

Feature Science and Technology

Dream World of Communicating Data

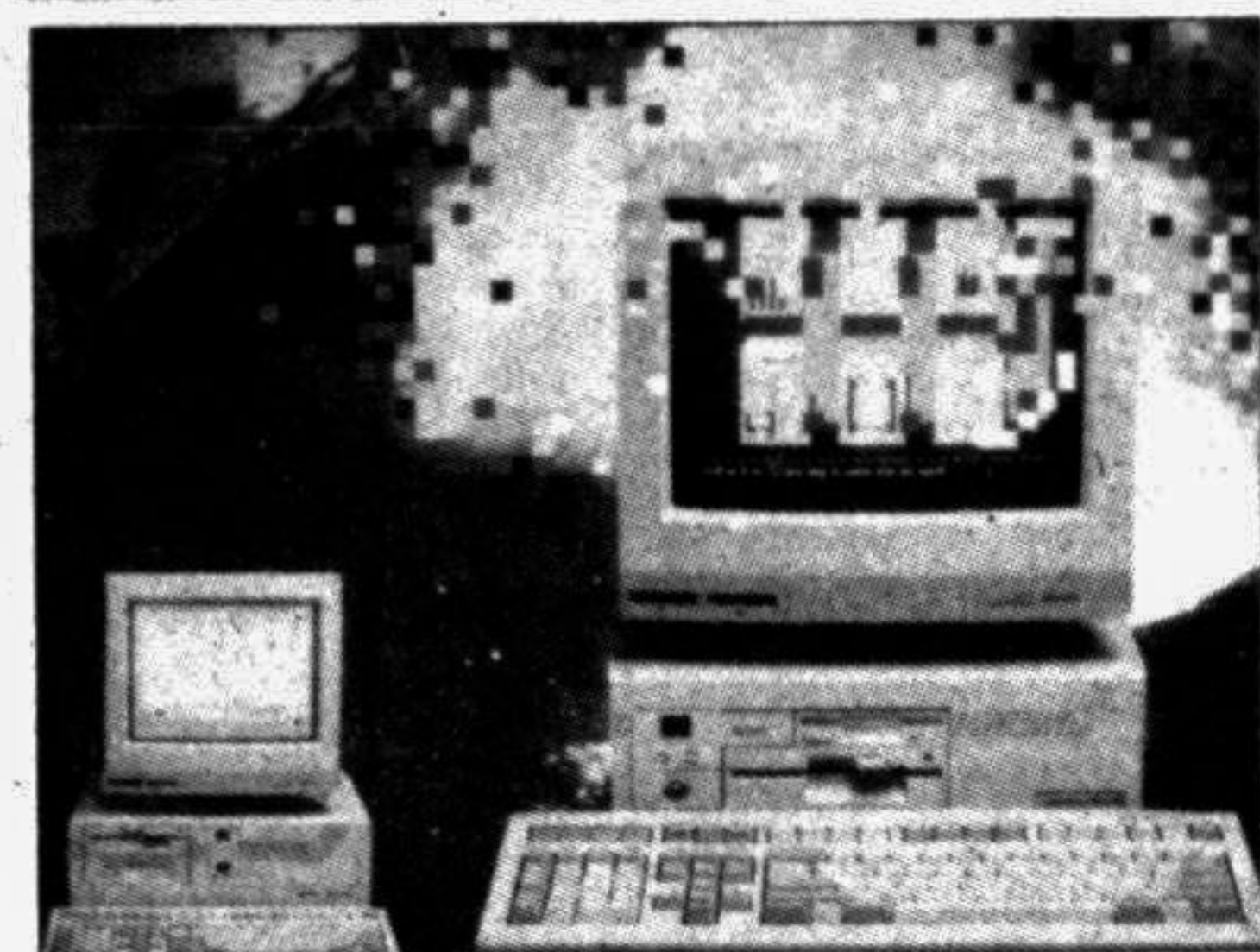
by Jamal Arsalan

BEFORE the advent of the personal computer or PC, the portable manual typewriter reigned supreme. The electric typewriter took away some of the market. But the portable has the advantage of being able to do without electricity and is more durable. So even now it is carrying on, especially in countries where the electric typewriter and the PC are still too expensive for general users. In offices the manual typewriter is still in use for similar reasons. Another reason is that for secretarial and other work, portables are too small. An 18 inch or larger roller is needed.

typed on the computer key board. It cannot be 'absorbed' by the computer, like a photocopy machine.

