Gabriel I. Năstase

ION BASGAN
A Romanian Inventor

Dr. Eng. Ion Basgan
(1902-1980)

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FOREWORD

I have heard long ago speaking about Ion Şt. Basgan and his work, but only now was written a biography, in the true sense of the word.

To the credit of Mr. Gabriel I. Năstase and his family, we can now enjoy reading it.

The book did not captivate me from the very start: but, soon, after the first pages, I had the curiosity to carefully read the whole book, in which I found interesting elements concerning his work and tragic elements concerning his relationships.

Ion Şt. Basgan (b. on 24 June 1902, in Focşani – d. on 15 December 1980, in Bucharest) comes from a family of priests, whose spiritual exercise had been present throughout generations. However, he dedicated his life to science and technology and succeeded to write an unbelievable legend of his own self.

The following pages speak in detail about his evolution. We would have to point out that on 18 May 1934 he gets the Romanian Patent no. 22,789, and on 21 December 1937 the American patent no. 2,103,137, covering the heavy proportional pipes drilling and the sonic drilling, that is "rotor-percussion drilling".

The inventions of the Romanian engineer Ion Şt. Basgan concern the progress of all types of drilling and they effectively put them into practice.

On 27 December 1941, the USA Government blocked the patent of the Romanian citizen. It is very curious that, within American oil industry, Ion Basgan's ideas are applied, bringing fabulous sums of money to oil industry companies. He would have had the right to cash 8.6 billion US dollars, as copyright, according to an expertise dating from 1965.

In 1961, Ion Basgan starts a recuperation trial for his inventor rights (he had paid the taxes for the protection of his

American patent for 17 years), charging 118 American oil companies.

Nowadays, we begin to understand "the American democracy", favouring the theft of his rights.

He was told that the Patent No. 2,103,137 had been and was still blocked; the poor man fights with the US Administration and on 13 October 1965, the State Department of Justice unblocked the patent, which had a symbol effect. World War II ended twenty years ago, but the blockage of the patent was still valid, for the benefit of American companies.

This gesture had its "legal" reason, since in 1961, oil companies had shown a death certificate in front of the American justice, of the medical doctor Ion Basgan (the inventor's cousin) asserting that the inventor had died and that the trial should have been declared closed.

A justice system which does not check the papers does not deserve our respect.

Ma. E. Ion Şt. Basgan spent a long time abroad, during 1966, 1967, 1969, 1971, 1974, and so on, in order to set up his defence, and wasted much energy and hope.

Everything was futile. There is a fact that the Romanian inventor understood, step by step.

In 1967, an anonymous engineer from Dallas told him in London: "We shall be in court with you for years, and afterwards with your sons, but we shall never pay back!"

While in Rome, in 1966, he was proposed by the Jewish Organization "Saint" to become an Israeli citizen, for the sum of 10 million US dollars, so that he might get the help to recuperate those 8.6 billion US dollars and bring them to Israel (Bild am Sonntag, 25-26 May 1969).

On 2 January 1973, Ion Şt. Basgan was making a TV declaration for the editor Cornel Rusu: "I found in the USA a special target enterprise dealing with acquiring inventions made in Eastern Europe. There I was told that it is common knowledge that the great majority and the most interesting inventions came from Romania".

Nevertheless, Ion Şt. Basgan is pursuing his way: on 11 June 1974, he sends to the USA Government a request, including

21 documents and claiming for his inventor right. The answer was negative.

At his proposal to set up in USA a foundation including 34 sections (hydrotechnics, sonics, oil-industry, water duction, a.s.o.) with the money he could get from his copyright, the USA, Government did not bother to answer.

Let's see together that "the editor Balcar from Munich, after obtaining a few of the Romanian inventor's papers, claims exaggerated financial rights in order to give them back to the owner! Moreover, Ion Basgan understands that those papers were used in technical and scientific espionage, in favour of an American oil Company".

Ion Şt. Basgan had no chance. All his attempts to defend his invention were blocked by the American "democratic" mechanisms, which allow the theft under the cover of some slogans, and, afterwards, it gives the theft the legal authority, through specific institutions.

Therefore, a great world power is stealing in fine style and afterwards it proves that it was "right" to do it.

This method had been applied to other Romanian citizens as well. I remember the famous case of Nicola Tesla (Nicolae Teslea), an extraordinary Romanian engineer, whose inventions brought the USA huge incomes, as well as the status of "an advanced technology country". Poor Tesla! He was declared to be insane; his laboratory was put on fire and he died in a hotel room; he had not even succeeded to build himself a house. Now, the Tesla technologies are up to date again. But the USA is not obliged to pay for benefiting from the 900 patents of Nicola Tesla.

The great powers are stealing everything and the tragedy of Ion Şt. Basgan draws our attention, once more, on the good intentions with which hell is paved and which are put forward in front of the curtain pompously called "democracy".

The name of Basgan raises the problem of its etymology and we find the answer in this book: his name comes from the village and the river in the county of Bacău – Bazga, *code 5531.*

I have been several times in the village of Stroieşti, in the region of Râbniţa, in Transnistria. Its citizens know that, at the end of the 19 century, a so-called Mazgan *built a water-mill in*

their village, but they do not know its origin. They also want to write a monograph of their village, but they do not have any documents, because the Russian invaders stole them and destroyed them, with a special purpose.

I am not aware that in our country, especially in Ardeal, there could be a village or a river called Mazga*, but the words:* mâzgă *(slime),* mâzgălitură *(scribbling),* a mâzgăli, mâzgăleală *(scribble), etc. could be an answer to our question.*

Moreover, in the phonebook of Bucharest there are names like: Mazga *(2),* Mâzgăneanu *(8), and* Mâzgăreanu *(3), as well as:* Bazga *(2),* Bazgan *(7),* Nazgă *(2),* Bazgu *(1),* Bâzgă *(1),* Bâzgan *(3) and* Bâzgă *(3). We can conclude that these names have the same etymology and come from the Romanian territory. This must be known by the citizens of Stroieşti from Transnistria!*

They should also know that the great empires are stealing in fine style, if they did not find this out till now! Moreover, after stealing, they proceed to forgery, through cosmetic operations, and work out false histories, force-imposed, as "sacred truths!" The Romanian thesaurus is still in Moscow since 1917 after an agreement between two allied Governments and we are still waiting for it to be returned. In front of the great powers, which are stealing from us, those little peoples, we have the moral duty to defend ourselves and to remember that nothing should be forgotten.

There will come a time when history will be re-written under real coordinates and history does not forgive. Thus, one can find out who was the inventor and who stole the invention, who worked hard and who robbed; who was the bad guy at a given moment, in a given space.

Professor Ma. E. Nicolae P. Leonăchescu
President of the Romanian Society of Thermotechnicians
Bucharest, 6 March 1997

REMEMBER ION BASGAN

I often remember Basgan… A very proud man, shy, quiet, who could talk in an odd rhythm of silences, a deprived man, maybe too often, but refusing to ever blame those who made his life hard with their injustice.

I remember him, firstly, when he talked about himself, not without hesitations (and only after much insistence) and when he agreed to speak with me, with a new-born hope (and a sheer trust) in those acknowledgements, usually late, of Time and Life, written in a recuperating cycle of history, which still finds those deprived alive, very rarely. He wanted to believe that the long postponed day of moral recuperation, due to a certain period of time refractory to the "Basgan modality" – and all those periods of time, in the plural – too many and full of people, and too tight-handed to personality appraisal, that the long postponed day had arrived, secretly, to his house and was determined to ring the bell.

It was by the end of June 1975. Then, he lived in the block of flats Leonida – and he was 73 years old – and a big lawyers house from the USA, with many famous names on the front of its legal fame (among them there was Nixon's father-in-law) was ready to start a trial for a legal recuperation of those 8 billion US dollars, to which Basgan was entitled for his patents, largely used until 1945 and which the American Administration had blocked in banks, when the USA entered the World War II. (And there were so many people around Basgan who were interested to help him!).

Today he would have been 95 years old and he would have been still disappointed by the obscure ways of human justice. And, sometimes, why not to say it?, of human beings…

From the very beginning, during our first meeting, I confessed to Basgan that I was working on a book (and I am still working on it) about the Romanian great scientists I had the luck to meet in their full power of creation – Onicescu, Macovschi, Moisil – and Ion Basgan could not have been forgotten from the memories to come which I was very interested to publish…

"And what do you want to write about me?"- asked Basgan with a soft smile.

My intention was very clear, and yet equally confused was my attempt to anticipate the future disclosure…

I told him, or at least I tried to answer him, that I would write "about our ancient temptation, so human, to penetrate the great depths of our Terra…", about our need (and thriving) to be able to exploit sometime the huge oil deposits, beyond the temporary boundary of 2,000 metres, to which science and technology stopped in the 30 before a young engineer, absolutely courageous, who hardly was, in 1935, older than the great foreseers (he was 33 years old) could stagger the inertia of his time, bringing about an essential revolution in drilling…

"I wasn't a foreseer, he protested. I have calculated absolutely everything, very rigorously…

All foreseers check rigorously their great provisions, in a strange kind of mathematics, unknown to us…"

We talked much and several times, before publishing – on 12 July 1975 – my first essay on Basgan and his dreams – I called it "Towards the Depths of the Earth" – an essay which, when I reread it now, after more than two decades, I still find it appropriate and real and maybe less coded that could have been forced to do it, against my own will, by "the sonic drilling" and the explanation of "the Basgan Effect". I wrote that there was a time when "geological maps still paid a tribute to improvisation and estimation, and the pure drilling, the penetration to areas hopefully extractive did not exceed – at least until the 4th decade of our century – the 2,000 meters of depth!".

"May I call it the boundary of impotence?" – I asked Basgan.

"The boundary of inertia – preferred Basgan. The boundary stimulating the self-surpassing…"

And now that I brought about that essay of July 1975… The fact that deepened then, at the middle of the 3rd decade, the lack of satisfaction of those who worked in drilling was not only the unsatisfactory level of 2,000 meters, but also the special difficulties encountered: "the penetration of the drilling equipment, even to this depth, clearly poor, could not avoid the serious direction deviations (15-20 degrees against the vertical), the permanent column bending, the dangerous pipe breaks, the quick ruining of the extraction hooks.

Did we reach – there were some voices – the limits of science? Was the Earth itself against this geo-investigation and thesaurus attacks to the depth fortune of its deposits? Modern equipment which allows today geo-physicists and geo-chemists to unveil the secret of the Earth, from measurements of various characteristics of the gravity field, from constant recordings of the same radiations and vibration reflexion, from detecting important particles… did not exist then. And even if we admitted it existed, the modern world is increasingly requesting the exploitation of newer and newer deposits… Mankind reached – as I told him then – one of those limit situations which puts the basis of a drama in science – as in art.

"Do you write plays?" Basgan asked me.

I tried and wrote a play starting from such a case, having the topic of drilling: "If love didn't exist…", being obsessed with the question (and the song): "What girls would do / If love didn't exist? / They'd die like leaves / In autumn, like white-frost". Otherwise: What could we, people, do without our great passions?…

"We'd die suffocated by inertia, by obtuseness, stricken by our own indecisions" – Basgan continued my thought.

I remembered well his last words, which I used in the end of that essay, about a creator who could confirm his call, exactly by decidedly refusing to fall into conformism, into "the already-known", into the "we cannot do it otherwise". The only way in science, as in life – due to an original scientific interpretation – towards a truly new solution and – referring to Basgan – towards the one the most important acquirements of this century.

