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F. V. E. A. A. NEWSLETTER

DECEMBER 1990

MEETING NOTICE

The next FVEAA meeting will be **DECEMBER 21st** at College of DuPage Building K 22nd & Lambert Rd. Glen Ellyn Time Meeting 7:30 P.M sharp. We can arrive at 7:00. Guests are welcome and need not be members to attend the meeting NOTE: Enter at EAST entrance We meet in room # K-157

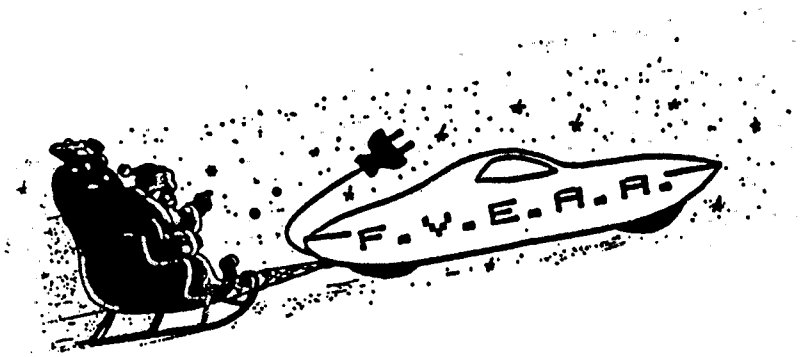
DEADLINE for newsletter *STUFF* - in my hands the friday before the next meeting. Editor

THE EDITOR SEZ

Each month at the meeting there are publications, flyers, past newsletters, and newletters from other electric auto clubs available for club members to take home and use as they see fit. All we ask is that they be returned so others may benifit from them. If you have any similar items you may wish to share, bring them in and we will add them to the club library.

Any requests for want ads (items for sale or wanted) will be published for one month only unless you tell me otherwise. Let me know if you want to continue your ad in case you didn't sell your stuff or get what you wanted. There is no charge for this service to club members, so dig through your basement or garage and make a list along with prices of items others just may be looking for.

John



FOX VALLEY ELECTRIC AUTO ASSOCIATION
6542 Fairmount Downers Grove Il 60516

FIRST CLASS

ADDRESS CORRECTION REQUESTED

New battery could give electric cars big push, Japanese researchers say

By Asahi News Service

TOKYO — Japanese researchers have developed a powerful, light and quickly chargeable battery that could give electric cars the punch they need to handle actual traffic conditions.

Prototype electric cars have tended to be slow and expensive. Their chief weakness, however, has been the inability of conventional chemical batteries to deliver enough power to accelerate quickly, a must for driving on public roads.

Development has continued on a small scale, however, because exhaust emissions from internal combustion engines make up a major portion of the so-called greenhouse gases that some scientists believe cause global warming.

The battery developed by Isuzu Motors Ltd. — which is 40 percent owned by General Motors — and Fuji Electrochemical Co. and unveiled Monday, may change all that. If it lives up to the claims of its makers, say experts in the small field of electric automobiles, the product could be epoch-making.

The Isuzu battery is a condenser consisting of two conducting plates separated by an insulating material. Condensers store energy in the form of electricity, whereas lead batteries rely on chemical reactions to store and discharge electricity.

The new auto battery has 20 times the output density and one-third of the resistance of conventional batteries, allowing it to deliver the intense bursts of energy a car needs to accelerate, say the developers.

The improved performance is attributed to two innovations.

Instead of using the kind of electrodes found in ordinary condensers, made of a paste consisting of activated charcoal and diluted sulfuric acid, Isuzu and Fuji Electrochemical created a solid form of the mixture.

The other change was the use of a new ion-exchange resin as an insulator. The firms would not explain these advances, however, saying they are applying for patents.

Isuzu plans to commercialize the battery as an electricity source for engine starters within two years, a spokesman said.

