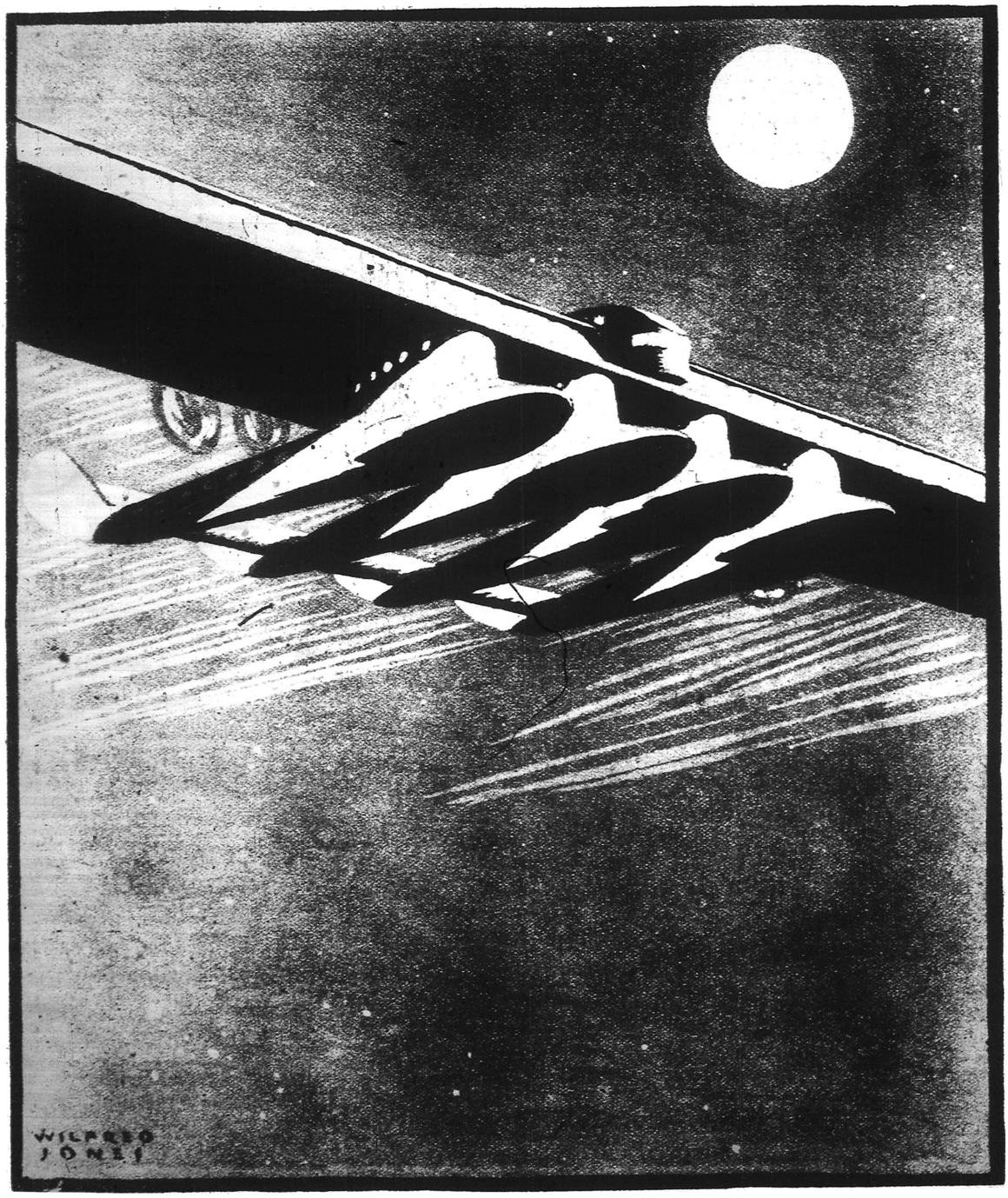
WIZARD SCIENCE IS ANNIHILATING SPACE

Airplane, Televisor and Radiophone Are Signs Of Wonders Yet To Come



"The Journey From Berlin to New York Could Actually Be Performed Between Sunrise and Sunset."

