maker in Glasgow in 1757 at  
the age of 21. Professional jealousy  
hindered him from opening a work-  
shop; but the authorities of Glasgow  
University conferred upon him the  
title of Mathematical Instrument-  
Maker to the University of Glasgow  
and gave him a convenient room  
within their precincts which silenced  
all opposition.

Watt's position within the college  
brought him in touch with such able  
men as Adam Smith, professor of  
moral philosophy; Robert Simson of  
mathematics; the illustrious Dr.  
Black, who filled the chair of chem-  
istry; Dr. Dick and the celebrated  
Robinson often so famous for his at-  
tainments in physical science who  
was then a student.

Robison says, "Whenever any puzzle  
came in the way of us students,  
we went to Watt . . . the attachment  
of his acquaintances was strong. I  
have seen something of the world and  
am bound to say that I have never  
seen such an instance of general and  
cordial attachment to a person whom  
all acknowledged to be their super-  
ior. It is true that that superiority  
was concealed under the most am-  
iable candor and a liberal allowance  
of merit to every man."

In the year 1763 Watt married his  
cousin, Miss Miller, and removed to  
a house in Glasgow. He continued  
his profession but enlarged it to in-  
clude engineering. He thus began to  
be consulted in large works requir-  
ing science and skill. In the winter  
of 1763-4, Mr. Anderson, sent him a  
small model of Newcomen's steam  
engine which would not work. The  
little black model on Watt's table  
was the epitome of all that the world  
had learned of steam power up to  
that time. In the brain of the young

instrument-maker lay all that the  
steam engine has become since.

A long list of illustrious men had  
seen a dim vision of the possibilities  
of the slumbering giant. Hero of  
Alexandra, Solomon de Caus, the  
Marquis of Worcester, Captain  
Thomas Savary's model for draining  
mines, Dennis Papin; and Thomas  
Newcomen and John Cawley in col-  
laboration. It was the engine of the  
last two which lay on Watt's table.  
Watt investigated the parts of the  
machine and investigated thoroughly  
the theory of its action. He deter-  
mined, says Arago in his "Life," the ex-  
tent to which water dilated in pas-  
sing into steam. He calculated the  
quantity of water that a given  
quantity of coal could vaporize—the  
quantity of steam in weight that  
each stroke of an engine of New-  
comen's of known dimensions ex-  
pended—the quantity of cold water  
which required to be injected into  
the cylinder to give the descending  
stroke of the piston a certain force  
—and finally the elasticity of steam  
at different temperatures.

It would be impossible to do more  
than list the improvements which  
he made in Newcomen's crude en-  
gine among which were as follows—  
the separate condenser, the conden-  
sor pump, and the closed in cylin-  
der divided into two chambers  
quite distinct from each other, one  
above and one below the piston.

After two years of public indiffer-  
ence he formed a partnership with  
Dr. Roebuck, the founder of the  
Carron Iron Works. The partners  
took out a patent in 1769. Financial  
difficulties forced Dr. Roebuck to  
dissolve the partnership and left  
Watt with the whole patent but with  
no funds.

From 1769-1774 Watt let his steam  
engine lie idle, while he worked at  
important engineering works in var-  
ious parts of Scotland.

In 1774 Watt entered into a part-  
nership with Matthew Boulton of the  
Soho Foundry near Birmingham  
which proved most fortunate.

In 1775 he married Miss MacGreg-  
or the daughter of a rich Glasgow  
merchant. Once more Watt improved  
his engine in various ways which  
we have space only to barely notice.  
He connected the piston rod to the  
beam by the "parallel motion." Watt  
also gave the piston an upward as  
well as a downward stroke by the  
Double Acting Engine. He controlled  
the engine's regularity of perform-  
ance by adding the apparatus called  
the "governor," to regulate the  
quantity of steam admitted from the  
boiler into the cylinder.