If computers could take in matter penned by hand the number of users would multiply astronomically. Right now there are some versions of computer entry pads which use a special pen to record sales data for a salesperson or inventory for store personnel.

If computers could absorb printed matter directly, no typing or writing with a special pad and stylus, one could use an ordinary pen and plain white paper for input to the computer. Prices would have to come down to \$300, and preferably \$200 to sweep the market even in US and the developed countries. Sounds like a dream? Well, let us first take a look at Sony's \$150 drawing slate (marketed two years ago in 1990) for children. It plugs into a colour TV. The user can paint electronic images and pictures.



An age that can do little without computers

—Photo: Executive

More advanced is the Sony Palmtop — larger than its name implies, costing about US\$500. Paper-back sized, the Palmtop is a computer which can 'read' hand-printed writing: Japanese for the original version, now English, etcetera for the US and European market. It can keep records of appointments, addresses, phone

numbers and other related information. The Palmtop story — brainchild of Tomoshi Hirayama, a 34 year old software engineer — began when he was returning from UK to Japan on board his plane. The idea (itself hatched when he realised that business executives, specially the Japanese, needed a pocket secretary. Pocket-size computers with keyboards and tiny

cerned. The size of a fat paperback, it has a folding screen which can display print and drawings. Information, recorded by voice can also be played back. All these are stored on a silvery diskette smaller than a normal compact disc or CD. Each diskette can store 1,000,000 typed pages of information and 32,000 drawings or graphic images, and naturally, a combination of the

two in proportionately lesser numbers.

The advantage to users comes in the form of foreign language dictionaries which 'pronounce' the required word, encyclopedia and classical or popular fictional works like Shakespeare's works (plays, sonnets) or, as in Japan, 'talking' comic books. Diskettes still have a forbidding price range of US \$29 at the lowest. The Data Discman itself sells for about \$550. What the hand-written computer needs from the Discman is the memory diskette. Unfortunately, though the Palmtop and the Data Discman were invented by Sony, they were innovated and developed separately. This translates into bad news for the consumer as well because the data process does not allow sharing, including the existing PCs! Sony is working on this and has taken steps to prevent future slips.

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to come down to \$300, and preferably \$200 to sweep the market even in US and the developed countries. Sounds like a dream? Well, let us first take a look at Sony's \$150 drawing slate (marketed two years ago in 1990) for children. It plugs into a colour TV. The user can paint electronic images and pictures. If this turns out to be a 'masterpiece', it can be video-recorded on a normal videotape!

For the few who would rather dictate than write or type, some device might be forthcoming based on the video phone. Of course, dictating one's ideas is not for everyone. As one would expect, in general, those who are expert at dictating cannot write fluently or type. The dictaphone was, or is, used by them to record for the stenographer to type at leisure, until the tape recorder allowed greater flexibility and portability. Now there is the digital computer dictaphone.

Computers are in existence which can record data by recognizing speech. Confusion arises over words pronounced similarly or with a slight difference which get exaggerated by the style of individual speakers. 'I hurt myself' computes as 'I heart myself' and 'he has heard of the accident' turns into 'he has herd of the accident'.

Cellular cordless phones with video possibilities are one end of the spectrum. As part of this development Apple is supposed to unveil a computer one can hold in the hands. It can be yet another boon to non-typists for the key board is being substituted by the pen stylus. It is heralded as being able to work according to the wireless phone network — high capacity fibre-optic networks? No worry about plugging in the phone or any cable connections. Whatever happens, it is, we, the customers, who are on the winning edge. All we have to do is wait.