I quote again from this first essay: "Reconsidering the whole process and phenomenon, interpreting the Principle of Archimedes from the applicative angle of great depths at which drilling is performed", declaring very simply what the specialty literature calls today: "the Basgan Effect" and thus setting up the heavy metallic proportional pipes drilling, modern science succeeds in penetrating down to 9,000 meters depth! Transmitted in its general lines, since the first world oil congress (in 1933), patented in Romania in 1934, and in the USA in 1937, this paper is worldwide known. But Ion Basgan wouldn't stop here, at "this boundary of 9,000 meters". "Starting from the principle of remote transmission and capture of sonic energy (founded by George Constantinescu),

Basgan succeeds in adding to the old Rotary drilling system the advantages of vertical penetration of the sonic drilling system. The new patent, registered back in 1967, allowed theoretically the spectacular penetration towards depths of – who would even suspect it 60 years ago? – 15,000 meters. What is going to happen next? And when? Beyond and above any economic advantage, this penetration towards big depths had the role to certainly complete, through an appropriate information, the understanding suggested today by geomagnetic and gravimetric researchers, the study of emissions of radioactive origin, the modern seismology and – why not? – volcanology. Let's think therefore – we invite our readers – to this permanent progress of human knowledge and to this fascinating penetration towards when speaking of Basgan's merit – "with a feeling of pride".

Let's go back now to my wonderful companion in the summer of 1975, to what Ion Basgan was…

I remember that he told me about his school years and about that spiritual toughness he was to acquire during his entire life, about the innocence and special education acquirements, about the happy life spent in the Internal High-School in Iaşi, a school of will, of perseverance and of devotion for an ideal… Since nobody graduated this school without having an ideal. About his departure to the Superior Mining and Metallurgy School in Loeben (Austria), in 1920, where he made himself known through his native potential, then about his doctor degree which foreshadowed the revolution of the ancient Rotary drilling system, about the prize "Ma. E. Cornel Nicoară" of the Romanian Academy, in 1936, about which I found something, and about which Basgan felt obliged to admit… that he was awarded. During our conversation I reconstructed in my mind those seven difficult years – 1925-1932 – during which he acquired a productive experience, absolutely determining, at the famous, at that time, "Steaua Română", a school-enterprise of new extractive technologies.

"I think you care much about those seven years, very difficult years, which foresaw those seven years which were to bring a revolution in drilling…".

"Which renewed the other years, he corrected me. Which changed them, which directed them on other coordinates. As for the rest…" "The seven difficult years" parable, in science, at least, is

not necessarily accompanied by the seven happy years… In science – all the years are difficult! And coming back to the years of my thought: there is something else which surprised me and it still surprises me…

Undoubtedly, Basgan was also a very good economist. He had bright ideas at that time – however unaccepted – about which he used to speak shyly, as about a common fact, which could not be avoided from happening, despite his deep conviction that those ideas, essentially reforming, would be the necessary capital for important changes in the economic life of our country. When he was only 30 or 31 years old, he already founded, together with Gogu Constantinescu, "The Economic Association for the Study of Conjuncture … At the same time the Academy of High Commercial and Economic Studies in Bucharest … And there are still many things to be mentioned here about the new tools and equipment, many of them extremely original, which he was to present and manufacture, during 50-70, discovering thus new oil deposits, experimenting various extractive installations into the hard rocks of Dobrogea. However, we put a full stop to our long "remember"…

Today, there is, finally, in the town of Focşani, the town where Basgan was born, on 24 June 1902, a street bearing his name… Maybe, there will be a memorial plate in Iaşi, sometime… Maybe another one in Bucharest: "Here lived between…" Hopefully a "Basgan prize" of the Romanian Academy will be founded. But all these late acknowledgements will only immortalize a name and will speak too little about the unique character of Basgan, about the courage of his ideas and about that injustice of the world which deprives sometimes a researcher, years after years, of his own merits. I welcome this book – as a holy initiative for reminding a spirit – and a noble thriving of a son – and I mention the engineer Ion Basgan – to snatch the name of his father from silence and oblivion.

Dorel Dorian

Bucharest, 24 June 1997

MEMORIES ON THE ROMANIAN INVENTOR MA.E. ION BASGAN

Such a well-documented and valuable paper dedicated by Ma. E. Gabriel I. Năstase to the great scientist, the engineer Ion Basgan, is deemed to wake my most remote memories.

I had the honour to be introduced to the oil-industry engineer Ion Basgan, in January 1945, during the foundation of the Studies Circle of the National Liberal Party, in the house of Sabina Cantacuzino, in 37, C.A. Rosetti Street, the headquarters of the club of the above-mentioned party since August 27, 1944.

Among hundreds adepts of the National Liberal Party and of the Fărcăşanu, there were present the three great members of the Brătianu family: Dinu, the President of the party; Constantin (Bebe), the Secretary-General; and the great historian I.I.C. Brătianu, the vice-President of the party, who delivered the opening speech.

Welcomed enthusiastically almost at every moment of the exposed problem, Professor Gheorghe Brătianu formulated the new prospects of the liberal doctrine within economic problems. After widely referring to the world economic situation, after the devastating World War II, Professor Brătianu stated:

*"Within the new world economic policy situation, my opinion is that, in a dried and exhausted Romania, the traditional and historical formula of our party, concerning economic problems: "*Through ourselves*…" when stating this formula, the audience started to strongly applaud. But, following the idea of his argumentation, I knew what he was going to say and I could hardly stop from laughing. When the enthusiastic applause stopped, Professor Brătianu continued his thought, mostly embarrassed ... "must be forgotten".*

In my capacity as President of the Studies Circle of the National Liberal Youth, I used to often take part in the serious speciality studies as well. Almost at the same time the Liberal

Engineers Circle "Vintilă Brătianu" was also founded. This circle was named in the memory of the energetic and incorruptible leader of the economic policy of the party, Vintilă Brătianu. Then, the engineer Basgan told me that he had several opportunities to put his technical knowledge to the benefit of the Liberal Party and that he was very much appreciated by Vintilă Brătianu. This declaration was confirmed by my father-in-law, the lawyer Gheorghe Lazăr, who was also a member of the economists' circle, led by the President of the National Liberal Party.

Strictly referring to the present paper, I remember that out of the mission mentioned by the author, on page 237, I met Professor Grigore Vasilescu (with whom I used to play bridge), engineer Basgan, and I was close friend with the civil engineer Georgel Veniamin, today living in Paris. I also met the lawyer C. Dinu Popescu-Galaţi, who was a member of the Brussels Bar Association and who died several years ago. At page 246 of the biography, where the matter came about Dinu, the author makes an extraordinary synthesis of engineer Ion Basgan, concerning the economic programme of the National Liberal Party, which was centred on a trade supported by a healthy agriculture, with the target to stimulate production, importations, exportations and industry, in case there were material and intellectual conditions.

The reversing of the priorities by the communists (a natural reversing, as a matter of fact, because the heavy industry was absolutely necessary for Russia in order to fill up the catastrophic technological gap after World War II) was destroying Romania, as did the reversing of staff election, starting from a healthy origin and not from value.

Another problem is to be noticed in the well-documented biographical paper of Ma. E. Gabriel I. Năstase, that is the turning into account of the creative intelligence of the Romanians from European States.

Starting from the beginning of the 18th century – the Enlightenment Century – for the orthodox, vegetative and corrupt Europe – all foreign observers of Romanian realities, starting with Antonio Maria de Chiaro, were amazed, one by one, by the cleverness of the Romanian people, especially by its intellectual

smartness which allows it to easily grasp, in a very quick period of time, any know-how taken from foreigners, irrespective of its sophistication and domain.

This special gift does not stop to be compromised those days in Romania by the obscure environment: ideological, bureaucratic, orthodox and corrupt. However, abroad, in an environment propitious for creativity, the Romanians can work miracles, even today.

The lesson is finite: we have the duty to put at the disposal of the Romanians, situated intellectually above the average, all opportunities available, from special schools to universities and to the necessary material incentives. Otherwise, they will emigrate, the way those 700,000 Romanians emigrated, between 1990 and 2000, of whom at least half were above the average.

In the well-documented paper of Professors Alexander Hellemans and Bryan Bunch (recently translated into Romanian by Diana Constantinescu and published by Orizonturi Publishing House) we find only two Romanian world scientists: Henri Coandă and Gogu Constantinescu.

The huge economies obtained through the exceptional technological innovation, experimented on a huge scale and due to engineer Ion Basgan did not bring profit either to him or to the Romanian people, but to the world economic system, be it capitalist or communist. The two antinomic systems have two elements in common: a permanent one, that is the corrupt bureaucracy (exploiting during communism, sometimes limited during capitalism) and another element experienced between 1940-1980, that is the concept of Lord Keyness, synthesized in the profoundly non-liberal formula: Full-employment.

The great wealth obtained in the USA between 1983-2000 is very much due to the initiative of the great President Ronald Reagan, under the double influence of the conservatory experience in Great Britain of Lady Margaret Thatcher and that of Chili's President, Augusto Pinochet, that is the replacement of the Keynessian system with the managerial monetarism of James Burnham and Milton Friedman.

A society, either capitalist or communist, which does not respect its commitments and which does not rightly encourage the creative and innovating activity of the individuals who are born in that society, is a disqualifying and obscurantist society and, to better express the idea, is an underdeveloped society. In other words, the society is blocked, regressive, bankrupting and backward-looking.

This is the way Romania has been for half a century and we hardly could see that is has an intention to get off the darkness and moors in which it arrived with communism.

Yet, an American society which does not understand to fulfil its commitments, the most elementary ones, towards creative peoples and towards creative individuals who work for this society, has the same odd shadow.

Senator D.A. Lăzărescu

Bucharest, 21 July 2000

I dedicate this book to those who guided my steps through the wilderness of life, who gave me a peaceful home and a happy childhood, with all the tenderness of their heart. Their behaviour and councils taught me to appreciate and promote the authentic values that are to be found in our fellow men, sometimes offered us generously: the happiness of creation.

I dedicate this book therefore to my mother, Maria Năstase and to the memory of my first teachers: my father Ion Năstase, my grandfather Ştefan Năstase and my uncle, Nicolae Năstase.

I hereby bring my acknowledgements to all those who were near me to comfort and counsel me, with all their heart, in the hard times of my life.

G. I. Năstase

INTRODUCTION

Predestined to offer Romanian science and technology a series of far reaching achievements in the domain of oil-drilling improvement, Ion Basgan was, still is and shall remain one of the most brilliant Romanian inventors. Inspired by the new ideas of sonicity, Prof. PhD. Eng. Ion Basgan produced over 50 technical and scientific works that were printed in several specialized technical publications in various countries.

As a disciple and collaborator of the father of sonicity, Gogu Constantinescu, Ion Basgan, the oil industry engineer, distinguished himself in the realm of technical and scientific creation by manifold exceptional achievements, in the domain of oil industry, that later became worldwide priorities.

His special achievements pertaining to the oil-drilling technique were appreciated by George (Gogu) Constantinescu, the father of sonicity, as well as by other Romanian and foreign specialists: 'Method for improving the output and perfecting rotary oil-drilling, by percussion-rotation and hydro-mechanical pressures absorption' (Romanian Patent No. 22789/1934) and 'A new oil-drilling system taking into account hydrostatic pressure and long-distance sonic energy transmission by means of proportional heavy oil drilling rods and sonic oil drilling (USA Patent No. 2103137/1937).

Ion Basgan was born at the beginning of this century on the 24th of June, 1902 in Focşani, an old town in Vrancea county, in the South of Moldavia, in an over three hundred year-old family. His mother was known to be the offspring of an old Transylvanian shepherds' family. The peaceful life of this honourable family and its off-springs is in itself a living example of the general truth that native intelligence has always been a state of the spirit of the Romanian nation and a symbol of its perennial existence.