Watt suggested the use of pistons  
which should be perfectly steam  
tight though of metal—he first used  
mercurial manometer for measuring  
the elasticity of steam in the boiler  
and condenser—he conceived the  
idea of the steam gauge—he intro-  
duced the indicator to accurately  
show the state of the steam in re-  
lation to the position of the piston,  
and many other minor improvements.

To express in any ordinary lan-  
guage the advantages to humanity  
from Watt's improvements of the

## HARVARD NEVER GIVES DIPLOMAS, GRADUATES PUR- CHASE OWN DOCUMENT

In 300 years Harvard University  
has had more than 65,000 graduates  
but has never given away a diploma  
to a single one of them.

The institution's founders regarded  
a diploma as a letter of recommenda-  
tion which each student must apply  
for and purchase personally. The  
same practice prevails today. Unlike  
most other colleges, also, Harvard  
has never awarded diplomas to in-  
dividual students at commencement,  
but has required graduates to make  
their own arrangements to pick up  
the document, or have it sent to  
them, after the exercises.

This was revealed in a display of  
rare historical Harvard diplomas,  
including the earliest Harvard diplo-  
ma in existence, the first engraved  
diploma, and the new Bruce Rogers  
design adopted in 1935 now on view  
in Widener Library as a part of the  
Tercentenary exhibit.

For nearly 200 years after the  
founding of the college each student  
made up his own diploma citation,  
had it engrossed at his personal cost,  
and presented it for signature to the  
president and whatever members of  
the governing board he could find.  
The president received a fee for  
signing.

The earliest Harvard diploma in  
existence, drawn up in 1676 for  
George Alcock, class of 1673, was ob-  
tained in this way, the exhibit in-  
dicates.

Not until 1813 did the increasing  
number of graduates make it neces-  
sary for Harvard to adopt a single  
format and make up an engraved  
plate from which the diplomas could  
be run off. One of the first diplomas  
from this plate, a very valuable item  
of early American engraving, is in  
the display.

Adoption of engraved diplomas  
did not alter the method of award-  
ing them. Since 1813, as before,  
graduates must apply in person and  
pay for the "recommendation" before  
it is issued.

Illustrating the continuity of the  
Harvard sheepskin from the first,  
the exhibit includes a diploma issued  
in 1727, the form used in 1931, and  
the new style format and seal  
adopted in 1935.

steam engine would be impossible.  
Watt died at Heathfield in Stafford-  
shire August 25th 1819 in his 54th  
year, and was buried in the parish  
church of Handsworth where a monu-  
ment by Chantrey the famous scul-  
pter was erected, as well as one by  
the same artist in Westminster Ab-  
bey.

His friend, Lord Jeffrey said of  
him:

"He had an infinite quickness of  
understanding; a prodigious memory  
and a certain rectifying and meth-  
odizing power of understanding which  
extracted something precious out of  
everything he came in contact with."

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## SIR SAMUEL HOARE IS FAST BECOMING "MAN OF THE HOUR"

Signalizes Return to Power By Devising New  
Empire "Life-line"

LONDON, July 21—"Let us mem-  
bers of the empire remain firm in  
the conviction that we can best help  
the cause of peace by being true to  
type, by holding firmly to the policy  
that conforms to our traditions, by  
undertaking nothing that we cannot  
fulfill and by remembering always  
that, while our influence will be al-  
ways on the side of European peace  
and that we will faithfully carry out  
our obligations to that end, we are  
an imperial and an oceanic rather  
than a continental power. Thus we  
shall best serve the cause of peace!"

These are the words of Sir Sam-  
uel John Gurney Hoare, man of the  
hour in Britain, new first lord of the  
admiralty. They were made in his  
keynote speech after accepting the  
office. With them changed Britain's  
imperial defence policy and strategy.

Since 1875, when Disraeli secured  
for England the major share of stock  
in the Suez canal, the canal has for-  
med the important link in Britain's  
"life-line." Malta, Alexandria, Cairo,  
Gibraltar, these strongholds were  
thought to guard the Mediterranean  
against control by any other nation.