Taiwan Takes Off into Aerospace

NOISE, or its relative absence, played a key role in the selection of Cheng Kung University Aerospace Research Laboratory as the vanguard in Taiwan's leap into the aerospace business.

About 15 kilometres south-east of here are the quiet villages of Keut-hen and Liu-chia. Nearby will rise the university's Aerospace System Development Division — Taiwan's centre-piece in aerospace research and development.

The site was chosen because — among other things — the noise level is below 70 decibels. But more important are the nearby companies and factories which include the Far Eastern Machinery, Evergreen Superalloy Company, China Steel, China Shipbuilding, Taiwan Machinery and the Poyi Company (which makes combustion chambers for jet engines).

These companies and other related industries located in the nearby Nan-tze Export Processing Zone will also help in the development of Taiwan's aerospace industry.

Since December, nine aerospace experts from around the world have examined and evaluated the site and found it suitable for aerospace research. The Science-Based Industrial Park (SIP) in Hsinchu would be the back-up site. The establishment of an Aerospace Research and Development Centre and a Payload Development Centre are also under consideration.

Taiwan joined the world's aerospace industry last October 1991 when Taiwan Aerospace took up a 40 per cent stake in the civil aircraft operations of McDonnell Douglas of the United States.

Taiwan will manufacture fuselages and wings for McDonnell Douglas's new MD-12 jetliner model. But with its US\$2 billion investment, Taiwan eventually plans to play a larger role in world aircraft and satellite development.

The country is qualified to do just that. It has vast experience in large manufacturing operations, electronics, plas-

R&D at the Industrial Technology Research Institute will focus on establishing digital engine control systems; airplane body and wing systems and navigation and information systems

tics, shipbreaking and building steel and metalware, machinery, textiles, leatherware and toys. And it has the world's largest foreign exchange reserves (about US\$75 billion).

Taiwan's 15-year satellite plan includes a programme to develop a satellite as well as a satellite operation centre. Research and development will focus on researching basic aerospace science, specifying payload system operation needs and functions and drawing up and executing an international satellite launch cooperative project.

Research and development at the Industrial Technology Research Institute (ITRI) for the next five years will focus on establishing digital engine control systems; airplane body and wing systems and navigation and information systems.

The ITRI aims to raise industrial production by focusing on the testing of aerospace parts and devices, the evaluation

of engine functions, precision parts, airplane maintenance, aerospace body work and assembly and technologies for interior and standard parts.

At present, Taiwan's Aerospace Project Office is recruiting and training personnel and drawing up a schedule for a basic line satellite project.

The ITRI aims to establish high-tech industry in the next five years with an estimated industrial investment of US\$100 million. It expects Taiwan to control 10 per cent of the global market share in the design, manufacture, maintenance and testing of dynamic system turbine engines with an annual production value of US\$150 million.

ITRI will also develop the design of engine causing systems, including the structural and atmospheric kinetic heat conductive design and the production of key parts and devices. An estimated industrial investment of US\$100 million is expected to control a 5 per cent world-wide market share by the year 2000 with an annual production value of US\$100 million.

Another US\$100 million will be spent on the development of structural design of airplane bodies and wings. ITRI hopes Taiwan will be able to control a 2 per cent world-wide market share by the year 2000 with an annual production value of US\$100 million.

In digital electronic engine systems, ITRI hopes that about three new patents a year will be developed. ITRI will also assist about 100 companies to be aerospace certified within the next five years which will offer testing services for US\$ 400 million worth of products over five years. — Depthnews Asia

Indian Scientists Plan Inter-planetary Probes

by Prakash Chandra

HAVING successfully launched ballistic missiles — ground-to-ground, surface-to-air, and air-to-air — the Indian Space Research Organisation (ISRO) has now something more ambitious on its sights.

It plans to probe the solar system. Scientists have picked up Mars, Mercury and Venus for India's first-ever inter-planetary studies.