Endowed with an authentic intellectual capacity that was sustained by an unusual spiritual strength and a strong determination to study, Ion Basgan had graduated the Primary School No. 2 of Focşani and then attended the Secondary 'Boarding'

School of Iaşi. As a pupil, he would always receive scholarship grants and prizes: his propensity for study allowed him to receive outstanding school performances. On the 5th of June 1920, he graduated the secondary school and was awarded a 'Steaua Română' ('Romanian Star') scholarship for the courses of the Superior School of Mines and Metallurgy (Montanistische Hochschule 5, Leoben, Austria) between 1920 and 1925. In 1933, he was awarded the doctor degree in technical sciences. Ion Basgan became famous thanks to the applications of his Rotary drilling method that became the most extensively utilized method in all oil – producing countries.

Based upon the principle of sonicity, the new drilling system brought about a technical revolution for the American oil industry. That was how the American economy would substantially increase its profit, through yearly savings of 1.8 billion dollars. Unfortunately, Ion Basgan, who died on the 15th of December 1980 and his descendants did not benefit from the Patent ownership rights, to say nothing of the fact that the Romanian Academy (that awarded Ion Basgan the Dr. Cornel Nicoară prize in 1935), the Institute of Oil and Gas, as well as Politehnica University of Bucharest have failed on many occasions to render the due homage to Ion Basgan, the Romanian scholar who had dedicated his life and work to Romanian science and not only. His entire existence was a living proof that native intelligence is a dominant feature of the Romanian nation and not a mere accident of fate.

Many of the technical achievements of Ion Basgan, the inventor, represented the topic of extended debates in several periodicals and treaties, while they were also sources of inspiration for other specialists in their attempt to improve the oil drilling technique. The Foreword to one of Ion Basgan's works that had been published in the former USSR, in 1935, mentioned the following assertion of Prof. K. Tiscenko regarding the outstanding practical results that were obtained in oil production by former USSR and USA when applying Basgan's invention: 'compelling the oil – boring system to vibrate during rotary drilling and thus setting an alternative dynamic load on the base, a significant increase of the driller travel can be achieved. A.Z.N.I.I. tested this principle and

proved that the driller starts to operate again under the action of longitudinal vibration, at the end of its travel. In 1938, this principle was practically tested in Romania at the oil well no. 471 of the Ghirdoveni oil field. Positive results were obtained when testing the implementation of the Basgan method, that confirmed the high drilling speed, its costs reduction and higher quality, through perfectly vertical boring.

Essentially, the Basgan method is based on two principles, namely: the sonic oil drilling and the technique of heavy proportional oil rods. Therefore, the percussion rotary drilling, that is the sonic drilling permits the driller to perform percussion on the oil driller bottom*, while the driller still rotates. The percussion* shocks *are a result of the sonic effect, inducing a certain level of the driller vibrations. The method of the sonic drilling as applied in other countries also is based on the vibrations produced by* mud pumps *into the oil rig and the long distance transmission of energy through the drilling rigs, without bottom vibration apparatus.*

Ion Basgan emphasized the importance of utilizing heavy proportional rods at drilling rigs, whose load is equal to the load applied on the driller in order to avoid deviation of drilling bores and rods brake. The above-mentioned process enables the oil producer to perform vertical drilling with a 30 to 50% economic output, as compared to that of previously applied oil drilling methods.

The scientific works of American scientists, Murray Hawkings and Norman Lamont of Louisiana University (California, USA), American, French, German and Russian university courses (of Prof. Moore, Prof. Evescenko, Prof. S.I. Siscenko, etc.) have focused on the originality of the Romanian conception, namely Ion Basgan's idea, as well as on its contribution to the development of Romanian science.

After thorough research, studies and calculations, Ion Basgan proved that with the field *method, the application point of the Archimedes force lies at the lower end of the drilling installation and not at the gravity centre of the drilling rig that is introduced into the drilling mud.*

Thanks to his inventions (patented in Romania and USA), that are of great importance as a result of their practical economic

effects, namely: drilling by means of heavy proportional rods and the sonic drilling, Ion Basgan's name is written on the panoply of renowned Romanian inventors. This is how through Prof. Dr. Eng. Ion Basgan, Romania has contributed one of its most valuable inventions to the technical and scientific international patrimony.

The outline of the professional carrier of the Romanian scientist may be rounded up by adding to it a further dimension, that of a subtle observer of the political events, although he never got involved in the deeper political interplay, in spite of the frequent demands of contemporary politicians. His existence was mainly marked by his propensity for technical and scientific creativity less than for political incertitude. Nevertheless, his fine political contribution proved his love of his people and the national interests of his country.

Ion Basgan was and still remains, through his work and creativity, an inventor of genius for the Romanian people, whose undying creation already belongs to the entire world.

I am indebted for the completion of this monographic description to Dipl. Eng. Ion (Ginel) I. Basgan, the son of the inventor Dr. Eng. Ion St. Basgan, for his kindly permitting me to study the documents of the family archive, which I found to be a valuable support for a documented description. I express my gratitude to Dipl. Eng. Ion Basgan for his beautiful words that came as a conclusion of Ion Basgan's moral image as a remarkable Romanian scientist and technician.

'At last the time has come to bring forth and pay for the debts of our nation towards my father. It is to be regretted that the Romanian Academy, Politehnica University of Bucharest, the Technical University of Constructions of Bucharest, the Technical Museum "Dimitrie Leonida", the Institute of Oil and Gas and others have failed to remember my father for a commemoration or an anniversary to the memory of he who was a brilliant inventor, a specialist who has brought about a revolution in the deep drilling technique. The only people to remember that Dr. Ion Basgan has been the son of this country were the citizens of Focşani, his native town.

Since the reader will find a lot of information regarding my father's life and work, I would rather share with those who take

interest in the personality of this man, a few ideas that might round up the picture of the personality of the inventor. No matter how beautiful and full of fruit may be the crown of a tree, one can fully appreciate it provided one also knows how deep its roots are in the soil which sustains and ensures its life. I shall always cherish in my heart the moral testament that has been handed in by one generation to the other of the Basgan family. This moral legacy has been entrusted to us also through the permanent concern of our father for the education of his children by continuous instruction and respect for work and honest earning.

He was apparently a tough man, to the extent that to him the very presence at the table at the right time when dinner was served was a part of the everyday education. He was not at all indifferent to the way we learnt, how we did our homework. He had noticed for instance my early practical natural dispositions for technique. Now, not only do I take interest in such activities, but they represent a real relaxation and refuge from everyday life. When I was a school boy, he started sharing with me some of his preoccupations and the problems he had to face in the achievement of his inventions.

Unfortunately, life brought to our family also unpleasant difficult moments, such as the repression of the communist regime, that were generated by the aberration of this political system. The contemporary situation and the events of Hungary had been hanging over and threatening the peaceful life of our family. My father had to search for new jobs, to get rid of the persecution from the part of the Romanian repressive organizations. The family felt his anxiety and revolt. Generally, when a man is harassed, he cannot either work or create as he would under normal living conditions. Nevertheless, my father succeeded through tremendous efforts to prove that he was and remained a man involved in science and technique, who took no special interest in politics, yet took part in political events when he was required to pass a specialist's judgement, because he was persuaded that when deprived of a competent scientific, technical and economic support, political decisions can become an extremely dangerous weapon against the people and his country. That is why the function of adviser which he had to perform on various occasions implied a lot of responsibility and it had a significant professional effect in contemporary political decisions.

Although he had the chance to live in other countries for the rest of his life, where special material and spiritual advantages were offered to him, my father rejected every such opportunity, because he had never imagined that he could live far away from his native land and work for the prosperity of another nation. With this conception in mind and an unusual moral strength, for almost half a century he suffered humiliation and degradation by the citizens of his own country and by strangers. That which most made him strong and fit for facing life were: the family, real friends, work and the thought that his achievements were one more proof that Romanians are endowed with an exceptional creative force which has often opened new ways for the progress and civilization of mankind during its entire history.

Unfortunately, my father could not fully enjoy the fruit of his creative work. After he died, there were some signs of recognition of his creative activity and original achievements in drilling, to say nothing more of the financial benefits that have been and are still obtained as a result of applying his inventions, that entered into banks other than the Romanian banks, with unknown destinations.

I can say, honestly, that the universal dimension of my father's personality had a positive effect on my life, as did the love that we shared in our family and the trust we put in God almighty.

The spirit that characterized my family's existence was a real blessing to me and made me understand that honest work and love of mankind are the way to real success in life, that man alone is capable to create and gain a place for himself in the everlasting memory of mankind.

That is why, this work represents a special event to me, and a successful editorial event to Dr. Gabriel I. Năstase, a young man of science and spirit'.

Unfortunately, a lot of family documents, including photos, were either lost after the earthquake of the 4th of March 1977, or had been confiscated by the State security, as Ion (Ginel) Basgan, the son, declared, which could have added even more to the real picture of Ion Basgan.

Dr. Gabriel I. Năstase

LIFE AND WORK

Ion Basgan was born on the 24th of June in 1902, in Focşani, a town in the Vrancea region, in the South of Moldavia, under the star of creativity, of the spirit of truth and beauty. He was going to grow into one of the most remarkable figures of the Romanian science and technology, as well as a restless fighter for the defence of national interests. As nothing happens by chance on this Romanian land overthrown by passions, neither was the almost divinely birth of this man on a legendary shepherds' land. The history of the Basgan family has deep roots in the Romanian land and each new generation had added to the dower of the new - born child Ion Basgan.

It is admitted that the name of "Basgan"[1] comes, by analogy to other names, from "Bazga", a place located by the river with the same name, in the northern part of the Falciu District, north of Răducăneni.

It seems that the etymological origin of the name, though no longer to be found in the dictionary is 'buzzing' or humming.

Old documents of the Saint Bishopric of Husi (that are kept by the State Archives in Bucharest and Iasi, the Biographic Journal and the Genealogy of the "Bazgan"[2] family) are attesting the ancestral presence of the Basgan family in Romania, namely 'priest Bazga' is mentioned to make the part of his estate of Buneşti – Falciu a donation to Neariul, the contemporary Minister for Internal Affairs. Bazga priest's donation was confirmed by the voivode Moisa Moghilă on the 17th of January 1631 (7139 from the making of the world). A later attestation is that of the 17th July 1654, when it is mentioned that Varvara, the daughter of priest

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[1] The first 'Bazgans' spelled their name with a 'z' instead of an 's'. The change was initiated by the three priests, the sons of Ion Basgan's grandfather, priest Ion Bazgan the 3rd.

[2] Ludovic Cosma, The Bigraphic Journal and the Genealogy of the Bazgan Family, the Romanian Printing House, Galaţi, 1944.

Bazga sold their part of estate from Bucharest and Cobiseşti to Darie Spătaru.

In 1780, the priest Ion Bazgan the 1st was born, whose documentary presence was attested only in 1826.

In 1800, the priest Ioniță Bazgan the 2nd was born. He married Simina of Davideşti, Falciu District in 1823. His earthly life ended in 1830 and his wife Simina died in 1863.

The priest Ion Bazgan III, the son of Ioniţă and Simina Bazgan, was born in 1824. He grew as an orphan from the age of 6 and was educated by mother Simina. His spiritual education was marked by the years that he passed in her company and his steps were guided towards the ecclesiastical seminary of Socola – Iasi. Then he would marry Elinca, the daughter of Vasile Zugravu and have 10 children by her. Ion Bazgan III, the grandfather of the brilliant scientist Ion Basgan lived to the end of his life (the 28th April, 1876) in the village Armaşani, county Avereşti, in the Falciu District.

The tenth son of the priest Ion Bazgan III, called Ştefan Basgan, was born on the 30th of June, 1874 in Avereşti county, in Armaşani village, the Falciu District. He attended the primary theological school and the seminary at Huși and he ended he theological studies with a scholarship at the Seminary 'Veniamin Costache' of Iasi. He attended the Faculty of Theology in Bucharest between 1896 and 1900 with a scholarship at the Theological Boarding School. Ştefan Basgan IV had lived in Focşani as a priest, a member and President of the Spiritual Consistory of the Roman Diocese, as well as a member of the Diocesan Assembly until the 15th of February 1974, the day when he will part for ever from the earthly world.

