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K. E. TSIOLKOVSKIY AS A FILM CONSULTANT

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A. S. Fedorov†

The cinema has brought us a live view of the prominent Soviet /117* scientist Konstantin Eduardovich Tsiolkovskiy. Documentary frames taken during his life have entered into numerous films on space exploration and into popular scientific films dedicated to the work of the founder of rocket flight and astronautics.

Tsiolkovskiy clearly saw the great possibilities of motion pictures for popularizing scientific knowledge, including ideas of flights to other worlds. However, the first fantastic films on space travel, made in the dawn of the 20th Century, not only did not satisfy the scientist but brought forth sharp criticism on his part. Lecturer of the State Institute of Cinematography N. A. Salamanov recalls his meeting with Tsiolkovskiy in 1931. "Many years ago," said Tsiolkovskiy, "a friend convinced me to go to the movies and see the picture 'Flight to the Moon'.[1] It was terrible nonsense, but afterwards I several times returned in my thoughts to the film, since despite the overabundance of nonsense it proved to be the case that film can show the most fantastic, extraordinary things. How they do these things, I do not know, but some of what I saw was done cleverly. And I thought that the future, even the remote future, not only of the development of aviation but also the future of astronautics, even before people began, for the first time, flights into space near the earth, can be shown on the motion picture screen."[2]

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*Numbers in the righthand margin indicate pagination of foreign text.

[1] The discussion, evidently, was about the film by the French director J. Mellies [?] "Journey to the Moon", made in 1902.

[2] Quoted from N. A. Salamanov's article in the collection "Tsilkovskiy i kino", prepared for printing by the All Union State Institute of Cinematography.

Many years later Tsiolkovskiy directly participated in the preparation of the science fiction film "The Space Trip." Work of his is of great interest in that it demonstrates the creative method of a great scientist. This film was made by the motion picture studio "Mosfil'm" in 1933-1935. The film crew included: Producer-Director V. N. Zhuravlev, cameraman A. V. Gal'perin (now Professor of the State Institute of Cinematography), and artist Yu. P. Shvets. The script was written by A. A. Filimonov. Tsiolkovskiy was invited to be the scientific consultant for the film.

The recollections of the authors of the film on their meetings with Tsiolkovskiy and their joint work on "The Space Trip" have been printed in Soviet journals. Letters of Konstantin Eduardovich to producer V. N. Zhuravlev, connected with the production of the film, were published in the journal "Iskusstvo kino", No. 11, for 1957. In the archives of the Academy of Sciences USSR in the file of K. E. Tsiolkovskiy's manuscript materials there is preserved the so-called "album of space travels", which is a detailed description of the most important scientific problems connected with space travel, which had to constitute the scientific basis of the film. Occupying the central part of the "album" are the numerous illustrations—drawings, diagrams, and sketches—made by Tsiolkovskiy which significantly lightened the work of the film artists and the entire filming crew.[3] In addition to all this there are preserved the acting and production scripts of the film "The Space Trip" containing numerous notes, remarks, and additions in Tsiolkovskiy's hand, showing how deeply and carefully the scientist worked on this film. /118

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[3]"The album of space travel" was prepared by Tsiolkovskiy at the end of June 1933. It was first published in the form of an appendix to the book "Manuscript materials of K. E. Tsiolkovskiy" in the archives of the Academy of Sciences USSR. Scientific description", Moscow, "Nauka", 1966.

The enumerated materials make it possible to put together a very complete picture of the creative participation of the prominent scientist in the creation of "The Space Trip".

In the spring of 1933 the film studio "Mosfil'm" sent Tsiolkovskiy a letter requesting that he assume the reponsibility of being the scientific consultant for the feature film. The response was not long in coming. The film crew was invited to Kaluga. On the appointed day and hour the authors of the film were received by the famous scientist.

"We put many questions concerning interplanetary travels to K. E. Tsiolkovskiy," recalled director V. N. Zhuravlev. "We were interested in the general outlines of rocket ships, the cabins intended for the spaceship crew, the problems of launching a rocket ship, flight, problems of a 'weightless world', landing on the moon, returning to native earth, and the sensations of a man on the lunar surface. Despite such an abundance of questions, we obtained from K. E. Tsiolkovskiy in our first conversation exhaustive answers which were as clear and precise as mathematical formulas. On that monumental day, K. E. Tsiolkovskiy worked with us with exceptional attention and industry, painstakingly, and with no problems. Together we thought through and discussed all possible methods for solving the subject of the future film. There were no bounds to Tsiolkovskiy's imagination. In particular, he was very concerned that everything in the picture should be interesting and entertaining so that the film would in no case be a dry exposition of theoretical calculations... The conversation with Tsiolkovskiy was a source of great inspiration for us. Having expressed our full thanks for the attention given us we left the scientist's home in order to return again after a month with a finished script and sketches of the scenery".[4]