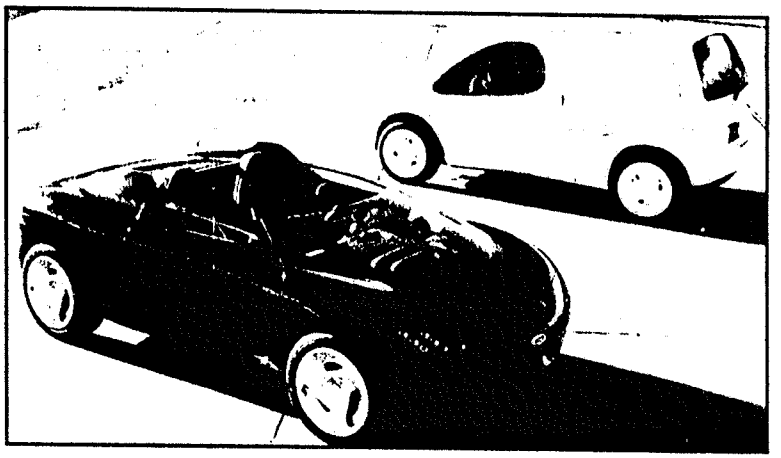
The Isuzu spokesman said the most promising application of the condenser is in the fledgling field of electric cars.

As the new battery has a very small internal resistance, it takes less than 30 seconds to charge. The ease and quickness of charging and discharging strong bursts of electricity in a short time mean the condenser can save and store excess energy quickly and can release enough energy in a short time to enable electric cars to accelerate rapidly, he said.

"If it's true that the new battery has about 20 times the output density, it's marvelous and very good news to electric car developers," said Hiroyuki Watanabe, manager of the solar energy planning department at Kyocera Corp., a leading solar-car developer in Japan.

F.V.E.A.A. MEMBER Len Fisher of Dublin, Ohio sent us the following article from Page 3 of Ford Motor Co.'s quarterly report. Len speculates that "maybe we'll see the results in 3 to 5 years."

Charging Ahead: Ford has been awarded a $14.5 million cost-shared federal government contract for research and development of electric vehicle powertrain components. Ford will integrate the powertrains into a small two-seater passenger car, a subcompact wagon and a minivan. GE Drive Systems, a major subcontractor, will design the electric motors and controls.

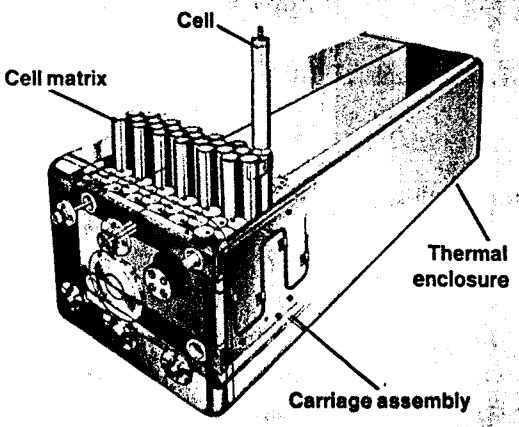


SUPER COMPACTS: Ford's advanced experimental Zig (left) and Zag are designed to a minimum size to conserve energy and raw materials. The mini-roadster is 140 inches long, the multi-purpose leisure vehicle 134 inches long. Their fiber-optic lighting system features a row of miniaturized lenses molded above the bumper.

SIZING UP THE NEW BREED OF BATTERIES

Power for the latest crop of electric-charged vehicles comes from technology that was showing promise just a decade ago. A few are near or in production and some may need another decade before finally reaching battery compartments.

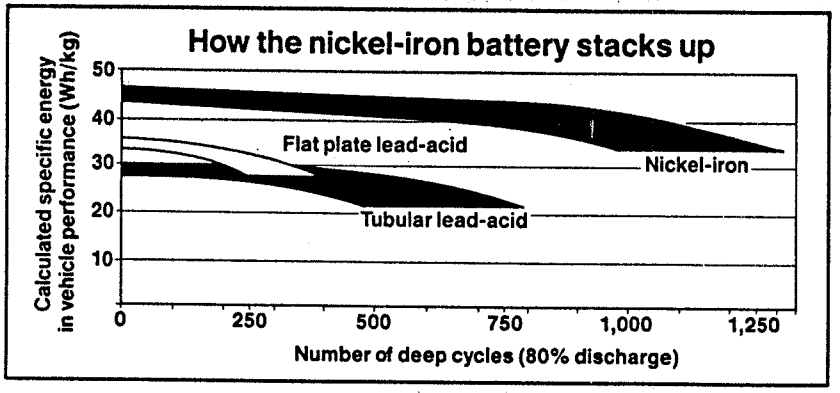
Sodium sulphur is a top contender as a widespread vehicle power supply because it stores up to four times the energy in the same weight as a lead acid. Also, it is made of materials that are inexpensive and plentiful. Furthermore, its life may be longer than standard batteries. Chloride Silent Power, a U.K. company, claims to have cells that have operated for six years and survived more than 6,000 charge-discharge cycles.