On the 5th September, 1901 he had married Maria (born in 1882), the daughter of the priest Vasile Ban of Găgeşti, Vrancea, who was the descendant of a shepherd's family who had come to Vrancea from Transylvania across the Carpathian Mountains. Ştefan Basgan will have five children (three boys and two girls).

His first-born child was Ion Ştefan Basgan.

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* *

Ion Ştefan Basgan graduated the Primary School No. 2 of Focşani and would be awarded school prizes during all these years. Between 1909 and 1913, he attended the courses of the Boarding High School in Iaşi, with a scholarship and obtained the graduation diploma no. 1.295. He learned mathematics from Gheorghe Lascăr and Ion Roianu, and natural sciences from Teodor Bădărau, the Headmaster of the High School. These and other teachers of the time had been for the young man Ion Basgan a symbol of the work for truth, beauty, determination and creativity.

Between 1920 and 1925, Ion Basgan would attend the courses of the Superior School of Mines and Metallurgy in Leoben – Austria with a scholarship and he obtained the graduation Diploma 10 on the 17th of July 1925).

While still a student he would be President of the Romanian Society 'Sonda' (Oil Well) of Leoben and he would carry out the student practice in 1924, at the oil mines of Pechelbronn (Alsace – France), where he would study the oil exploitation process through the mine galleries.

Born as it were under a lucky star, Ion Basgan came out sane of two duels to which he was challenged in the first and the fourth year of study, as well as out of a railroad accident (as a result of the collision of two trains at his arrival in Pachelbronn).

Mention should be made here of an apparently insignificant, yet relevant event to the spiritual character of the young Ion Basgan: in 1922, when he was President of the students' 'Sonda' society, he refused to join in the right – wing students' movement. Other students of this society followed him in his attitude. Soon after this event, the great historian of the Romanian nation, Nicolae Iorga, would appreciate their attitude in a letter which he sent to the young student personally.

Later in July 1929 the engineer Ion Basgan, who at that time was the chief in charge of the Scaiosi field, would meet Nicolae Iorga, a representative personality of both the Romanian and the universal culture, who was then visiting the site. He remembered Ion Basgan and would invite him to hold a lecture on 'Oil Industry' at his University in Vălenii de Munte in July 1929.

Ion Basgan, a student at the Superior School of Mines and Metallurgy in Leoben – Austria.

When he was back in Romania, in 1925, Ion Basgan would work as an engineer on the fields of the 'Steaua Română' Society and in December 1925 he attended the courses of the Military School of Artillery Officers in reserve in Craiova. He shall do the military service at the 4th Regiment of Heavy Artillery in Focşani. In July 1926 he resumed his work on the Moreni field that belonged to the 'Steaua Română' Society, together with other outstanding contemporary engineers, such as: Victor Dumitrescu, Cardas I. And Marinescu C. In August 1926 he will pass his exam for the function of chief of exploration in the oil industry and natural gas (Patent no. 39).

At this time, the lucky star of his destiny would shine to lead him towards even deeper research studies in geology and hydro-technique. Under these favourable conditions to his profession, Ion Basgan would intuitively remark that the activities that had been performed in oil drilling before were rather empirical. In August, 1926, he published his first work in the Annals of Mines No. 8/1926 on the 'Oil Region of Moreni Gura Ocniţei', in both Romanian and French, in collaboration with engineer I. Cardas.

Dr. Ion Basgan when attending the courses of the Military School of Artillery Officers in Reserve (Craiova, 1925).

Yet, as life is not made of lucky moments only, sadness, troubles and hardships made their way into the early days of the young scientist: Ion Basgan was deeply hurt by the death of his brother Vasile Basgan, by a tragic accident in Lyons, France.

Ion Basgan's brother, Vasile Ştefan Basgan, was born in Focşani in 1908. He attended the primary school courses in Focşani, and the secondary courses in Iasi, at the Boarding High School, which he graduated when he was only 16 years old (in 1924), by passing two years exams in one year. Then he joined his brother Costică Ştefan Basgan in Lyons and attended the chemistry engineering university courses. Just a few days before his graduation, the young Vasile Basgan died from electrocution in his bath, on Easter day, in 1929.

The short life of Vasile Basgan had been a case in his epoch, both sensational and tragic. Ion Basgan had to gather his strength to bring back from France the body of his brother, so that he might find a restful place for it on the land of his country, in Focşani.

Dr. Eng. Ion Basgan together with his parents, Ştefan and Maria Basgan, when he was attending the courses of the Military School of Artillery Officers in reserve (Craiova, 1925).

G. G. Longinescu wrote about the untimely death of Vasile Basgan in the 'NATURE' review of science dissemination (year XVII, no. 6, the 15th of June 1928) the following words to comfort the family: 'Let God not give man the full measure of what he can bear. God forbid that one should ever drink the cup of bitterness that the priest Ştefan Basgan of Focşani had to drink. He lost Vasilic, a dear son of him, on the first Easter day, who died as if thunder-stricken in a bath of Lyons by an electrical circuit. That was a deep sorrow to his parents and a great loss to our people. The readers of 'NATURE' have already been acquainted with the brilliancy of this worthy young man from his letters of gratitude to his teacher, N. Negru of the Boarding High School of Iaşi. They are sparking witty writings testifying of a strong determination to work by a young man as we need

today. It is rather strange how this nation is deprived of its educated young man, of its men of valour quite at the time when we need them more: two years ago, we lost Emanuel Sudan, the winner of the swimming contests, who died while swimming heartily in the Black Sea, at Balcic. A year ago, Preda Brătășanu, the electrician engineer with a University degree in mathematics, which he had obtained at twenty years only in Paris, was falling down from an industrial rig to die an unknown death, instead of living to be one of the brilliant engineers of Romania. And now, forty days ago, we lost a distinguished young man who had graduated from high school when he was only seventeen and was studying Industrial Chemistry in Lyons with Victor Grignard, the renowned chemist, the Nobel Prize winner and a good friend of the Romanian people. After only three years of study, when he had obtained brilliant results, he received his Diploma in mathematics and chemistry. He died at 20, at a time when other young men of his age were just graduating from high school. An awful accident has stifled his life in the bud. The tree of his life was not allowed to bring forth fruit and thus be a joy to the teachers who had made him grow. His father had to taste bitterness instead of sharing the delight of his son's professional ascension to the highest position that he would have deserved. No human words can ever express the grief of parents when their child is lost and that of the entire nation who shall read them. Let God comfort the bereaved father and give a peaceful place to his innocent son.

Having surpassed this difficult moment of his life, Ion Basgan undertook the management of the Scaiosi field in the Teleajen Valley that belonged to the 'Steaua Română' society, where he carried out a series of exploitation works of the fields in this area. In June, 1929 he published in the Romanian Annals of Mines No. 6 and No.11 a record of the first tests in the country of the explosion engines in drilling: 'Motoare Waukesha in the rotary drilling' ('Waukesha Engines in Rotary Drilling'). As already mentioned before, the renowned Romanian historian and patriot, Professor Nicolae Iorga, had been from the very beginning aware of the real ability of the young Basgan and in July 1929 he invited him to hold a lecture on the topic 'Oil Industry' at the 'Nicolae Iorga' University in Vălenii de Munte. In October 1930 Ion Basgan published his work

'Exploatările Petrolifere de pe Valea Teleajenului' ('Oil Exploitation in the Teleajen Valley') in the Annals of Mines. The same year he was appointed director on the 'Steaua Română fields of Moineşti. Taking advantage on the position he had earned, he kept working even more intensely in the field of hydro-technique and sonicity research with applications in the drilling technique. One year later, in 1931, he was appointed deputy of the Inspectorate of Oil Drilling on all the fields of the 'Steaua Română' Society.

On the 15th of December of the same year, as a result of a premeditated murder that took place in the Hospital of Valea Rea in the city of Bacău, another brother of his died, the physician Constantin Ştefan Basgan, who had graduated from the Faculty of Medicine of Lyons, France. He was born in 1904, in Focşani. He attended the primary school courses and a part of the secondary school courses there, which he continued at the Boarding High School of Iaşi. When he had passed his high school graduation examination, Constantin Basgan enrolled to the Medicine Faculty of Bucharest. Because of the students' movement of 1922, he would leave to Germany, later to France, intending to cross the Ocean to America. Professor Bonnet asked him to remain in Lion. When he was back in his country, he was appointed chief physician of the Valea Rea Hospital, in the Bacău District. Unfortunately, his life ended there with a sudden death by a deadly shot from an insane post master.

As soon as he recovered his strength after his brother's death, on the 31st of December, Basgan decided to withdraw from the 'Steaua Română' Society, in order to dedicate himself to the publication of the results of his technical and scientific research and to sustain his doctor's degree.

With this end in view, he settles down in Bucharest in 1932, working out the first theoretical notions of the Basgan Effect, as well as the new laws of the Archimedes Principle and the sonic drilling. Ion Basgan together with his master, George Constantinescu, with Nicolae Malaxa, Alexandru Perieţeanu and others founded the 'Association for the Study of the Romanian Economic Situation'. He would work as a referent and the leader of the oil and mines section, publishing on this occasion economic reports and syntheses.

The objective of this association was to study the relations between the private companies and the State industry. His personal attitude regarding the State policy in oil industry shall be reflected in

a series of publications containing documents in which he stipulated the development framework of the Romanian oil industry and the country industrialisation, while taking into account the material and power resources existing in the soil of his country. He would recommend the nationalization of the oil industry and the total industrialization of the country, focusing on the role of the State as compared to the private initiative. The non-compliant spirit of the young Basgan was not at all appreciated by the private financial providers of the Association, who shall finally withdraw their financial support of the association. Since the fall of 1933, the 'oxygen balloon' of the association activity had been provided by the National Bank for a certain period of time.

In the same year, the Romanian Academy published his work entitled 'Form and Operation of the Rotary Drill in the Oil - Bearing Formations of Romania' with an Introduction by Prof. Eng. Ficsinescu. This work was introduced to the Academy specialists by its President, Prof. L. Mrazec.

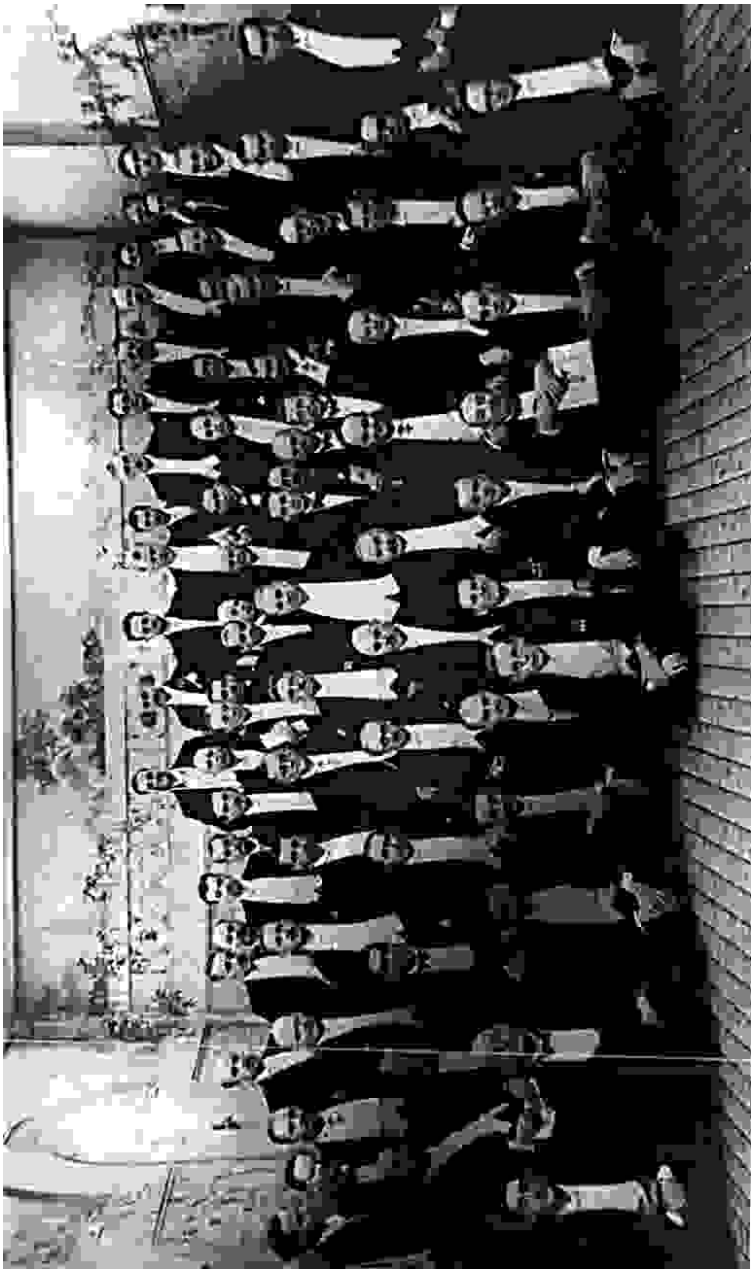
In 1933, the Romanian Academy published his work 'Vibrating Phenomena and Their Effect on the Drill Operation in the Rotary Drilling System', when Prof. Nicolae Vasilescu – Karpen had made its presentation in high terms.