But Italy has shown England, and  
its first lord of the admiralty, that  
Britain must revise her defence pol-  
icy in other directions. The Mediter-  
ranean is vulnerable; the Italo-Ethi-  
opian war proved that, according to  
opinions held in official circles in  
London. And so Britain cast about  
for a new route to India and the East.  
That route could only go around the  
continent of Africa, past the stormy  
Cape.

### South Africa Speaks

Officially, Britain will regain her  
fortress at Malta, but in diplomatic  
and defence circles the opinion is  
expressed that little hope is placed  
in it should it be required for de-  
fence. One of the first acts of Sir  
Samuel Hoare in his new position  
was to stage a thorough sham battle  
over Malta. Planes zoomed and  
"bombed" for hours; soldiers and  
civilians dropped in the streets, pre-  
tending they were caught in a gas  
attack. Whether or not these man-  
oeuvres showed Malta a prey to  
enemy battle 'planes was not reveal-  
ed.

Timed to perfection in the revela-  
tion of Britain's new defence policy  
is South Africa's demand of the  
mother country. Premier Hertzog has  
been loud in protests at Britain's  
leadership in revoking sanctions  
against Italy. South Africa stands  
firm in defiance of Mussolini.

But South Africa wants not only

sanctions maintained; they are also  
anxious to make a deal with England  
—and they drive no easy bargain in  
view of the new British "life-line."

South Africa wants complete sove-  
reignty and a naval base built near  
Capt Town at a cost of \$150,000,000  
money to be supplied by the British  
government, control of the land to  
remain with South Africa. In demand-  
ing these, Premier Hertzog and his  
cabinet offer no concessions, but re-  
iterate their statement that they will  
not participate in any war without  
the consent of the people of South  
Africa; they also state that should  
there be a re-division of the Portu-  
guese colonies in Africa, as seems  
probable in view of the work of Ger-  
man Nazis in smashing a strong  
Portuguese government, South Africa  
will get a good share.

### Groomed for Premiership?

The man who has all these facts at  
his fingertips and who is juggling  
Britain's foreign and defence pol-  
icies, is Sir Samuel Hoare, brought  
back to the cabinet after his resig-  
nation in disgrace six months ago  
when he framed with Pierre Laval,  
then premier of France, the infa-  
mous Hoare-Laval treaty by which  
Mussolini was willing to accept a  
part of Ethiopia in return for peace.  
Public opinion was strong against  
the foreign secretary, and Sir Sam-  
uel resigned. Mussolini carried on  
his war and is now in possession  
of not half, but all of Ethiopia.

Once an intelligence officer in  
Czarist Russia, Sir Samuel has had  
a brilliant career in British political  
and diplomatic circles. As minister  
for Indian affairs he drafted the new  
Indian constitution. Now, in many  
circles, he is said to be headed for  
the prime ministership—no longer  
whispered since Baldwin's announce-  
ment that he will retire after the  
coronation next year.

## REST OF WORLD NEWS

MEXICO, July 21—A gun-fight be-  
tween two political factions at Tlalpa-  
pantla, State of Mexico, that lasted  
all last night, resulted in the death  
of three men.

A twenty-four-hour tie-up of the en-  
tire oil industry, and an electric  
power strike through much of the  
heart of the country, is threatened  
in sympathy with the strikers at the  
Standard Oil of New Jersey field.

RUMANIA, July 21—Former Depu-  
ty Michel Stelescu, ex-member of  
the Fascist "Iron Guard," who rebel-  
led against the leaders of that organ-  
ization, was assassinated in hospital.

PUERTO RICO, July 20—The trial  
of eight Puerto Rican Nationalists on  
charges of conspiring to overthrow  
the United States government by  
force opened amid bitter protests  
by defence counsel against the  
searching of attorneys and wit-  
nesses.

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