A sodium-sulphur cell holds molten sodium in a ceramic-electrolyte container that conducts sodium ions. Sulphur blocks then surround the ceramic and the unit is encased in an aluminum container. The cell is further protected in a carriage assembly and thermal enclosure.

Because the battery operates between 572 to 626°F, it has an onboard heating system, it is well insulated (warm to the touch), sealed for life, and it is maintenance free. In fact, another battery manufacturer, Powerplex Technologies Inc., Toronto, Canada, claims that winter weather will have little effect on performance because of the insulation. Once both companies begin volume production, about 1993, energy costs are expected to be $200/kWh.

Nickel-iron batteries are within a few months of production, according to engineers at Eagle-Pitcher Inc. The advantages of this design are that its energy density is about 30% more than that of similar voltage lead-acid batteries and it operates at room temperature. Hence, it needs no special heaters or insulation. Also, its voltage curve is almost flat over about 95% of its discharge cycle and the nickel, iron, and electrolyte are recyclable with current technology.



Developers also say the 28-module battery will withstand 1,200 to 1,400 charge cycles to propel a vehicle about 100,000 miles over 8 years. In one prototype, the batteries have endured over 900 cycles and are still in operation. Basic 6-V modules measure about 7 × 10.5 × 10 in. and weigh 54 lb.

The Ni-Fe battery can be trickle charged over 8 h or quick charged in about 3 h. Researchers also suggest this figure might soon drop to 1.5 h. Efficiency estimates are 68 to 85% while charging, and 75 to 85% while discharging.

Lithium alloy-iron sulfide is a high-temperature molten-salt electrolyte

How the new batterys stack up

Battery type	Specific energy (Wh/kg)	Specific peak power at 80% depth of discharge (W/kg)	Projected operating cost (1986 $/kWh)	Cycle life (Cycles to 80% depth of discharge)
Lead acid types	47	105	72	181 +
(flow through)	36	80	—	800 to 1,000
(tubular)	35	200	63	600
(monopolar)	57	—	—	1,200 (estimated)
(bipolar)	49	103	125	2,000
Nickel-iron	44	110	72	700
Nickel-cadium	55	88	75	50 +
Zinc-bromide	83	100	91	350 to 1,000
Lithium aluminum-iron sulfide	136	180	91	810 +
Sodium-sulfur	70	83	91	48 +
Iron-air	200 to 300	—	—	6 to 12 mos
Zinc-air	800 to 1,200	—	—	Does not recharge
Lithium air	400 to 500	—	—	—
Gas-engine power train				

--more--

How the new batterys stack up

battery (internal temperature about 850°F) that promises 200 miles between charges. For the battery to operate during charge and discharge cycles it must be maintained at a temperature above the melting point of the lithium salt electrolyte. But researchers estimate that the battery can self-sustain its operating temperature for about a week and still propel a vehicle over a limited range. If longer periods of inactivity are anticipated, a simple resistance heater plugged into the electric utility will maintain the battery's operating temperature. During charge and discharge cycles, the chemistry maintains a working temperature of about 850°F. Again, insulation techniques will produce little operating difference from summer to winter.

One advantage of this design is that the battery is easily shaped to fit available space. While prototype cells show promise, the cycle life needs improvement to be acceptable for the electric vehicle user. However, researchers at Westinghouse Naval Systems, Chardon, OH, say that recent changes to the electrode formulations are expected to boost cycle life.

Zinc air holds promise as a near-term battery capable of powering an EV for 150 to 200 miles, according to researchers at Dreisbach ElectroMotive Inc., (DEMI), Santa Barbara, CA. While the battery pack for this task may only weigh 1,000 lb, its life will be admittedly short before replacement is necessary, about 6 months to 1 year. While researchers work to lengthen that period, the chemistry offers other benefits. For example, the battery needs no liquid electrolyte, operates at room temperature, and all components are recyclable.

Lithium air is predicted to be the ultimate EV battery, with better than three times the energy density of gasoline. Researchers at DEMI predict EV ranges stretching to an amazing 400 miles in city driving and 1,000 miles on the highway. Later this year, a Southern California Edison Li-air-powered EV will begin road testing to prove the concept.