By WALDEMAR KAEMPFFERT

THE other day Major Gen. J. H. McBrien, formerly of the Royal Air Force and now head of a commercial aviation service in Canada, delivered in New York an address in which he predicted the attainment of speeds of 1,000 miles an hour in the air. He made his forecast with the utmost earnestness, pointing out that only a few years ago it seemed ridiculous to suggest that some day men would travel in airplanes at 100 or 200 miles an hour. In almost every year since the Wright brothers flew in public the speed record has been broken by the airplane. If the future is but the fulfillment of a promise held out by the past, General McBrien's prophecy may well become a reality in less than half a century.

When the railway train first flashed across the landscape at two or three times the speed of the stage coach, and the telegraph flashed the first message between two cities, startled orators used to speak of "annihilating space." We have so accustomed ourselves to annihilating space in fast vehicles or by electrical means of communication that even such new discoveries as television have but an ephemeral existence as wonders. The world has been shrinking, in a sense, since the steam locomotive and electricity were introduced, so that we no longer think of distance as much as we do of time. Probably not one man in ten knows the distance in miles between New York and Chicago, but he is sure to know that it can be covered in twenty hours in a fast train.

General McBrien's speed of a thousand miles an hour has not been even approximately realized. And yet he is conservative compared with half a dozen European inventors; they discuss air speeds of 2,000 and 3,000 miles an hour as attainable within a few years if the engineers are only supplied with money to conduct the necessary research. Boldest of all these dreamers is the German, Max Valier. The earth is much too small for the realization of his ambitions. Nothing less than flitting from planet to planet will satisfy him. Although hard-headed engineers lift incredulous eyebrows when they read his articles, they have no fault to find with his reasoning, nor yet with the theory that underlies his method of traversing astronomical distances at a pace that makes General McBrien's 1,000 miles seem snail-like.

High speed in the air is purchased at a heavy price in fuel and energy, Valier reasons. Air resistance increases with the square and horsepower with the cube of speed. To attain speeds of thousands of miles an hour we must rise above our dense atmosphere into a region where there is little or no air and consequently no head-on resistance. If we can ascend thirty miles or more in hermetically sealed machines and keep ourselves alive with oxygen, Valier sees no reason why speeds of 4,000 miles an hour and more may not be attained.

He realizes that airplane engines and propellers would be useless in the partial vacuum that prevails at the heights that he would attain. A gasoline engine is as much dependent on air as a human being, for vaporized fuel must be mixed with air to form an explosive. Moreover, propellers must beat against something; they must virtually screw the machine through the air. So Valier would rely on a rocket motor, something that would work even in a vacuum and would kick him off the earth up to a height of thirty miles and thence through space so rarefied that it is virtually a void.

Valier has only the vaguest conception of the form that such a rocket motor would assume. Research must be conducted for years before it can be evolved. Still, he has made some rough mathematical calculations to show the possibilities of the rocket motor. He visualizes the annihilation of distance between Berlin and New York thus:

"The craft would be launched at a steep angle—70 degrees—so as to pass through the dense air near the earth as rapidly as possible and reach altitudes where high speeds are attainable. Only seventeen seconds after it had been shot up the ship has acquired a speed of 400 meters (1,312 feet) a second at an altitude of 3,000 meters (9,840 feet). Thirty-five seconds later it is coursing along at an altitude of 20,000 meters (12.42 miles) at the rate of 800 meters (2,624 feet a second), or about 1,800 miles an hour. In 48 seconds more it has reached its ceiling of 50,000 meters (31 miles) above sea level, 70 kilometers (43.47 miles) from the starting ground. Its horizontal speed is now 2,000 meters a second or 7,200 kilometers (4,471 miles) an hour. Allowing for a landing at Vigo, Spain, the distance from Berlin to New York would be covered in 93 minutes, or about an hour and a half."