"We have worked out the entire mission sequence for probes to be launched for each of these planets," says one top scientist. These include the control trajectory, execution of delicate manoeuvres and the use of gravity of other planets as slingshots to hurl the probes deep into space.

The first mission, if everything goes alright, will be around 1998-99. Prof UR Rao, ISRO chairman, says his organisation has the confidence and the capability to embark on inter-planetary space probes.

But his critics say the government's financial situation is such that they cannot even continue existing programmes unless they have a lot more cash. It will need at least US\$1 billion for equipment and services before such an ambitious project can be launched.

Prof Rao dismisses the financial problems. He says with a great deal of confidence: "We must be ready with the technology and worry about the funds later. If the government cannot fund the entire project, we could collaborate with other countries. I hope the geo-political situation will change for the better by then." He has told the *Economic*

Times newspaper about possible cooperation with China. He says: "I don't now if they will be interested. It also depends on how much money they can spare. But they have very good scientists."

As for space vehicles, Prof Rao said: "The ISRO has started experiments on the Rohini series of rockets to prove the concept of air-breathing on reusable launch vehicles. These tests will go on full swing after the launch of the polar satellite vehicles because we plan to draw people

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from that project and ask them to work on air-breathing vehicles."

An important ingredient is the cryogenic engine which propel rockets, promised by the Russians. But Americans have warned the Russians against providing the rocket engine, which is to be used for Indian missiles. Indeed, New Delhi and Washington are at odds on the sale of any missile technology to India.

Thus, Prof Rao is on a bit of slippery ground as the technology is just not available — yet.

But undeterred, Prof Rao has elaborated on the project recently at the Indian Institute of Science in Bangalore. In simple terms, the process of air-breathing helps to deploy heavy satellites and other pay-

loads into space at one-tenth of the costs of current launches using vehicles such as the space shuttle.

It means that the space vehicle, fitted with cryogenic engines and carrying only liquid hydrogen, sucks in oxygen from the atmosphere, liquefies it and uses it along with liquid hydrogen to travel deep into space.

Though the funds required for such vehicles would be astronomical, the ISRO wanted to ensure development of technology. "It will be another

five years before we take a decision on these vehicles, but we must be ready with the design and technology by then. Many countries may have to join because these are prohibitively expensive vehicles," he added.

Prof Rao said the ISRO had worked together with Bharat Dynamics Ltd, Hyderabad, for the design of hyperplane (hypersonic platform for air-breathing ascent to near-earth orbit), a multi-million-rupee vehicle which combines the technologies of aircraft, rockets and air-breathing to fly at several times the speed of sound and deploy heavy satellites in space.

While agencies such as the European Space Agency (ESA) were working on such transportation systems, the first

such vehicle would probably fly by the year 2010, he added.

Prof Rao said ISRO scientists would visit China later this year as a follow-up of the agreement signed by the two countries for cooperation in space. Already, broad areas of mutual interest — such as building small low-earth orbit satellites and application of remote sensing to spot natural gas deposits — have been identified.

According to Prof Rao, ISRO would carry out another development flight of the augmented satellite-launch vehicle (ASLV) before declaring its operation. ASLV is an important part of India's space programme and was launched successfully in May. "On the basis of this flight the country could progress towards its goal of achieving self-reliance in rocket technology."

As Prof Rao explains: "ASLV can prove a very good vehicle for launch of low-earth orbit satellites. It will be cheaper than Pegasus, where one has to pay US\$10 to US\$15 million for the launch of 125-150 kilogram payloads."

One of the key aspects of the Indian space research programme, which has been operational for the last 30 years, is to develop low-cost projects compared to billion-dollar schemes of the French, the US and other European governments.

"We must build up an inventory of at least 10 ASLVs so that the production would be cheap, the turnaround time will be short and we have the same people working on them."

Improved Engines for Two-wheelers

SCIENTISTS at the Indian Institute of Petroleum, Dehradun, are introducing simple design changes in engines of two-wheelers to save fuel and reduce smoke emissions.