In April, in the framework of the lectures cycle organized by IRE at Politehnica Society, Ion Basgan delivered a lecture on the topic 'Oil Policy in Keeping with the Situation of Oil Exploration and the Fuel Question'.

Upon the request of the Association of the Mining Engineers, Ion Basgan would deliver the same lecture in Moreni, in front of certain specialists who were particularly interested in the new achievements in the domain of the Romanian science and technology.

In May, 1933 Ion Basgan held a conference lecture at Politehnica Society in Calea Victoriei, on the topic 'Technique and Scientific Interpretation of the Rotary Drilling System'.

On the 7th of July 1933 Ion Basgan would hold his Doctorate dissertation at the Montanistische Hochschule of Leoben, Austria. Caius Brediceanu the Romanian Secretary of State in Vienna had also joined the solemn ceremony.



Ion Basgan delivering his lecture
at the first World Oil Congress (London, 1933).

On the 20th of July 1933 Ion Basgan will join the first World Oil Congress in London, by his appointment as the official delegate of Romania, through Ministry Decision No. 34.555/1933.

Ion Basgan would speak in the name of his country at the opening session of the Congress and hold the lecture 'Scientific Consideration of the Technique of Modern Drilling'.

In August and September 1933 he attended the summer courses of Political Economy of the London University.

In September 1933 he was appointed honorific professor at the Department of 'Oil Study' of the Academy of Higher Commercial and Industrial Studies. In November 1933 his article 'Technics and a Scientific Approach of the Rotary Drilling System' was published in the AGIR Bulletin and the Annals of Mines. In the same month he had a radio interview 'Comments on the Occasion of the World Oil Congress of London'. Later, *L'Indépendance Roumaine* would publish his speech.

In April 1934 his Doctor degree dissertation entitled 'Die Arbeitsweise und Form des Rotary Meissels'[3] was published in Vienna with an Introduction by Dr. Eng. George Constantinescu, the father of sonicity, containing the following report on the scientific research contained herein:

'The treatise that Mr. Basgan presented us on the vibration phenomena of the rotary drilling has introduced us to an important problem whose solution seems to be out of reach at the first sight.

It may be said that the problem was solved, while admitting in advance that the described phenomena represent the result of a continuous harmonic vibrating phenomenon with one or two frequencies, yet in reality it could be a changing phenomenon, with multiple frequencies and even changing frequencies, eluding therefore mathematical analysis.

When reading this treatise, one should not disregard the fact that Mr. Basgan started, as a result of his practical experience, from the analysis of the results he has obtained and which proved that in reality it is a continuous vibrating phenomenon that is manifest and corresponds to his own calculations *on the basis of the results of the sonic theory*.

This is an important step forward, because when including the remarks, that one derives from practical experience, into a simple mathematical theory, one may easily calculate something that practical experience never shows.

In our case, for instance, one can predict frequencies, rod lengths and drill loads at which drill rods may break. This is a

[3] Ion Basgan, *Operation and Form of Rotary Drills*, Hans Urban Printing House, Vienna, 1934.

TECHNICAL ACTIVITY

Ion Basgan graduated from the High School of Mines and Metallurgy (Montanistische Hochschule 5, Leoben – Austria, with the Diploma No. 10, of the 17th of July 1925, that was validated through the Report No. 44 of the 22nd of April 1926, by the Ministry of Public Works and the Report No. 1,902 of the 13th of February 1961 by the Superior Commission of Diplomas.

He started his practical mining activity at the coal mines of Seegraben-Leoben (Austria) and the iron mines Eisenerz-Steiermark (Austria).

In order to better understand and become acquainted to this domain of activity, Ion Basgan visited the lignite mining site near Vienna, the magnesium mines of Veitsch (Austria), the salt pit of Hallstadt-Salzkammergut (Austria), as well as other mining sites in Austria, Germany, Poland and Romania. In the summer of 1924, he performed a practical training of several months at the oil fields of Pechelbron (Alsace), where he studied the oil exploitation through galleries.

In July 1925, Ion Basgan was employed as a probationer engineer at the 'Steaua Română' Company. Up to 1932, Ion Basgan travelled on foot around all the oil fields in Romania, such as: Moreni, Mislea, Ceptura, Moineşti, Gura Ocniţei, Câmpina, Scăioşi, Podenii Noi, Boldeşti, Migle Steaua Română' Company and the certificates, that were issued by the Mining Inspectorates of Ploieşti and Moreni for leadership in oil and natural gas exploitation are attesting the professional evolution of the young man Ion Basgan. Namely, from the 25th of July to the 15th of September 1925, Ion Basgan worked at the oil fields No. 18 and 22, in the 'Alianţa' system at Pâscov-Moreni and from the 15th of September to the 15th of October 1925, as an oil field worker at the oil field No. 39 in the 'Alianţa' system, in the Southern area of Moreni. From the 15th of October to the 1st of December 1925, Ion Basgan carried out his activity as a deputy

engineer of the Section chief in the Southern area of Moreni, working on the oil fields No.4, 6, 38, and 44 in the 'Alianţa' system. From the 1st of December 1925 to January 1926, Ion Basgan was an oil field worker at the 'Rotary' oil well No. 208 in the Northern area No. 2 C of Moreni. Between the 1st of January and the 1st of April 1926, he was a deputy engineer of the Section chief in the Northern area of Moreni, working on the oil fields No. 206, 208 and 210, all of them working in the 'Rotary' system. From the 1st of April to the 15th of April 1926, Ion Basgan carried out his activity as a manufacturer of oil drilling plants in central workshops and from the 15th of April to the 1st of July 1926, he had the function of deputy engineer of the Section chief in the Southern area of Moreni, on the oil fields No. 3, 4, 6, 38, 39 and 44, that were under drilling conditions and on the oil fields No. 8, 41 and 46, that were going to be rigged up. From the 1st of July to the 25th of July 1926, Ion Basgan worked on the Ceptura oil field (Prahova) as a chief engineer of the Şoimescu Section, working on the oil field No. 1, 2, 3 and 5, of the 'Indian' system and the oil field No. 10 in the 'Rotary' system and attending to the rigging up of the oil fields No. 9 and 13, in the 'Rotary' system.

As a Chief Engineer of oil field exploitation, he passed an exam in August 1926, in order to continue his activity as a Section chief engineer, specialising in the 'Rotary' oil drilling, on various Romanian oil fields: Ceptura (Prahova), Ochiuri (Dâmboviţa) and Moreni. As a Chief Engineer of the oil drilling team for oil exploration, Ion Basgan was in charge of the leadership of the oil fields at Podenii Noi (Prahova) and Scăioşi (Prahova), where he joined in the drilling of several 'Rotary' oil wells (at Podeni), four 'Calis' exploitation oil wells and several 'Rotary' oil wells, that were commissioned to start oil production.

Ion Basgan was a Chief of exploitation in oil and natural gas since the 7th of May 1927 (Patent No. 39), as a result of the practical work he had carried out in this domain and the exam that he had passed in August 1926 at the Ministry of Industry and Commerce.

In 1930, he was appointed Director of the oil field exploitation works of the 'Steaua Română' Company in the Bacău District, at the oil fields of Moineşti, Zemeş and Solon,

where every field included several dozens of production and a few drilling oil fields. In this sense, the oil well No. 29 of Moineşti witnessed the first attempt of Ion Basgan to implement the 'Rotary' drilling in the region of hard rocks in Moldavia. The work experience and method that he applied were to be used later in Galitia - Poland.

In 1931, Ion Basgan was transferred to Câmpina, as the deputy of the drilling section Inspectorate. Therefore, all the drilling works on the company's field were under Ion Basgan's leadership.

His high responsibility and professionalism had earned him the confidence of the company managing staff who entrusted him several high difficulty tasks: he was required to do the fishing job at the oil well No. 11 of Boldeşti, that had been drilled with violent outburst into the air and to work at the oil well No. 471 of Scorţeni – Mislea, where there had been problems with the deep 'Rotary' drilling.

Ion Basgan carried out a wide range of specific activities at the 'Steaua Română' Company, including: exploitation drilling, as well as high-productivity oil wells drilling. This kind of practical activity was a good opportunity for Ion Basgan to undertake research and gain experience from the geological, technical and economic point of view, resulting in the elaboration of several significant works in this domain.

Between 1932 and 1933, Ion Basgan joined in the leadership of the Oil and Mining Section, as a referent of the Oil and Mining Section and a founder member of the Association for the Study of the Economic Situation in Romania and on this occasion he published a series of economic syntheses studies, covering the entire oil industry and the oil-extraction industry. He established the statistical framework for the monitoring of various sectors and phenomena specific to these industrial and economic activities. As we have mentioned before, as a referent at the Oil and Mines Section, Ion Basgan brought an excellent contribution to the outlining of the shortcomings of the oil policy in Romania as compared to the world corporations. On this occasion, Ion Basgan elaborated the general framework for an independent economic policy through the nationalisation of the Romanian oil

industry and the industrialisation of the Romanian economy. At the same time he established contacts with similar State-of-the-Market Institutes from abroad, by visiting the Vienna, Paris and London institutes.

In 1933, he was appointed the official delegate of Romania at the first World Oil Congress in London, by the Ministry of Industry and Commerce. On this occasion, he represented Romania at the opening session of the Congress and he participated in the debates with a report on the results of his scientific research that he had been carrying out in order to supplement Archimedes' Principle and to study the transmission of sonic energy through the drill column. 'The Petroleum Times' magazine of the 22nd of July 1933 contained a report of the first World Oil Congress in London and a photo of the official participants and delegates from all over the world, as well as a summary of Ion Basgan's report. When he was in London, he attended the University summer courses technical knowledge, Ion Basgan passed con brio his Doctor degree examination on the 7th of July 1933 at the Montanistische Hochschule, in Leoben, Austria, with his work *'Die Arbeitsweise und Form des Rotary Meissels in Erdölgesteine'*. He was awarded the Doctor degree in mining sciences – *Doktor der Montanistischen Wissen-Schaffen* (which was validated by the Superior Commission of Diplomas of the Ministry of Education, with the equivalent title of *'Doctor Engineer'*, No. 1,279 on the 30th of December 1965).