A point on the Equator spins around at the rate of a thousand miles an hour. Valier would travel at least four times as fast. Around the world in six hours" is his slogan. He would travel faster than the sun's shadow, for he would leave Berlin after breakfast at 8 in the morning in bright sunlight, plunge into the night at the antipodes and land in Berlin again in sunshine at 11, with two hours to spare for luncheon.

In a word, a rocket journey around the earth would mean no more to him than a pleasant but much too brief excursion through space, something comparable with an afternoon's motoring in the country on good roads. No wonder a flight of 260,000 miles to the moon is the least that will satisfy him. And yet, given a rocket motor demonstrably operative, Valier's proposal is practical on paper. No one can deny that a century hence we may possibly attain speeds that approach 4,000 miles an hour, even though the superman of the future will not vault light-heartedly into interplanetary space on a voyage of discovery to Mars.

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ENGINEERS more conservative than Valier would increase the speed of the airplane by vaulting to heights greater than those attained by any record breaking climber. It is air resistance that makes it so difficult to attain high speed, as Valier correctly insists. Beginning at two miles above sea level and extending upward for five or seven more is a stratum of air that blows in great planetary swirls in the easterly direction—swirls produced by the spinning of the earth on its axis. The greater the height the more furious is the blast of this relentless gale. Two years ago the possibility of climbing into this layer in a sealed airplane and traveling across the ocean in fast flight was seriously discussed by German aeronautic engineers at a meeting held in Mannheim. It was conceded that oxygen would have to be supplied to crew and passengers either from tanks or by supercharges, and a heating system installed to combat a temperature of 152 degree below the Fahrenheit zero.

In the layer of planetary swirls the air is only one-fifth as dense as at sea level, so that little head-on resistance would be encountered. In addition, a steady following gale would add miles an hour to the speed in one direction. Superchargers will be indispensable to supply enough air to the engines, as they are now attaining record-breaking heights. The propellers must have blades adjustable to different pitches at different heights, so that the craft will be driven along with the least expenditure of energy, regardless of its altitude and the density of the air.

Professor A. von Parseval, one of the most experienced aeronautic engineers of Germany, has gone so far as to picture the possibilities of flying, at an altitude of nine miles, from Berlin to New York by way of Vigo, Spain. He asks us to imagine a Goliath of the air with a starting weight of 50 tons and a paying or useful load of 9½ tons. With 19 tons of fuel, the radius of action of this Goliath will be 3,250 miles at an average cruising speed of about 215 miles an hour, which is rather modest when it is considered that 300 miles an hour have

been achieved by Bonnet in the much denser lower stratum in which we are accustomed to fly.

The machine would cover the distance from Berlin to New York, with a three-hour stop at Vigo for refueling, in little more than 28 hours. Von Parseval would use 6,250 horsepower to reach a height of nine miles, and then push on with about 5,000 horsepower. It would take fully two and a half hours for the craft to attain its maximum height of nine miles, and in that time it would cover about 420 miles. The pilot would have to allow 90 miles for the downward glide to Vigo. About 28½ tons of fuel and oil would be consumed between Berlin and New York, or approximately three times as much as the paying load.

Von Parseval is much too conservative in his speed estimates. There is some reason to believe that 420 miles an hour can easily be attained at a height of seven to nine miles, so that the journey from Berlin to New York could actually be performed between sunrise and sunset.

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A VOYAGE through the air even at the eventually practical height of ten miles would be as weird as it would be swift. The sky would no longer appear a glorious azure welkin suffused with light, but a black canopy. In the inky heavens the stars would shine both at noon and midnight—dazzling points. They would shine, moreover, not with the scintillation to which we are accustomed, but with hard, relentless steadiness. In that cloudless sky of jet the sun would blaze so fiercely that the human skin would have to be protected from the blistering under its rays.