Laboratory prototype engines developed at IIP have provided 10-12 per cent fuel economy and reduced hydrocarbon emissions by 30-40 per cent.

The main advantage of the new design is its low cost and

Improved Engines for Two-wheelers

easy adaptability to Indian conditions, IIP scientists claim.

The IIP technology is based on selective exhaust recirculation (SEGR) which recirculates only the hydrocarbon-rich portion of the exhaust gases.

These gases are fed to the transfer passages in the engines and not allowed to mix with fresh charge which is

filled in the crank cases. The exhaust gases thus enter the cylinder first.

Also, perhaps for the first time in the world, IIP researchers investigated the use of alcohols in the small air-cooled two-stroke engines of scooters and mopeds, and successfully operated 18 vehicles on a mixture of petrol and 18 per cent alcohol in field trial

runs covering 1,70,000 kms. Other parameters that are receiving attention include different types of fuel injection pumps for light commercial vehicles and, improving the "octane number", a factor that indicates the tendency of a fuel to knock in an internal combustion engine.

IIP's studies have helped upgrade the octane number of petrol from 79 to 87 to improve fuel economy.

An International Venue for Inventors

by Pierre Albert Lambert

IN early spring, the Lepine competition traditionally gives the finishing touch to the Paris Fair of which it is a part. This international event pays homage to the art of resourcefulness, said to be a speciality of the French.

The competition owes its name to a chief commissioner of the Paris police at the beginning of the century who also created the emergency police service "Police Secours" and gave city policemen their famous white truncheons. This top civil servant wanted to live up small trades and so, in 1901, he had the idea of launching a competition for fancy goods and Christmas toys.

It was a considerable success and so it was decided to hold it again in the following years under the auspices of an Association of Small French

For nearly a century, the Lepine Competition, which is a real fair for inventions, has experienced growing success. It has allowed numerous inventors to have the public benefit from sometimes brilliant innovations.

will turn into a great discovery.

Every year, there is controversy around the "Lepine" competition. Some people compare it to a venue of buffoons and crazy inventors. Others reproach the organisers for not being able to distinguish a funny idea from a real innovation. But its success keeps on growing. It receives an average of 300,000 French and foreign visitors, keen on new techniques, a year.

Who would have thought that, when they were presented at the Lepine competi-

tion, came up again, and the individual garage, inspired by a violin case and without a future, but causing a lot of laughs. There were also a lot of leucuses who invented systems with wings to fly in the sky but they never managed to take off or ended up in hospital.

Many of these inventors, who hope to gain distinction in the Lepine competition, are self-taught and suffering from the research bug. But there are also some learned engineers some of whom graduated from the prestigious "Arts et Metiers" school or the "Polytechnique".

The 1992 edition of the Lepine competition brought together 250 exhibitors including a strong foreign contingent with Germans, Swiss and British participants, Bulgarians, many Chinese, Koreans, Peruvians and Mexicans.

Among the inventions which gained the interest of visitors, there was a machine for throwing confetti, an anti-venom stick to neutralise wasp stings, a pocket stool, an anti everything (anti-earthquake, anti-fire, anti-pollution, anti-noise, anti-tornado, etc) house, etc.

There were also plant pastilles "which replace seven cups of herb-tea" a device for "saving the coffin and its ornaments in case of cremation", a system of infra-red transmission of the intentions of a driver to the one behind him, an anti-tiredness sock with, in its sole, mini ceramic beads which massage the sole of the foot, and a reversible plexiglass greenhouse/swimming-pool. In summer, one can bathe in it 1.5 metres of water and the rest of the year, turned the other way up, it can be used to shelter flowers and vegetables.

The gold medal in the 1992 Lepine competition was awarded to an inventor from Le Touquet, in the north of France. As a pianist and composer, Henry Carcelle, aged 36, thought up a new keyboard with the keys arranged in a rational and regular way. The new score which goes with it no longer sows the notes as being part of a scale but actually shows the keyboard itself.