However, the chemistry here is more complex because lithium-air batteries are not recharged. Instead, electricity is produced as lithium combines with air to produce lithium carbonate. To refuel a Li-air battery, the lithium carbonate, formed in a removable pack, will be replaced with fresh lithium in about a 5-min operation. Later, in a complex operation, lithium will be electrically separated from the compound for reuse. In this way, lithium is not consumed, but recycled.

Advanced lead-acid batteries will be sealed, need no maintenance, and produce no gas by-products when charging. Also, they may cost less than more sophisticated designs to develop, and can be put into production sooner.

Ensci Inc., Woodland Hills, CA, is working on two advanced lead-acid designs, a monopolar or advanced conventional battery and a bipolar design. Both systems improve on the energy density of standard lead-acid designs. In addition, the bipolar battery eliminates standard battery items such as grids or inner-cell connects that hold the active material and transfer current between cells. Researchers claim that energy density in bipolar battery is equivalent to that of nickel-iron designs.

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1991 DUES

Membership renewals
are due.

DEADLINE

for newsletter STUFF
- in my hands the friday
before the next meeting.
Editor

NEWSLETTER STUFF

We need interesting
articles for OUR
newsletter. My sources
are running dry.

NEWSLETTER EXCHANGE

The FVEAA newsletter
is now being exchanged
without charge to other
clubs on a reciprocal basis.
So far we're exchanging with
Oregon, Pennsylvania, Massa-
chusetts, California, Colorado,
Canada and Illinois. These
and hopefully many more
will keep us informed of news
and events in other areas.

CHRISTMAS GREETINGS

Merry Christmas and a Happy New
Year from the newsletter staff

swatch®

SWATCH "SPIRIT" POWERS TO VICTORY IN WORLD SOLAR CHALLENGE

The Swatch-sponsored "Spirit of Biel-Bienne II" cruised to a stunning solar-powered victory Friday, November 16 in the 2nd World Solar Challenge in Adelaide, South Australia. The "Spirit" reached the finish line in 6 days after covering over 1800 miles in approximately 47.5 hours. Averaging 36 to 48 mph, the "Spirit" took the lead three hours outside of Darwin in the Northern Territory, the starting point of this incredible race of solar technology.

Highlights of the Swatch/Biel performance include an incomparable top speed of 54 mph during the race's third stage on Tuesday, November 13. On this day, the four "Spirit" drivers covered 378 miles averaging 45 mph for the day. By the end of the fifth day, the "Spirit of Biel-Bienne II" had increased the lead over its nearest rivals from Japan and the United States to 210 miles placing them in a virtually untouchable position for the 144 mile homestretch.

The Swatch/Biel "Spirit of Biel-Bienne II" totally outclassed an impressive field of 40 entrants including three General Motors-sponsored vehicles and the Japanese Honda-sponsored vehicle. The "Spirit of Biel-Bienne II," designed and engineered by Rene Jeanneret, carried Swatch racing colors to the finish line General Motors first crossed in 1987.

The "Spirit's" extremely low drag coefficient, perfected at the Swiss air force facility, and advanced solar technology contributed to this impressive win. The technical systems of the "Spirit of Biel-Bienne II" proved so reliable the team experienced no major setbacks. In fact, 'punctures' or flat tires, caused by using maximum tire pressure to reduce friction, gave the Swatch/Biel team the only regular trouble. However, the efficient crew was able to change both front tires and get back on the road again in the space of four minutes.

The "Spirit of Biel-Bienne II's" time was just two hours over the time set by the General Motors "Sunraycer" under ideal conditions in 1987. The "Spirit" met with inclement weather including strong headwinds and rain which slowed the Swatch/Biel team's time most noticeably on day four when the "Spirit" managed an average of only 31 mph and a distance of only 281 miles. The first day of the race was affected as well when poor weather reduced effective driving time from nine hours to eight.

The goal of the World Solar Challenge is to prove that solar powered vehicles are capable of efficiently travelling long distances. Hans Tholstrup, race organizer, firmly believes solar cars will replace conventional vehicles within 20 years. According to Tholstrup, "In 100 years, people are going to look back on this rally the same way we do on the Wright brothers. It's that important." If this prediction is correct, the Swatch/Biel "Spirit of Biel-Bienne II" will go down in the records of solar-car development as the vehicle from Switzerland that took on the automobile giants of the world - and won.