The physical transportation of the human person from place to place, even though it be effected at speeds of hundreds of miles an hour, must always remain a crude method of communication. Bankers and statesmen have been known to journey hundreds of miles to transact affairs; they reach conclusions in less than half an hour and waste days in coming and going. No wonder that in ancient times attempts were made to convey messages and arrive at agreements by visual signals and by carrier pigeons. Even the telegraph is imperfect because of the limitations imposed by a code of signals.

Not until the telephone was invented and introduced did we catch a glimpse of what communication is destined to become and what "annihilating space" really means. That destiny is nothing short of the electrical disembodiment of the human personality and its reincarnation at the uttermost ends of the earth, the whole process occurring with the speed of light.

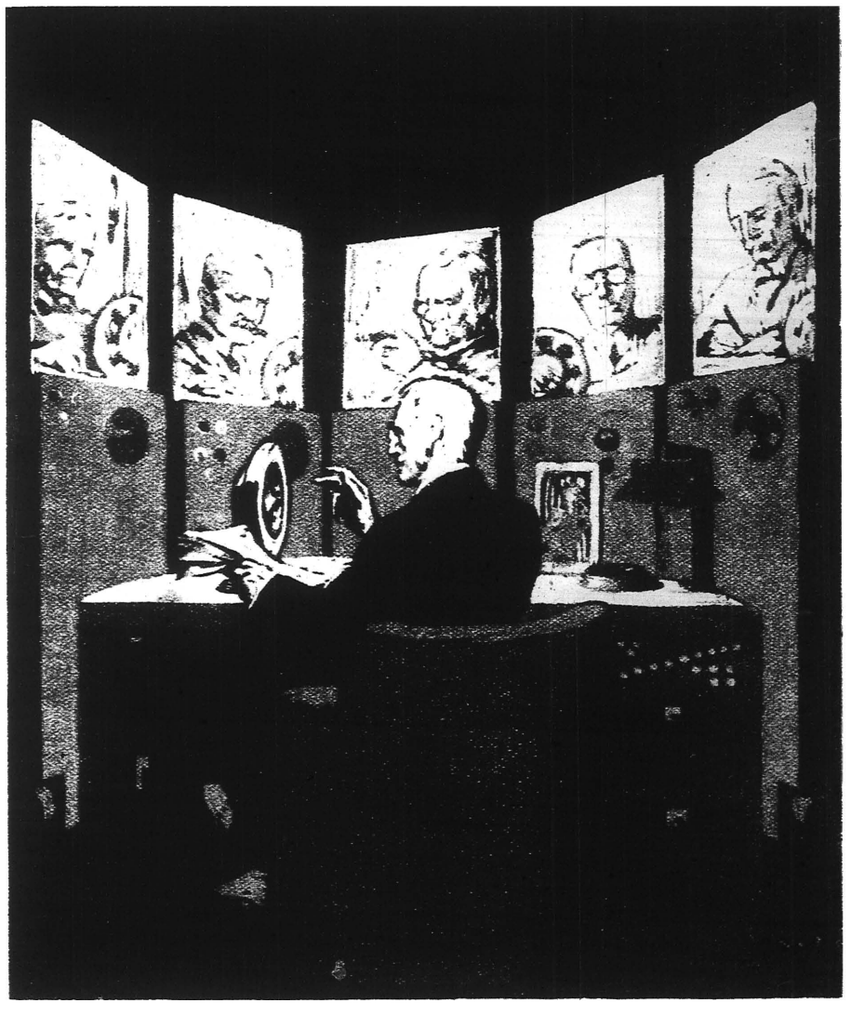
All electrical means of communication are but extensions of the human faculties through space. When we telephone from New York to San Francisco we send our lips, mouth, larynx, vocal chords, our whole talking apparatus across the continent. We talk into an ear in San Francisco, although we ourselves are in New York. It is not the real voice that is heard by the ear in San Francisco, but a deceptively realistic, electro-magnetic duplicate; for the voice is transformed into electric impulses coursing over a wire, and the impulses are retransformed into sound.

Within recent years the principle has been so far extended that we can use the ether instead of a wire, with the result that we can talk by radio from any city in the United States to some of the principal cities in Europe. The telephone was the first invention that extended part of the human personality almost infinitely into space.