Ion Basgan's graduation paper was very appreciated by specialists and it was retained by the examination commission for publication in the school year book and by the Hans Urban Printing House of Vienna. In this sense, Prof. Dr. Eng. Pirkl and Prof. Eng. Fulglewicz mentioned the following in the report of the school Rector:

'Engineer Basgan had the opportunity to analyse the operation of the Rotary driller during several Rotary boring operations, that were carried out on the oil fields of Romania and to draw the attention on the rhythmical vibrations that occur in the drilling rods. After an accurate appreciation of these important phenomena, he established their laws, first in a practical manner, then by mathematical calculation. As a result of his deductions

and conclusions, Ion Basgan presented rules and formulae to the drilling technician for the correct dimensioning of the drilling equipment, for the drilling pressure, as well as for avoiding the resonance effects of the vibrations on the drilling rods'.

The paper represents a precious contribution to the technical and scientific bases of the Rotary drilling system.

Both specialists made an extremely favourable conclusion on the theoretical and practical value of Ion Basgan's Doctor thesis and he was awarded his Doctor Diploma in a solemn festivity, in the presence of the Romanian minister in Vienna, Dr. Caius Brediceanu, who was a special guest of the school Rector. On this occasion the Romanian flag was raised and the lectures that were held were published in the Austrian and Romanian newspapers ('Obersteirische Volkszeitung'*, of the 8th of July 1933 and the Universe, of the 16th of July 1933). When he had received the Doctor degree, Ion Basgan worked as an honorific course assistant at the Department of oil study, being appointed by the Professors' Council of the Academy of High Commercial and Industrial Studies of Bucharest, on the 26th of January 1934).*

That is how Ion Basgan had made his way painstakingly, yet gloriously into the realm of the technical activity.

From 1933 to 1944, Ion Basgan would lecture a course on the '*Efficiency of Oil Enterprises'*, as a course assistant of Prof. Dr. Eng. V. Iscu from the Academy of High Commercial and Industrial studies of Bucharest, at the Oil study Department.

In 1934 he undertook the technical leadership (between the 15th of December 1934 and the 13th of May 1941) and later the administrative leadership (between the 13th of May 1941 and the 31st of December 1943) of an oil company, the 'Romanian Oil Company' that had been set up with a small internal capital just a little before. In nine years, i.e. before 1944, using low financial and technical resources, working intensely while being deeply involved in the leadership of both the site and the company, Ion Basgan succeeded in developing that company into a prosperous oil enterprise, with a daily output of 10 to 14 wagons and a significant drilling and production stock.

Three production oil-fields were opened by the above mentioned company, namely: the oil field of Moreni with the

wells No. 2A, 3, 4, 5 and 6 having 9,481 m in total and an output of 186,444 t and the oil field of Ghirdoveni, Prahova with the wells No. 471, 412 and 473 having 5,799 m in total and an output of 76,991 t ; the oil field of Răzvad – Dâmboviţa with the well No. 1 having 1,794 m and an output of 2,782 t.

In 1937, Ion Basgan attended the 2nd World Oil Congress in Paris, where he presented several applications of his Patents covering the new modern drilling methods. The article *'Progress in the Drilling Technique through Dr. Basgan's Method'* that was published in the '*Annals of Mines*' No. 7 of 1938 contained a series of technical data on the performances that he had attained, with the aim to disseminate the experience he had gained in this domain.

The 'Romanian Oil Company' was also responsible for the execution of ten water exploration wells for the army, in the unyielding Dobrudja rocks. In this domain, Ion Basgan pointed out a series of aspects when speaking on the topic *'The Water problem in Dobrudja'* at the AGIR Congress of 1943 and on the topic *'Water supply in Dobrudja'* at the Romanian 'Academy of Sciences'. As the unique delegate administrator of the 'Igienco' Company, Ion Basgan ensured the export of petroleum wax, thus covering the army demands of this product between 1941 and 1943.

At the same time as he carried out the above mentioned activities, in 1940 Ion Basgan was appointed by the Ministry of National Economy (Decision No. 142,583/1940) the technical adviser of the Oil Inspectorate that had been founded some time before, as a specialist in drilling and oil field exploitation. The Propaganda Ministry invited Ion Basgan (through the Address No. 1,454/1940 to draw up the paper *'Romanian Oil and Natural Gas'*. In July 1940, Ion Basgan was invited by Prof. Dr. A. Benz of Berlin to collaborate in an anniversary issue of the *'Oil und Kohle'* magazine for oil industries in the South-East of Europe. On this occasion, he published two articles in the above mentioned magazine that focused on the progress achieved by the Romanian engineers in the domain of oil industry.

A characteristic feature of Ion Basgan's activity is that it more often than not encompassed new domains always yielding

PATENTS, STUDIES AND PUBLICATIONS

The brilliant Romanian scientist Ion Basgan was the author of a broad range of patents, studies and publications, presented below in this chapter. Nowadays, some of their applications are used worldwide in the oil industry.

Patents

- ***Method for the increasing of the efficiency and the improvement of rotary drilling, by means of rotary percussion and damping of hydro-mechanical pressure*** (Romanian Royal Patent, No. 22,789 of 1934).
- ***A new process of drilling wells for oil and gas, using rotary and percussion movements combined, whereby efficiency of drilling operation is increased, by means of controlling hydro-mechanical pressures*** (USA Patent No. 739,632 of 1934).

Mr. William J. Wigney, the Director for Europe of the National Supply Corporation mentioned the following concerning this Patent, in his article entitled *'Developments in Oilfield Equipment During 1934'*, that was published in The Petroleum Times London, of the 19th of January 1935: '*Engineer Basgan of Romania has just evolved a drilling system combining rotary and percussive movements by means of pressure pulsations. This is being watched with great interest, but it is much too early, to draw any conclusions as to its successful use'*.

Professor Dr. L. Mazarec, ex-President of the Romanian Academy mentioned the following in *'The General Course of Minerals and Rocks'*, the 2nd Part, *'The Constitutive Substances of the Earth Layer'*, page 411:

'*Usually, deep oil-wells drilling results in a deviation from the vertical by tens and even hundreds of meters. It is by applying the Romanian Ion Basgan's principle when drilling for the 'Mining Credit' Company, that the 'Romanian Oil Company' attained 1915 m in 30 days in Pliocene with the oil well No. 470 called 'The Mining Credit', at Girdoveni, Ţuicani, including all the operations, that is a medium advance of 64 m per day, at an average drilling of 125 m per day, with the oil well in perfect vertical direction'.*

In the case of *the heavy proportional rods drilling*, the author showed on the basis of his research, that the hydrostatic pressure of the liquid at the drilled hole was not taken into account before 1934 and he discovered the compressed and the neutral zones of the drilling rig. The removal of the compressed zone from the heavy rods represents the invention made by the author in 1934-1937 through the Romanian and American Patents for the implementation of the heavy proportional drilling rods. These heavy proportional rods have a weight equal to that of the liquid volume that is displaced by the drilling rig, plus the load that is exerted on the drill (drilling pressure) and consequently varies with the depth of the hole.

The intermediary weight value between that of the heavy rods of 1934 and the value that is stipulated in the Patent is consistent with the program of this method.

The rotary percussion drilling, also known as the sonic or vibrating drilling, was patented by the author in Romania and the USA between 1934 and 1937. This drilling method is achieved through the utilization and adjustment of the existing vibrations in the drilling rig of the Rotary system or by setting up a new vibration regime to the drilling rig during rotation, either from the surface, or from the underground, as far as possible to the drill only, by applying the principle of the pneumatic or hydraulic hammer, that is based especially on resonance and magnetostriction.

- ***Rotary Drilling Apparatus***, USA Patent No. 2,103,137 of the 21st of December 1937. The Patent is guaranteed by the USA Government for originality.

These Patents contain modern drilling methods, namely the heavy proportional rods drilling and the sonic drilling (and they were improved through the Patent No. 37,743 of January 1945, entitled *'Drilling by means of Rotary Hammer'*).

The heavy proportional rods drilling was based on Archimedes force and its effect: compression from the lower part of the drilling rig and the neutral zone, that represent original discoveries with unknown effects, that resulted in the deviation of oil-wells (the *'Basgan Effect'*). In order to remove the compressed zone from the drilling rods, there were introduced the heavy proportional rods whose weight was equal to the weight of the liquid volume being displaced plus the drilling pressure, in order to obtain vertical holes, with 30% higher efficiency per every drilled meter.

The simultaneous Rotary percussion drilling, the sonic drilling, was founded on the sonic energy transmission for the first time through the drilling rig to the drill, by performing simultaneous percussion and rotation, resulting in vertical holes with higher efficiency.

These Patents have been applied all over the world. The heavy proportional rods drilling has been applied immediately after patenting.

Heavy drilling rods were immediately extended from a couple of meters to 200 m in length, in the American industry, as well as in all the countries with a developed oil industry. Rotary percussion drilling was utilized at international scale.

Unfortunately, the USA Patent was put under distraint by the American Government during the war until 1965, when the Distraint Order was abrogated through the Order S.A. 838 that was communicated by the Ministry of Justice of the USA, No. 20,530 of the 30th of November 1965.

In Romania, the heavy proportional rods drilling was successfully applied in the past by some Romanian oil companies (see *'Annals of Mines'* No. 7/1938, cap. VI, 25). A 30% reduction of drilling cost was obtained by the application of this invention.

The Ministry of Oil experimented this method on the oil-field of Roşiori-R. Sărat in 1961, with a 30% higher efficiency.

Innovations

- ***The Utilization of the Heavy Pipes at the Crelius KAM Prospecting Rig and any Prospecting Rigs and Drilling Systems of this Type*** (January 1951).

The innovation was attested also by the Direction of Inventions and Innovations through the Report No. 44 of the 22nd of June 1953 and disseminated in Romania to several ministries through the Report No. 99 of 20th of November 1955. Based on this innovation, the Ministry of Metallurgy launched into manufacturing a prototype at the 'Republica' Works, for which Ion Basgan received a reward in 1954.

An increase of 30% of the work speed and 10 to 15% savings for the exploitation cost resulted from the expert appraisals and an annual economy was calculated for Romania of over 30 sssn lei.

- ***Simultaneous Rotary Percussion Drilling*** (registered at I.S.P.A. and M.I.P.C. in 1960/1961).
- ***Heavy Proportional Rods in Rotary Drilling*** (registered at I.S.P.A and M.I.P.C in 1960/1961).
- ***Water Supply at S.M.T. Topraisar*** (for which Ion Basgan was rewarded from the Agriculture Ministry funds in 1956.
- ***Drilling by Means of the Drilling Rig Similar to the Lead String*** (that was first committed to be design by the Water State Committee through IPACH in 1964).

Studies and publications

- '***The Oil Region Moreni-Gura Ocniţei***' (a study published in collaboration with engineer I. Cardaş in Romanian and French, in '*Annales des mines de Roumanie*', 1926, No. 8).

This work was published at a time when the works on the Moreni oil field was in full swing. The Southern side of the 3rd

Meotic layer was unknown and the Northern side was anomalous with difficulties at water stopping at its launching into production. Since the oil wells were blowing into the open air and the drilling technique was not yet perfected, because the zone had not been thoroughly explored by then, thousands of crude oil wagons and billions of cubic meters of gas were lost.

Connections between various exploitation sites were made in this work. It presents a map of the isobath of the Moreni Dacian layer on the Southern site and of the Meotic layer isobath on the Northern side, for the entire region, stating several conclusions that would be taken into account for its subsequent development. The salt limits were defined by a transversal profile that was drawn to scale on the basis of the drilled salt pits, some of which had even passed through the salt. This standard profile of the region would be quoted any time when the Moreni region was to be mentioned (see *'Geology of Petroleum'*, page 94, by William Harves Emmons, Professor and Head of the Department of Geology and Mineralogy, University of Minnesota).

- '***Waukesha Engines in Rotary Drilling***' (a study published in Romanian and French, in the *'Romanian Annals of Mines'*, in the Review of the Association of Engineers and Technicians of the Mining Industry (Bucharest, the 12th year, No. 11, November 1929, pages 537-539).