With Henry Carcelle's invention, which is being marketed, future pianists will not longer have to learn to read music. It is a revolution in learning to play the piano.

— L'Actualite en France

New Technology for Electric Cars

by Martin Ebeling

Heavy environmental pollution caused by exhaust fumes from internal combustion engines has, for a long time, prompted the search for less harmful alternatives. So far, though, the development of electric cars, — which are a promising concept as such — has been hindered not only by a want of lightweight high-performance batteries; the problem of the mechanical transmission of power from the engine to the wheels has not yet been solved satisfactorily either.

THE new, contactless electric drive, developed by professor Klaus Hofer from the Technical College of Bielefeld, is based on a principle which has also been implemented for magnetic levitation trains like the Transrapid. Power is transmitted through magnetic fields. Three-phase current flows through coils positioned internally along the length of the vehicle. When current flows through a coil, a magnetic field is generated inside it.

In the case of the magnetic levitation train, the special arrangement of the coils causes these magnetic fields to travel backwards along the underside of the vehicle. The rail consists of a copper mantle with an iron core; the magnetic field at the underbody magnetizes a section of this rail, giving rise to forces of attraction. This creates a coupling effect between the rail and the vehicle.

As the magnetic field moves backward along the length of the vehicle, a forward thrust is generated, causing the vehicle to accelerate. The design

based on this drive principle is termed liner motor because, in contrast to conventional motors, no rotary motion is involved.

Professor Hofer now intends to employ this form of rail vehicle drive in electric cars too. If the rail is bent theoretically into a circle, and the car held stationary, the rail should start "spinning" underneath the car. If the rail is now viewed as a wheel, a contactless, electromagnetic wheel drive is the result. In other words, small "rails" in the form of iron and copper rings simply need to be fitted

to the rims. The "carriage", which generates the magnetic fields, is attached to the body of the vehicle. The air space between the "carriage" and the "rail" is meant to be only 4 mm, without allowing any contact.