And now the inventor has taken the second step. A primitive beginning has been made in television—in transmitting images of objects over wires and by radio from place to place. Baird, the young Scotch inventor, has even sent faces across the ocean. To be sure, the visions are but flickering, two-dimensional patches of light and shade; but they are recognizable. Again something little short of a miracle has been performed.

The face that one sees on a screen in the rosy glow of a neon lamp is a discarnate human being. That face has been optically sliced and chopped into tens of thousands of points of light and shade, and these points, falling in proper sequence on a photo-electric cell, have been converted into electric impulses or waves. At the receiving station the electric waves are reconverted into patches of light and shade, which are placed in their proper relative positions, the whole process occurring with such rapidity that the eye, unable to follow it, is tricked into accepting a mosaic as a whole.

Even now it would be possible for twelve directors of a corporation in twelve widely separated parts of the country to hold a meeting in the New York office of the Chairman of the board without leaving their desks. Their opinions and votes rather than their physical presence is required. But inasmuch as there are always opposing forces on every board and committee, the soft-spoken word may not be enough. Like poker players, directors and committeemen insist on studying one another's faces. So, a meeting of a board twenty or fifty years hence may well be a meeting of electrically disembodied personalities.

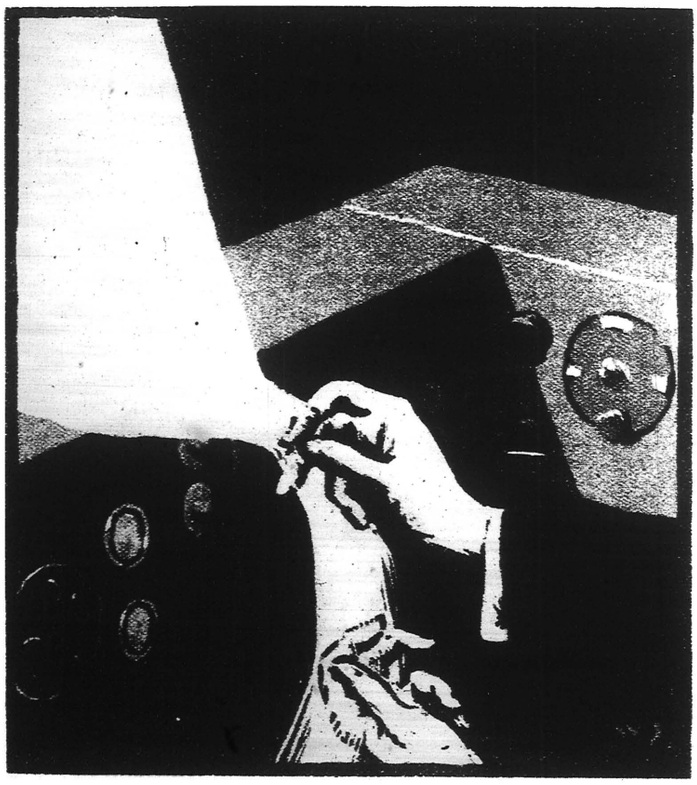


"A Meeting of a Board of Directors May Well Be a Meeting of Electrically Disembodied Personalities."

The Chairman sits in the usual, very dignified, funereally upholstered room at the usual flat-top mahogany or walnut desk graced by the usual framed photograph of the usual wife and children. At the far end of the room are twelve television screens. In the office of each of the remote directors are twelve similar screens. In thirteen different offices twelve voices and images, twelve electrical ghosts, will confer with a thirteenth man in the flesh. Each of the thirteen sees twelve faces before him. He talks to Stewart McDobbin, just as if McDobbin were physically present, and listens to McDobbin's objection to increasing the dividend on the common stock of the corporation from 5 to 6 per cent. And he knows that McDobbin is watching him and following his argument in favor of the increase just as closely.