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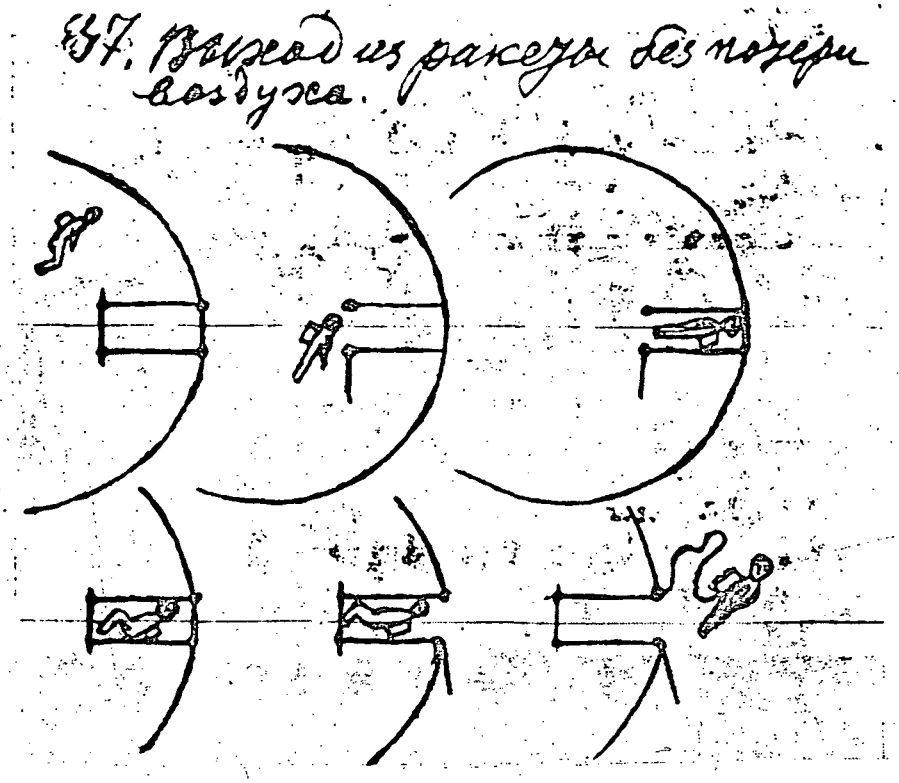
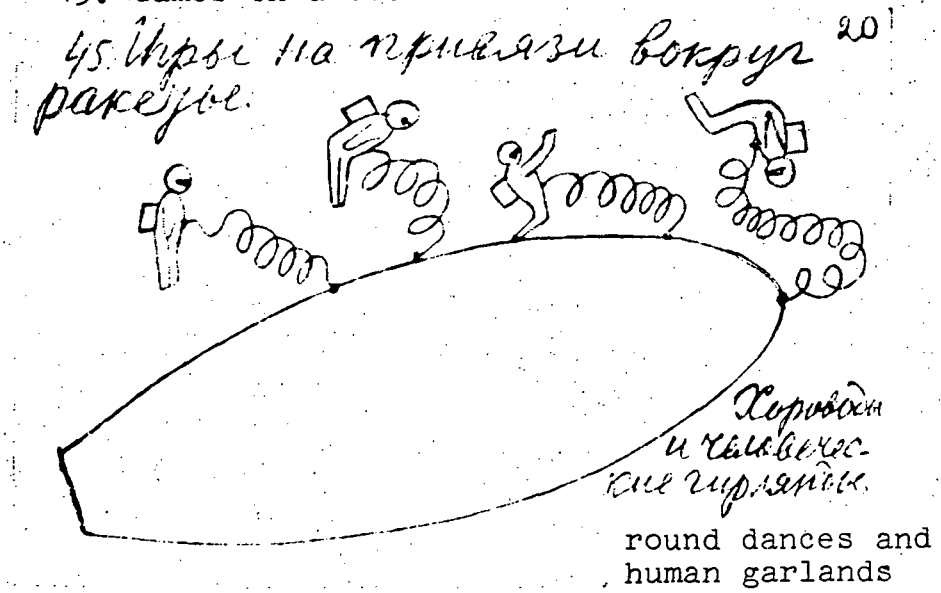
[4]The journal "Iskusstvo kino", 1957, No. 11.