The study described the first experiment that had been made in Romania by the author, utilizing the American Waukesha engines that would be largely used later in the Romanian oil industry; it also presented the economy which may be obtained through the drilling by thermal engines. Later, this process would be largely developed.

- '***Oil Industry***' (1929).
- '***Oil Exploitation on the Teleajen Valley***', published in Romanian and French, in *'Annales des mines de Roumanie'*, 1930, No. 10. A review was made on this work in *'Moniteur du pétrole roumain'*, Technical Chronicle, No. 22 of 1930, page 1,279, containing the following appreciation:

'In his study entitled 'Oil Exploitation on the Teleajen Valley', Mr. Ion Basgan focuses on the importance and the

results of the exploitations in these regions that are estimated to be a most valuable reserve for our oil industry. This note cannot present in detail the interesting guidelines that he gives for each of these regions, namely Copăceni, Scăioşi and Boldeşti, regarding their geological characteristics. We shall insist nevertheless on the connections in oil wells drilling and others. The study is characterized by the fact that the author's comments are based on accurate data, the author's own remarks, which he had the opportunity to gather and systematize while he was in charge of the exploitation, drilling and extraction in the respective regions'.

- '***Operation and Form of the Rotary Drill in the Romanian Oil Rocks***' (published by the Romanian Academy).

The utilization of the Rotary drilling, that had been introduced from America, was generally applied after the year 1925 in Romania. Nevertheless it was not supported by an adequate technical and scientific literature, either in Romania or in the USA. It was the outcome of practical work and drilling still belonged to the domain of art more than to that of technique and science.

This work analyzed and established for the first time the scientific principles and the laws that define drilling, such as: the principle of the drilling feed, the diameter of the drill and of the holes, the penetration and the factors affecting the feed, the drilling pressure, the laws of mud circulation, the functions of the mud and its properties in drilling, the rotary speed, as well as the form and the adaptation of the drill to the variation in soil hardness.

This work, with a foreword by Eng. Teodor Ficşinescu, Professor of drilling at Politehnica School of Bucharest, was presented to the 'Romanian Academy' by Professor L. Mrazec, during the session of the 11th of March 1932 and it was published in *'The Memorials of the Scientific Section of the Romanian Academy'.*

In this respect, Prof. Eng. T. Ficşinescu spoke of this work in the following terms:

'The analysis of the action and form of the Rotary drill in the oil rocks, that is made by a technician as the engineer Ion Basgan, a person with perfect scientific and technical training,

- '***Oil Exploitation in Romania – Oil Extractive and Processing Industry***' (*'Romanian Annals of Mines'*, No. 1 of the 20th of January 1941).
- '***Sfruttamento del petrolio in Romania***' (*'La Revista Italiana Del Petrolio'*, Roma, Febbraio 1941 – XIX).
- '***Caratteristiche degli olii greggii romeni***' (*'La Revista Italiana Del Petrolio'*, Roma, Gennaio 1941 – XIX).
- '***The Question of Water in Dobrudgea***' (published in the *'A.G.I.R. Bulletin'*, No. 10 of October 1943 and in miscellaneous excerpts).
- '***Political and Economic Principles in the Oil Legislation of Romania***' (*'A.G.I.R. Bulletin'*, No. 10 of October 1943 and in miscellaneous excerpts).
- '***Mines***' (quarterly chapter issued in the *'Bulletin of Romanian Institute of Economic Situation'*).
- '***Increase of Oil Production***' (published in the *'Romania'* newspaper, of the 14th of October 1940 and in *'La Stampa'*, of the 6th of November 1940).
- '***Principles of National Oil Policy***' (*'The Universe'*, the 7th of November 1940).
- '***Romanian Oil Industry and the Spirit of New Times***' (*'Oil – Bearing Romania'*, the 13th of July, 1940 and the reviews of the *'A.G.I.R. Bulletin'*, No. 9/10, September, October 1940, page 193).
- '***Oil Situation and National Interests***' (*'Oil – Bearing Romania'*, the 22nd of August 1940).
- '***Oil Exploitation in Romania, Oil Extraction and Processing Industry***' (*'Romanian Annals of Mines'*, No. 1 of the 20th of January 1941).
- '***The New Oil Law and the National Capital Law***' (see '*Oil – Bearing Romania*', the 1st of August 1942.
- '***The Water Supply in Dobrudja***' (lecture held at the Academy of Sciences, in Bucharest, December 1943).
- '***Proportional Heavy Rods Drilling***'. This work represents the written text of Ion Basgan's lecture which he held at the headquarters of A.S.I.T. on the 11th of April 1951, containing a technical and scientific description of his innovation which he had introduced in January 1951 in prospecting drilling exploitations.

There are also included quotations from foreign authors, who made a confirmation of the scientific and technical principles underlying this improvement of the drilling technique.

- '***Drinking Water Supply in the Countryside***' (published in the *'Hydrotechnics*' magazine, No. 8/1959).
- '***The Products' Quality of Sovromutilajpetrolifer***' (Bucharest, January 1954). The work includes the following chapters: How the oil equipment industry came into being in Romania; Technical and scientific measures for the improvement of the oil equipment quality; Technical and organizational measures for the improvement of oil equipment quality; Quality improvement by means of new high technique equipment; Quality improvement in oil equipment repair; Critical remarks on the utilization and maintenance of the oil equipment on the oil fields; Suggestion for the remedy of the shortcomings in the utilization and maintenance of oil equipment.

This work had been required by the Ministry of Metallurgy.

- '***A New Science and its Important Applications*' (*'The Economics'* *Life'* magazine, the 4th year, No. 21, the 27th of May 1966, page 11).
- '***Ludovic Mrazec***' (*'The Economics' Life'*, the 4th year, No. 34, the 26th of August 1966, page 10).

Conferences

- '***Oil Industry***' (held at 'Prof. N. Iorga' University, in Vălenii de Munte, July 1929).
- '***The Technique and Scientific Interpretation of the Rotary Drilling System***' (Politehnica Society, the 3rd of May 1933, under the boarding of Prof. Buşilă).

The technical review of the *'A.G.I.R. Bulletin'*, of May 1933, published a report on this conference, concluding that: '*Mr. Ion Basgan presented original analytic calculations for certain phenomena, that were very little known and the awareness of which may soon bring a change in the deep drilling system*'.

'***Remarks on the Occasion of the World Oil Congress***', ('Radio Bucharest', the 7th of November 1933).

'***Oil Policy in Keeping with the Situation of the Explorations and the Fuel Matter***' (conference held first on the 19th of April 1935 in the cycle of conferences organized by I.R.E. at Politehnica Society and repeated at the request of his colleagues from the Association of Mining Engineers in Moreni. The written text of the lecture was published in *'Curentul'* magazine, on the 24th of April 1935 and in the *'Movement'*, on the 27th of April 1935).

On this occasion, Prof. Eng. C. Buşilă made the following comments: *'Mr. Ion Basgan held a beautiful conference. We enjoyed his lecture: first of all it showed his courage to state his own remarks and conclusions in the oil policy'.*

Prof. T. Ficşinescu appreciated this lecture in the following terms: *'I cannot help praising the outstanding contribution of Mr. Basgan from the documentary point of view. He has gathered a series of facts that are extremely interesting, put them in an attractive form and held a beautiful and useful lecture to us'.*

Prof. Sp. Iacobescu of the Academy of High Commercial and Industrial Studies of Bucharest would state the following: *'I heartily join the spirit of Mr. Basgan's lecture; he made a thorough description of the oil policy to us'.*

This work was rewarded by the Romanian Academy. The debates that were held on this conference were published in the *I.R.E. Bulletin*, the 3rd year, No. 4, of December 1935, page 1,035. The written text of the report that was presented by Prof. L. Mrazec to the Romanian Academy was published in the I.R.E. Bulletin, the 4th year, No. 4, December 1936, pages 1,035 and 1,036.

- ***Professional Course Held at the Industrial-Import Enterprise*** (a cycle of four conferences on internal combustion engines, their classification, technical characteristics, spare parts, technical and commercial documentation, 1951).
- ***Professional Course on Oil Wells Drilling*** (training course held at Sovromutilajpetrolifer and at the Ministry of Agriculture for the upgrading of the General Direction staff, 1952, 1953).

- ***Drinking Water Supply in Dobrudja*** (conference held at the Ministry of Agriculture in May 1957).
- '***Sonicity in Oil Exploitation and Water Supply***' (lecture held at the science and technique courses of the Academy of the Popular Republic of Romania, *'Scânteia'* newspaper, the 15th of July 1957 and the *'Informative Bulletin'* of the Popular Republic of Romania, the 1st of March 1950).
- '***Sonicity in Oil Exploitation and Water Supply***' (lecture delivered at the science and technique courses of the Academy of the Popular Republic of Romania, on the 7th of November 1958, on the following topics: sonic drilling, ultrasonic drilling, sonic pumping and sonic paraffin removal).
- '***Drinking Water Supply in the Countryside***' (lecture held at the Ministry of Agriculture, in October 1958).
- '***Debates in Sonicity***' (lecture held at the Academy of the Popular Republic of Romania on the 5th of October 1961, during the work session of the Academy, that was presided by I. S. Gheorghiu, the vice-President of the Academy and the Romanian scientist George Constantinescu).
- '***Applications of Sonicity in the Technique of Drilling and Extraction***' (lecture held at the science and technique courses of the Academy of the Popular Republic of Romania on the 22nd of December 1961).
- '***Romanian Contributions and the Priority of Discoveries and Inventions in the Science and Technology of Drilling***' (lecture held at the Romanian Library of New York, on the 11th of October 1972).

Works rewarded by the Romanian Academy

- '***Oil Policy in Keeping with the Situation of Explorations and the Fuel Matter***'.

REPORT

The undersigned, engineers, members of the National Liberal Party, have met today, on the 19th January 1945 and decided on the foundation of the Society of Liberal Engineers, in accordance with the intention and demand expressed by Mr. Dinu Brătianu, the President of the Party and with the tasks that we had received from Mr. Gh. Brătianu, the President of the Circles of Studies.

The Society of Liberal Engineers operates in the traditional spirit of the National Liberal Party that has been gloriously sustained by the collaboration of remarkable engineers of the past, such as the Brătianu brothers, Duca, Anghel Saligny, Mrazec and others. The society will try to study in a realistic and objective light the general technical problems that Romania has been facing and that shall be dealt with by the National Liberal party decisively.

It is through the Technical Circle of Studies, through lectures and conferences that the Society of Liberal Engineers shall try to bring its contribution in the framework of the general activity of the Party.

With this end in view, there shall be set up a delegation represented by Prof. Eng. Gr. Vasilescu, Eng. Basgan, Eng. Braniski Al. and Gh. Veniamin, in order to gather up the General Assembly, to establish the activity programme, as well as the trends that must be followed.

Ion Basgan was appointed President of the Society of Liberal Engineers 'Vintilă Brătianu' and Eng. A. Munteanu was its Secretary. A series of materials were elaborated in the framework of the Industrial Policy section of the Society of Liberal Engineers, in order to offer solution of economic revival, industrial revival, in particular, to the National Liberal Party and to the country in general.

In the framework of the Circle of Studies of the National Liberal Party, the Trade Section, a team of specialists, including also Ion Basgan, drew up a report '*regarding several pressing measures, practical measures, in order to ensure a better development of the commercial activity in Romania' for the Armistice Commission.'* C. Dinu Popescu was the speaker in charge of this document.

The report that Ion Basgan presented in the framework of the Circle of Studies of the National Liberal Party, in which he stipulated the necessary conditions that were required to avoid the

manifestation of an autarchic policy, is but another opportunity for us to remember his ability to understand and make a synthesis of the phenomena that the Romanian economy was facing at that time.