The movement of a director as he bends over his desk and makes rapid calculations on pads of paper, the cocking of an ear to hear more clearly, every expression is revealed. Documents are held up before the televisor by the Chairman. They are critically examined and commented upon. It is even possible to sign telephotographic duplicates electrically by means of the telautograph, which has long been part of the equipment of every first-class hotel for the transmission of facsimile messages from floor to floor.

The spectacle of the officials of the Federal Reserve Bank, the Deutsche Bank, the Banque de France and the Bank of England traveling thousands of miles to meet in New York or London will pass with other quaint and cumbrous customs of the early twentieth century. Doubtless some future Assembly of the League of Nations will confer without the tedious necessity of meeting at Geneva, even though some of the delegates are Chinese and Argentinians. Long before the end of the century world-wide television and telephony will be commonplaces of engineering. Capitols and Houses of Parliament will be picturesque relics of a past, when the Legislatures of republics were compelled by sheer necessity to meet in a single place. Filibustering will hold no terrors. Bored members of Legislatures will simply shut off televisors and telephones and go to sleep.



"Are We Sure That the Engineer Will Not Devise a Way of Enabling Us to Touch a Hand Miles Away, or to Feel Silk in All Its Smoothness?"

SOON the images of television will be as large as those that smile and dance on the screen of a motion-picture theatre. They will appear in all the colors of nature. They will lack a third dimension—solidity. Even that may be conceivably imparted to them if stereoscopic fidelity proves to be essential, so that instead of a two-dimensional reproduction, a recognizable animated smear on a surface, we shall see something that has thickness, depth, density. That something will be as real as if we saw the three-dimensional, solid original through a window at the transmitting station. A miracle has been performed. We accept as a solid, tangible reality a few flecks of color, a number of ingeniously assembled points of light and shade. Yet it is something that we seek to touch in vain. Our fingers encounter only the glowing screen on which the image dances. It is as if we sought to feel a ghost, a mere wraith.

But are we sure that the ingenuity of the engineer will not devise a way of enabling us electrically to overcome this difficulty and actually to touch a hand a thousand miles away or to feel silk in all its smoothness and softness? It staggers the imagination, this possibility of transmitting and receiving touch through space. Yet is it any more staggering than television?

It is difficult to conceive the form that an electrical touch transmitter will assume; but conception is the very essence of invention. There must clearly be a feeler of some kind at the transmitting station—something that will explore and pal-

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pate every millimeter of a face or a piece of fabric. Minute, almost infinitesimal, differences in electrical resistance will be transmitted as the electrical feeler artificial sense organ if ever there was one passes over a surface. But how these impulses will be reassembled at the receiving station to counterfeit texture, hardness, moistness, dryness, brittleness that, for the moment, is more than an ordinary imagination can divine.

Perhaps we may sit in an electromagnetic field in which electrons are made to combine and separate and produce the electrical equivalent of hardness or softness. As we move the hand hither and thither we shall have the sensation of feeling a fabric or clutching the handle of a tool. Yet we shall feel and clutch only emptiness. Just as in television we see an image without substance, so in this emptiness we shall feel solidity but without a body. The electrical engineer will give us what may be termed abstract solidity. We shall be electrically deceived, as we are when we hear a voice over the telephone or follow images on the screen of a motion-picture projector or a televisor. Another human faculty will have been disembodied and sent through space.

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SMELL and taste—can they, too, be transmitted and received over a wire. Here the imagination fails utterly in conceiving even a remotely plausible mechanism, and this, probably, because almost nothing is known of the physiology of smell and taste and because we enter a field where the most accomplished organic chemist still flounders almost helplessly. Of all the senses smell and taste are of least value. Their importance to communication must be negligible at best.