37. Leaving a rocket without losing air.



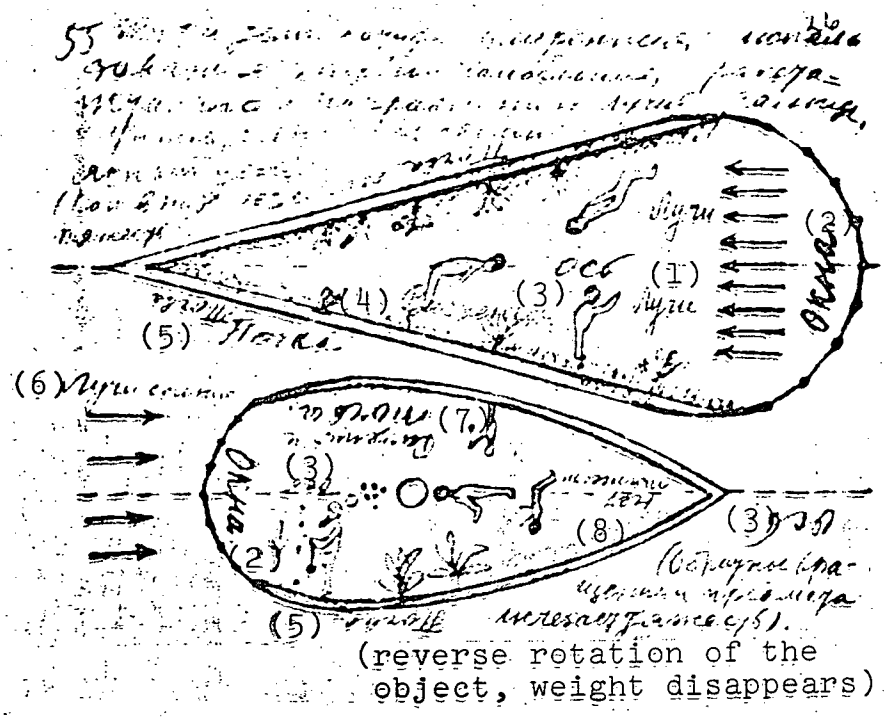
A cosmonaut leaving a rocketship. Drawing by K. E. Tsiolkovskiy from the "album of space travels".

45. Games on a tether around a rocket



round dances and human garlands

Space explorers. Drawing by K. E. Tsiolkovskiy.



(1) rays
(2) windows
(3) axis
(4) plants
(5) soil
(6) sun's rays
(7) plants and soil
(8) no weight

(reverse rotation of the object, weight disappears)

Life onboard a spaceship. Drawing by K. E. Tsiolkovskiy.

After the first meeting with the scientific consultant the work on "The Space Trip" went forward in the shops and studios of "Mosfil'm". Intense work was also being performed in Kaluga. Tsiolkovskiy analyzed scientific problems, thought out the details of the coming scenes of the film, and in exhaustive detail and accuracy responded to the numerous letters from the film crew.

In the first letter from 20 June 1933 the scientist wrote: "...first I think I will compile an album of pictures of the rocket and the travels; then I will reply to you. It is necessary first of all to get deeply into this matter and to evaluate its difficulties. We wouldn't want to make a nonsensical film..."[5]

[5] Nine letters of K. E. Tsiolkovskiy to the director of the film "The Space Trip" were first published in the journal "Iskusstvo kino", 1957, No. 11, pp. 98-104. These quotations are from this source.

Tsiolkovskiy did everything possible to lighten the work of the film crew, to make the film "The Space Trip" not only interesting but also scientifically well-founded.

On 1 February 1934, summing up his work on the film, Tsiolkovskiy wrote to the Central Administration of the Film Industry: "I read A. A. Filimonov's script 'The Space Trip' with great interest and satisfaction. My scientific consultation, scientific work, and discussions with the authors on interplanetary travels are presented by the author of the script in a living and fascinating and artistic work... I consider production of such a film to be desirable and timely to the highest degree, and I am ready to render further support." And the scientist, despite illness, continued his great and intense work as a film consultant.

In his last letter to the director of "The Space Trip", dated 24 January 1935, the 78-year-old Tsiolkovskiy prophetically wrote: "How do I look upon the essence of space travels? Do I believe in them? Will they some day be the property of man?

"The more I worked the more I found various difficulties and obstacles. Until recently I assumed that hundreds of years are necessary for making flights at an astronomical speed (800-1700 km per second). This was substantiated by the weak results which were obtained here and abroad. But my continuous work recently has shaken these pessimistic views: approaches have been found which will give amazing results in decades.

"The efforts and sacrifices which our Soviet government is bringing to the development of industry in the USSR and all types of studies, I hope, will justify my hopes."[6]

These lines again and again testify to the mighty gift of scientific prediction which our great countryman possessed.

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[6] Op. cit., p. 101.

A year after their first meeting the cinematographers again traveled to Kaluga. Tsiolkovskiy carefully prepared for this. He attentively read the script, replied to the questions of the cinematographers and together with the cameraman and artist made the necessary calculations to avoid constructing the largest scenery for the film (the hangar, launching pad, and so forth) on natural scale, and so that they could be photographed on small models.