A report containing the request made by Ion Basgan and other renowned engineers for the foundation of the Society of Liberal Engineers 'Vintilă Brătianu'.

In this respect, he estimated that it was possible to renounce the autarchic policy only provided an agreement could be made between the majority of Governments or among all the States, so that the following conditions could be met:

'...the State Governments should beforehand agree on a method of reducing the quantitative control of foreign trade and on a viable financial and economic system for resuming economic activity;

– to ensure political stability;

– to renounce the quantitative control of the foreign trade through the Preferential Union between States;

– to avoid economic slumps and to ensure the integral and continuous utilisation of labour by an agreement between States;

– to achieve a programme in order to resume the co-ordinated activity in the framework of an economic plan between States, that should thoroughly utilise labour and ensure a unitary economic security;

– to achieve international actions that should result in both maintaining the stability of economic exchanges, and ensuring the reinstatement of the production and trade credit in those countries that had been afflicted with unfavourable consequences of war;

– to achieve an economic system that should offer wider possibilities of co-operation to his own generation, in order to create a better world with thriving economy perspective.'

Original sheet of Ion Basgan's manuscript containing suggestions regarding the economic development of Romania.

Under the context of what has been mentioned above, mention should be made of the conditions that Ion Basgan considered to be necessary in order to avoid the return back to the quantitative control of the outer trade. Ion Basgan also maintained that these conditions should have been promoted in the framework of the economic policy of the National Liberal Party:

– the instability of currency had caused the quantitative control of foreign trade, in order to fight against dumping; an international action, that should aim at simultaneously maintaining the stability of exchanges and the reinstatement of production and trade credit in the countries that have suffered the damaging effects of the war;

– the effect of inflation is unemployment and limitation of trade; in this sense, in order to obtain the stability of currency, a special mechanism must be created that should permit to supply credits, in order to cope with the changes that had become manifest in the balance of accounts, and to proceed to methodical changes in the parity of the currency of various countries; to co-ordinate and align the financial national policies and to facilitate trade and multilateral clearing (Ion Basgan recommended that the conclusions regarding the future international financial stability that had been expressed by Victor Bădulescu at Bretton Woods should be re-examined).

Ion Basgan considered that the national currency remained the payment means for both international relations, as well as for external liabilities. The gold standard would remain the base of the monetary system, with certain limitation. Therefore, the stability of the Romanian currency had to be ensured through financial co-ordination and aligning.

In this sense, the signatory States should take the following measures: to refrain from availing themselves of the monetary depreciation as a competition means on international markets, as it happened between 1930-1939, in the case of the pound and the dollar; currency alignment should not be performed by fixing the currency parity in gold or dollars.

THE BASGAN EFFECT AND ITS APPLICATIONS

The Archimedes' Principle and Oil Drilling. Between 1925 and 1933, Ion Basgan carried out an extensive research aiming to improve the technological process of drilling and to identify the causes of the drilling holes deviation. His work ended when he discovered that the drilling rig when operating in the liquid is subjected to the effect of the Archimedes' hydrostatic pressure. Never before had the Archimedes' hydrostatic pressure been taken into account in the process of drilling.

The act of creation. A specific attitude if Ion Basgan.

Its effect was not on the centre of gravity of the drilling rig, but on the lower surface of the bit. Thus it was for the first time in the history of the universal science and technique that Ion Basgan supplemented the Archimedes' Principle as it was applied at high depth liquid drilling.

According to the classic principles and interpretations, it was believed that the hydrostatic Archimedes' pressure applied

at the centre of gravity of the drilling rig was proportionally distributed along the drilling rig, on its entire length before reaching the bit under stress. According to the classic definition of the Archimedes' Principle, any vertically suspended column in a lower density liquid than that of the drilling column material was considered to act as having a new specific density smaller and equal to the difference between the specific weights of the material and the liquid, a fact that generated the notion of apparent weight. This way of thinking and solving the problem would ignore the phenomena taking place at the lower end of the drilling rig.

As a result of his research, Ion Basgan admitted first that the area of the floating force application was at the lower end of the drilling rig. Thus he discovered and then calculated the compressing zone and the position of the neutral zone, and made a new interpretation of the Archimedes' Principle. This effect of the hydrostatic force, the compressed zone and the neutral zone, that were discovered by Ion Basgan were defined as the Basgan Effect. According to the Basgan Effect, the distribution of the axial unitary efforts in the drilling rig does no longer agree to the old conception that the drilling rig has only a tension in the range from zero (at the drilling bit) to the maximum value (at the upper hook of the drilling rig). According to the Ion Basgan's theory (published in the theses of his inventions of 1934-1938), a maximum compression takes place at the bit, in the lower end of the drilling rig that stays in the liquid with the base free of it. The compression value decreases down to the zero value in the neutral zone, then it enters into the tension zone that reaches up to the hook.

The length of the compressed zone of the drilling rig increases accordingly to the depth and it represents the main reason of drilling holes deviation. As a result of drilling rig rotation that may reach up to 300 rot/min, elastic bending takes place that is higher in the compressed zone, which explains the loss of steady balance of the drilling rig, deviation and drilling rod and bit breakage. Essentially, the length of the compressed zone of the drilling rid is equal to the length of the drilling rig

immersed into the liquid multiplied by the ratio of the specific weight of the liquid and that of the steel.

The result of the Archimedes' hydrostatic pressure is in direct proportion to the depth and length of the drilling rig immersed into the liquid, weight of the displaced volume, respectively. This represents 15-20% of the drilling rig weight that may reach approx. 30 tons under the conditions and the depth of modern drilling. Therefore, on the basis of the research and result obtained, Ion Basgan gives the following special interpretation to the Archimedes' Principle: *'A body in a bar form, partially and vertically immersed in a liquid is pushed upward by a force equal to the weight of the displaced liquid, with the upwardly acting force being applied on lower surface of the body.'*

Based on the scientific and technical provisions of his interpretation, Ion Basgan issued a series of new laws specific to the hydrostatics and the drilling technique, namely: 'the lower part of drilling rig vertically and partially suspended in a liquid is compressed as a result of the displaced liquid by the entire drilling rig'… 'The lower part of the drilling rig that is vertically immersed into the liquid and partially supported at the lower end is under compression and is equal to the weight of the displaced liquid by the entire drilling rig plus the reaction of the support'. 'There is a neutral zone along the vertically and partially immersed bar, separating the compressed zone from the tension zone. This neutral zone 'travels' along the bar depending on the depth to which the bar is immersed and on the support load'.

Proportional heavy rods drilling. Ion Basgan's discoveries made it possible to deal with the compressed area of the drilling rig by means of proportional heavy rods, thus lowering the neutral zone in the mass of the heavy rods and practically acting in perfectly vertical holes, permitting to reach ever deeper down into the land. The weight of the new type of rods, called proportional rods is equal to the weight of the displaced volume of liquid by the drilling rig, plus the drilling pressure necessary for rock piercing. In this respect, the following example is to be mentioned: with a drilling rig of

100 tons, the displaced volume is 15 tons, the force corresponding to the drilling pressure is 7 tons and the weight of proportional drilling rigs is 22 tons. Mention should be made that the principle is correct also for aluminium and plastics drilling rigs.

To get the scientific, technical and economic importance of this invention it should be noted that before 1934, drilling was made by means of heavy long rod (bit), also called a 'drill-collar'. Its length was from 6 to 9m and its weight approx. 1 ton. It was only experimentally that 2-3 tons rods had been used. After patenting and applying this invention, the weight of the rods increased to 20-30 tons, drilling vertical holes, down to 9000 m.

As we have mentioned before, the new procedure resulted in an output increase of about 30% at the cost of one drilling metre. Breakage of rods and hooking was eliminated.

In 1954, the 'Republica' Works started the production of the first new product, 'heavy rods', based upon the technologic transfer of Ion Basgan's invention.

In the USSR the method of modern drilling as initiated by Ion Basgan was introduced in the university courses in 1947.

In the USA, no sooner than the Patent of 1937 was obtained, the proportional heavy rods drilling was implemented, with rods 200 m to 300 m in length and 10 to 30 tons in weight. The scientific Romanian and international circles were involved in this special event, resulting in a series of technical and scientific controversies, debates and analyses.

Things were going to quiet down only in 10 or 20 years, when renowned American scientists, such as H. G. Texter, Ion L. Homquist, H. G. Handelman, P. Moore, Prof. O. Gatlin, D. M. Best, U. T. Okan had reached the same conclusions as Ion Basgan.

In Italy, the following comments were made in the 'Italiano del petrolio' of the 30th of April 1967: *'The methods invented by the Romanian Ion Basgan are applied in the oil exploitations of the company 'Eri-Agip'. The drilling wells are perfectly vertical and the works are performed under very advantageous economic conditions. Other wells that where these methods are not applied, there are registered deviations from the vertical*

between 15^0 and 20^0. This is a remark pledging for extending the methods of the Romanian inventor.'

Sonic drilling. Starting from the 'Theory of Sonicity', as a result of some extensive research taking place mainly on the oil fields of Moineşti, containing very hard rocks, Ion Basgan established the conditions that are specific to the transmission, by means of mud pumps and by sonic waves of a supplementary energy from the surface through the drilling rig to the bit. Taking as a starting basis the laws of sonic energy transmission under the form of waves through solid liquids and gas, as well as the remote sonic energy retrieval, Ion Basgan calculated the mechanical work, that may be captured at the bit, through sonic energy transmission from the surface, in order to simultaneously convey rotation and percussion shocks to the bit.

He succeeded to produce a kind disturbing penetration force. Under these conditions, direction amplitude, and frequency of bit oscillations, the mechanical work of the bit, as well as the resonance regime at the bottom of the hole have maximum values. He obtained bit oscillation of several centimetres during his oil field experiences. That was low Ion Basgan achieved a unique drilling system, that would integrate the advantages of Rotary drilling and percussion drilling, namely quickness and vertical penetration, respectively. Therefore, the assertion is true that Ion Basgan is the inventor of the 'rotary simultaneous drilling, the sonic drilling'.

This new drilling method that increases the drilling output, resulting in vertical holes was patented in 1934 in Romania and 1937 in the USA.

Later, in the USA, a series of patented improvements were made based on the Ion Basgan Patent. This 'Vibrating' drilling system was tested on the oil fields, by means of percussion, utilising the magneto-static method, underground turbines, and other bottom engines. Very good results were attained during the experiments, up to drilling indices three times higher than usual. Laboratory results also attested the essential progress in deep drilling that was achieved by applying the complex method of percussion and rotation.

A short description of Ion Basgan's inventions, as mentioned above, is a unique opportunity to show an attentive reader the way these 'jewels' of the Romanian creativity were produced.

I. **Rotary drilling procedure and system with sonic vibrations conveyed through the drilling fluid to the oil well bottom** (Patent 3,507,341, 21 April 1970, USA). The Patent refers to a rotary hydraulic drilling system, by means of percussion vibrations and brings about an improvement of the preceding methods.

This system includes drilling equipment with adequate frequency, as well as the required endowment including the bit, the drill collar, drilling rods and the lifting system, the crane, vibration energy generator.

Ion Basgan's invention was meant to deal successfully with the disadvantages of the traditional methods, without utilising complex tools and devices.

The oil drilling mud has a very high pressure at the base of the oil well, reaching up to approximately 140 000 lb/in (980 kg/cm^2) at 5 mile in depth. This pressure acts on the drilling rig upwardly, resulting in the compression of the lower part of the oil rig on a certain length. Above the compressed section, the drilling rig is under stress, as a result of suspension and under its own load with the neutral zone in between these zones.

Essentially, the invention refers to the fact that the neutral zone of the drilling rig is lowered by utilising a heavy drill collar, 10 to 15% heavier than the displaced drilling mud. This makes the drilling rigs to be maintained under stress. The compressed zone is comprised in the drill collar mass, thus drilling rods bending can be avoided.