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Solarmobil Spirit of Biel / Bienne II

Technical description:

Car body:

General properties:
Monoposte composite-body optimized to light weight and little air resistance, safe travelling behaviour in the whole field of application taking into account different cross-wind conditions

Construction form:
supporting fiber reinforced body structure, a sheell of body on layer lamination, strengthening ribs in sandwich construction, laminated by hand

Materials:
Epoxy resin reinforced by carbon and aramid fibers

Data specifications:

weight without mechanic electronic and solar cells	= 66 kg
drag coefficient CW	= 0.13
face surface	= 1.1 m2
dimensions (length*width*height)	= 5620*2000*1000 mm

Manfacturer: Bucher lightweight constructions, CH-8117 Fällanden

Mechanical Elements: (self developed by the School of Engineering)

Suspension:
front: double triangle transverse control linkage with hydropneumatic suspension (spring mounting)
rear: longitudinal oscillator in the center of the car with incorporated strat up bucking eliminator

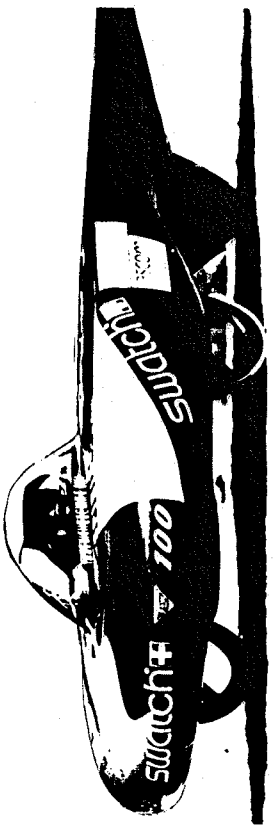
Tyres:
Double tyres racing bike tyres 26", 19mm wide; single tyre Bike-Slick 26*1.25"

Brakes:
front: hydraulic disc brake
rear: locking brake

Steering assembly: Steel cable steerage with guided middle part

Mode of driving: on rear wheel with chain

Electic Elements:



Solar generator:
construction : highly efficient silicon solar cells in shingle technics (clap-board- technics), enclosed in ultra light weight glass fiber reinforced plastic

Data specifications:

output power (at 25°C AM 1.5- Spectrum)	= 1300 Watts
efficiency	= 17%
surface and thickness of generator	= 7.67 m2, 1.3 mm
cell masking degree	= 97.5 %
generator weight	= 17 kg

Manfacturer: Telefunken Systemtechnics, a branch of the German Aerospace (CH-8804-Elektron AG)

Maximum- Power- Tracker:
Up converter, self developed by the School of Engineering

nominal power	=220 Watts (7 converters in built)
efficiency at nominal power	= 98.6% and 30°C cooling medium temperatur
efficiency at 1/20 nominal power	= 93%
weight of a power tracker	= 0.4 kg

Batterie:
Silver-zinc battery, 86 cells at 1.5 Volt in series

nominal (rated) voltage	= 129 Volts
capacity appropriate of definition	= 25Ah (measured at C5 = 35 Ah)
total weight of battery	= 38 kg

Manfacturer: Eagle- Picher USA

Motor:
synchro-motor with magneto-permanent , self developed by the School of Engineering

nominal power	= 1100 Watts (peak power = 5000 Watts)
nominal voltage	= ca. 65 Volts
efficiency at rated load	= 94.5%
weight	= 4.2 kg

Electronics for drive units:
inverter with MOS-FET, high efficiency and control system for run with cos $\varphi = 1$, self developed by the School of Engineering

nominal power	= 1100 Watts (peak power = 7000 Watts)
efficiency	= 97-98%
weight	= 5.1 kg

Instrument panel controls:
battery voltage
ampére-hour-counter charging and discharging control of the battery
current in each of the seven Power Trackers
tachometer
power of the solar generator
power of electronics
powermat: provides a constant electrical power while driving

Lighting:
Stop lights, direction indicator, signal fasher (hazard warning) alimented by a separate 12 Volts silver-zinc batterie

Weight:

Empty weight	= 175 kg
total weight incl. driver	= 255 kg

Plastic batteries key to getting electric cars on the road

Chicago Tribune

By Ceci Connolly
Associated Press

BOSTON—The race is on to perfect a plastic battery the size of a playing card that would make electric cars an attractive alternative to gasoline-powered vehicles, scientists say.