"There was not the least question to which he (K. E. Tsiolkovskiy—A. F.) could not give an answer," recalls the film artist /120
Yu. P. Shvets. "If a question was unexpected, as is often the case with people little acquainted with a problem being discussed, even then Konstantin Eduardovich, by means of comparisons and logical conclusions, found an acceptable and above all a simple scientific foundation."

Further, discussing how Tsiolkovskiy familiarized himself in detail with the sketches of the scenery and equipment of the future film, Yu. P. Shvets writes: "Here in the process of getting acquainted with sketches of the moon, Konstantin Eduardovich made a number of remarks: on the color of the sky in connection with the absence of atmosphere on the moon, on the bright light of the untwinkling stars, on the dimensions of the earth, its color and brightness, on the motion shadows and their depth, on the position of the sun and earth in the moon's sky, and on the solar corona. Particular attention was given to the shape of the spacesuits and on the conditions of a man moving on the surface of the moon in connection with the reduction in the force of gravity."[7]

Tsiolkovskiy attentively read all variations of the film script, making dozens of marginal notes intended toward making a

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[7]The recollections of Yu. P. Shvets are quoted from a manuscript prepared for printing by the All Union State Institute of Cinematography.

more accurate picture of the future film space flight. Here are several of his remarks indicating that not one detail escaped the attention of the scientist.

"Night. Billions of stars. The moon," is written in the script. "The unaided eye does not see billions of stars but only thousands," Tsiolkovskiy corrects.

Pilot baths are described in the script—cabins with cosmonauts dressed in spacesuits, floating in them. "Spacesuits are not necessary: naked or in shorts," remarks the scientist in the manuscript margins. "The cosmonauts are scattered in different places. One of them performs an intricate dance in conditions of weightlessness," so it says in the script. "A dance is difficult to perform," indicates Tsiolkovskiy, "these oscillations from wall to wall and various rotations". "The ship's commander ordered you to take the controls," it is written in the script. "Controls not necessary: instruments," briefly remarks Konstantin Eduardovich.

Further, Tsiolkovskiy makes important corrections in the description of the scenes of the cosmonauts stay on the moon. "We landed at the south pole," says the hero of the film, "and they didn't see our landing flare on the earth". "They landed on the back side of the moon," corrects Tsiolkovskiy. There where it says that the cosmonauts on the moon "swim", "fly up", "fly across", etc., Tsiolkovskiy corrects "rise up", "run or jump", "rise easily", "jump up", and so forth. According to the script, the heros of the film in the conditions of the moon "kiss each other on the nose, on the mouth, on the ears, in the eyes". "Kiss on the neck, where the nose, ears..." corrects the scientist.

The "album of space travels" compiled by Tsiolkovskiy proved to be of especially great help in shooting the film. In the first part of the "album" there is a synopsis of basic information on the solar system, living conditions on a spaceship, on artificial satellites, planets, and asteroids. The extensive illustration of the

"album" also contains calculations, explanations, and advice to the film crew. A number of drawings explain how the life and work of the cosmonauts in weightless conditions must be depicted: one of them shows the cosmonauts dining, another shows them moving in the cabin, and in a third illustration they are looking through the window of the cabin at the distant earth. In this case the scientist wrote on the margins of the drawing what the cosmonauts see, how the sun, earth, moon, black sky scattered with stars look to them. A whole series of drawings is dedicated to the cosmonauts leaving the rocketship and returning into the rocket. One of them shows the different stages of a cosmonaut leaving through a special hatch without dehermetization of the cabin or, as the scientist writes here, "without loss of air". The figures numbered 45-47 are interesting. They show the cosmonauts having left the spaceship but connected to it with long halyards which Tsiolkovskiy calls "tethers".

The next illustration and caption to it explain how return of the cosmonauts to the earth must be performed. "The rocket," writes Tsiolkovskiy, "was turned nose-backwards and counterfiring began... After entering the atmosphere they stop firing and brake the rocket by the resistance of the air."

The "album" ends with several pages of illustrations explaining the equipping of space islands with habitations, greenhouses, with devices for purifying the air and utilizing solar energy. These materials comprise the "maximum program", not all of them were used in making the film "The Space Trip". However, they served as a remarkable aid for the actors and film crew, then and there introducing them into the "course of the matter".

It is characteristic that several decades later, when the Soviets, and then the American astronauts, began to make space flights, were in conditions of weightlessness, left their spaceships, performed docking, and so forth, they repeated much of

what was predicted by the prominent scientist, serving as a consultant for the science fiction film "The Space Trip". This once more emphasizes the brilliant insight of Tsiolkovskiy, who believed that sooner or later the fairytale would become fact, fantasy would become reality, and not only did he believe, but by his works he strove to bring closer the beginning of the space era in the history of mankind.