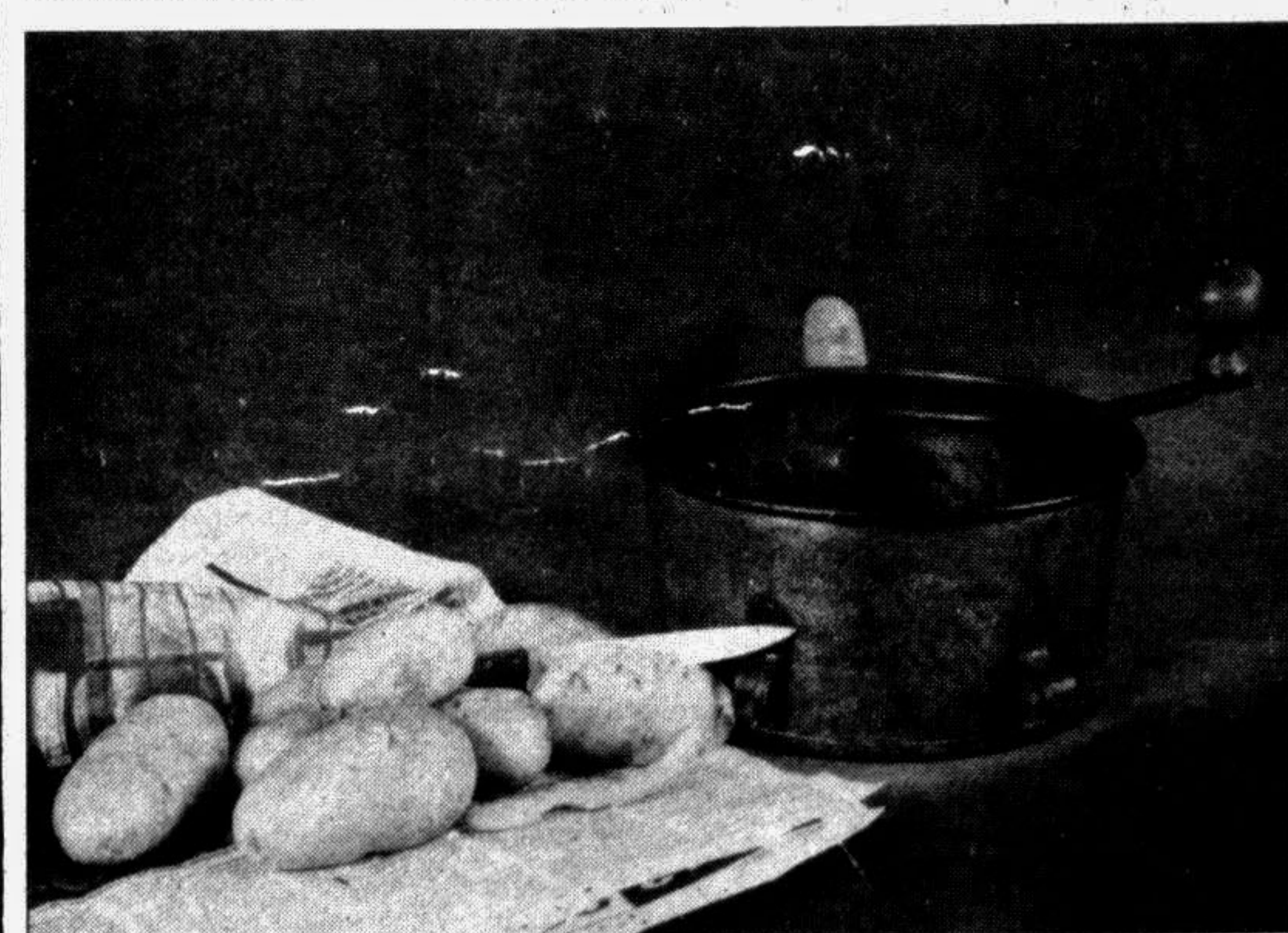
This makes the vehicle almost complete: the gearbox, clutch and even the conventional braking unit can be dispensed with. An important advantage of the electric motor over an internal combustion engine is that the car can not only be made to accelerate by supplying it with more electrical energy, but the reverse

process — deceleration — is also possible through the recovery of electrical energy, following the dynamo principle.

This considerably raises the level of energy utilization. The "electric brake" only has an effect as long as the wheel is still turning; thus, an anti-skid system (ABS) is integrated practically as a "standard" feature.

The electric car itself does not produce any exhaust fumes. Even if the pollution resulting from the recharging of the batteries for the purpose of energy recovery is accounted for, the electric drive proves to be more favourable than conventional petrol or diesel engines, thanks to its "economy brakes".

The development of new, powerful batteries in the USA, which employ hydrides as a means of storing energy, promises to increase the range of electric cars to 2000 kilometres. Filling up will only take a few minutes, at specially designed hydrogen filling stations. Stations like these and electric cars might soon become a common sight in daily traffic, at least in our cities.



A rustic but original utensil of 1930, which is the original of the Moulinex firm.

— Photo: Jerrican.

Manufacturers and inventors, acknowledged as being "of public utility".

Since then, every year, invention addicts rush to present the fruits of their creative and beneficent, but also sometimes delirious and crazy, imaginations. From among this motley collection of machines, devices and strange and unusual objects, a jury tries to detect the little gadget which

tion, the two-stroke engine, ball-bearings, the wireless, the shorthand typewriter, the lawnmower, the electric vacuum-cleaner and the dishwasher, to mention but a few, would become as widespread as they are?

Surrealist humour

Some inventions have made the fortunes of their inventors, for instance Jean Mantelet's

facture it. The patent ran out and, 30 years later, an American launched this pen on the market.

Some of the inventions presented in the competition are full of involuntary surrealist humour. In the past, there was the "machine for travelling at the speed of light", the pocket submarine which ended its first demonstration at the bottom of the Seine and never