So we are confronted with telephoning and televising as realities and with teletacting as a possibility. With these three we can go far toward reincarnating electrically disembodied personalities. Probably the reincarnation will never be wholly satisfactory, for the simple reason that it is easier to fool one sense than two. I am tricked into accepting the voice that I hear welling from a radio loud-speaker as a real voice, even though I know that the effect is produced by a cone or diaphragm that beats the air electromagnetically, but no one has yet succeeded in making me believe that the voice that accompanies a motion picture, however accurately the two are synchronized, comes from the two-dimensional lips of the photographic singer on the screen. When I add teletaction to telephony and television I complicate still further the task of achieving the illusion of reality. By no stretch of the imagination can I associate the image and the sensation of touching something so that I can synthesize the two. To add the sound of a voice makes the task of synthesis even more hopeless.

And yet, although the three electrically reincarnated sensations of hearing, seeing and feeling must remain discrete, a new world is opened. Picture to yourself voice, image and touch broadcast by radio. What is the physical transportation of the human body through space at the rate of 1,000 miles an hour, even at Valier's 4,000 miles an hour, compared with this? The prima donna of the future will be not only heard and seen in a million homes simultaneously, but literally touched if she so wills it. She thrusts her hand into the transmitting teletactor. A million other hands are stretched out to clasp it electrically. The softness of her skin, the hard facets of the diamond in her ring, even the bones beneath the cushion of flesh—all will be felt, while her smile lights up the screen of the televisor and her thanks for the privilege of singing for a whole nation at once come from a loud-speaker in a musical and perhaps foreign accent. A personality is not only disembodied, but infinitely multiplied in countless homes. It becomes the common possession of millions who have ears to hear, eyes to see and hands to touch.

Immortality of a kind is assured for this personality. Electric waves can be recorded in half a dozen ways and reproduced. We may convert them into light waves and preserve them photographically; we may record them electromagnetically on a steel wire; we may transform them into sound and embalm them on a phonographic disk. Thus Baird has changed television waves into sound waves and recorded them as such. Each face, when played on a phonograph, has its characteristic sound. The sound records of these faces can be reconverted into electric waves which are flashed through the ether or over a wire and then televised at a receiving station.

So it will be possible to preserve not only voices and faces in phonograph records, but also the grasp of a hand, the twitching of a muscle. Sound records and motion-picture films have already handed down to our day some phases of the disembodied personalities of artists who died twenty years ago. When teletaction is introduced scientific immortality will be an accomplished fact.

IN THE MALAY JUNGLE ARE MANY LEECHES

IN the Malayan jungle country the trees go up to prodigious heights, sometimes as much as a hundred feet to the lowest branches. Although the undergrowth loops and tangles in every direction the tree runs up so high that there is always room to let the light through. As far as the Malay Peninsula is concerned the so-called "impenetrable jungle" is a myth, but Malayan swamp country is a more difficult proposition and a really thick bamboo grove is the worst luck that can befall a Malayan surveying party. In the mixture of swamp and jungle outside of Singapore the worst enemies to be fought are mud and leeches, with occasional bouts of malaria to vary the monotony.

The ordinary jungle leech is no bigger than a match when it attaches itself to the skin but as big as a cigar when it has sucked its fill of blood. A man may be covered with them about the legs but he rarely notices them until they become full, when they feel like cold bags of jelly hanging to the skin.

Luckily leeches sleep at night. If they did not it would be almost impossible for any animal to live in the jungle. The big leeches called buffalo leeches are a more serious matter and Malay women are as much afraid of them as white women are of mice. They are as big as a cigar when they attach themselves and they fill up to the size of a German sausage.

Tigers and elephants are found in some parts of the Malay Peninsula but not ordinarily on near-by Singapore Island. Snakes are fewer than might be expected but they include 30-foot pythons and the king cobra, the most poisonous of all known snakes and the only snake which is aggressive enough to attack and pursue a man. For that matter, there are holy cobras in the Buddhist temples in Singapore itself and sometimes they escape and are captured in unholy kitchens and gardens. Crystals of permanganate are the usual snake-bite remedy and are rubbed into the bite after it has been opened with a razor. Monkeys abound. There are some insects more than a foot long and butterflies which measure a foot from wing-tip to wing-tip. The biggest and the smallest of everything abound in the jungle, along with such curiosities as crabs which eat cocoanuts and fish which eat coral.