Interest is so great, they say, that electric automobiles will be streaming down America's highways by the end of the decade.

"It's a matter of time," said Duward Shriver, a professor at Northwestern University.

Electric cars aren't a new idea, and some already are in use. They use no gasoline and emit no carbon monoxide, making them attractive in a world worried about pollution and nervous about oil supplies being cut off in the Persian Gulf.

The problem is the power source for electric cars. They need several batteries to cover long distances without recharging, and standard auto batteries are heavy and bulky.

For example, General Motors Corp. plans to manufacture an electric car, but under the current design, it will require 32 standard lead-acid car batteries, said spokeswoman Toni Simonetti. "It certainly takes up a lot of real estate in the car," she said.

The solution may be the card-sized plastic battery. Scientists in Boston for a symposium say the technology is available and that such a battery could be developed within a few years, ushering in the mass use of electric cars.

"We're trying to replace batteries of a traditional kind with a battery of a much less traditional kind," said Mark Ratner, a Northwestern University chemistry professor who received an award last week from the Materials Research Society for his work with plastics.

Ratner said the lead-acid battery is heavy and somewhat dangerous because it gives off toxic substances. By comparison, he said, batteries made of polymers, or plastics, are light, don't pollute and present few, if any, dangers.

Polymer batteries wouldn't be restricted to electric cars. They also could be used in light, portable computers and in "smart" windows, with panes that change color to absorb or reflect heat depending on energy needs, Ratner said.

Experts predict foreign countries or the U.S. government, rather than Detroit, will be the first to use vehicles with polymer batteries.

"The French, Canadians, Japanese—their governments have pushed more," Ratner said. "They were ecologically conscious a little before we were."

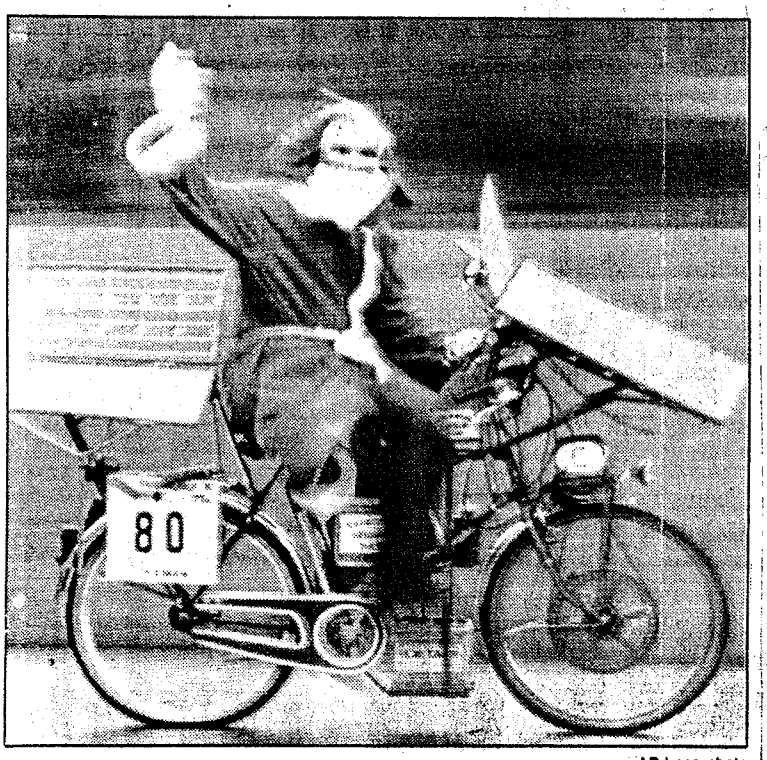
Still, scientists said they are encouraged by external forces that have made new batteries a higher priority. After nine years of working quietly in labs, Ratner said he has been deluged with inquiries since Iraq invaded Kuwait on Aug. 2, which made the price of oil a national preoccupation again.

Stringent air-quality regulations enacted in California also are speeding up polymer battery experiments. Under law, 2 percent of all cars sold by 1998 in California must be electric-powered.

"From the standpoint of city pollution, the standards in California almost force electric vehicles," said Northwestern's Shriver.

In the short run, electric cars are being pushed as a way of cutting pollution, said Jerry Martin, spokesman for California's Air Resources Board.

But "as technology improves, there will be more advantages," he said.



AP Laserphoto

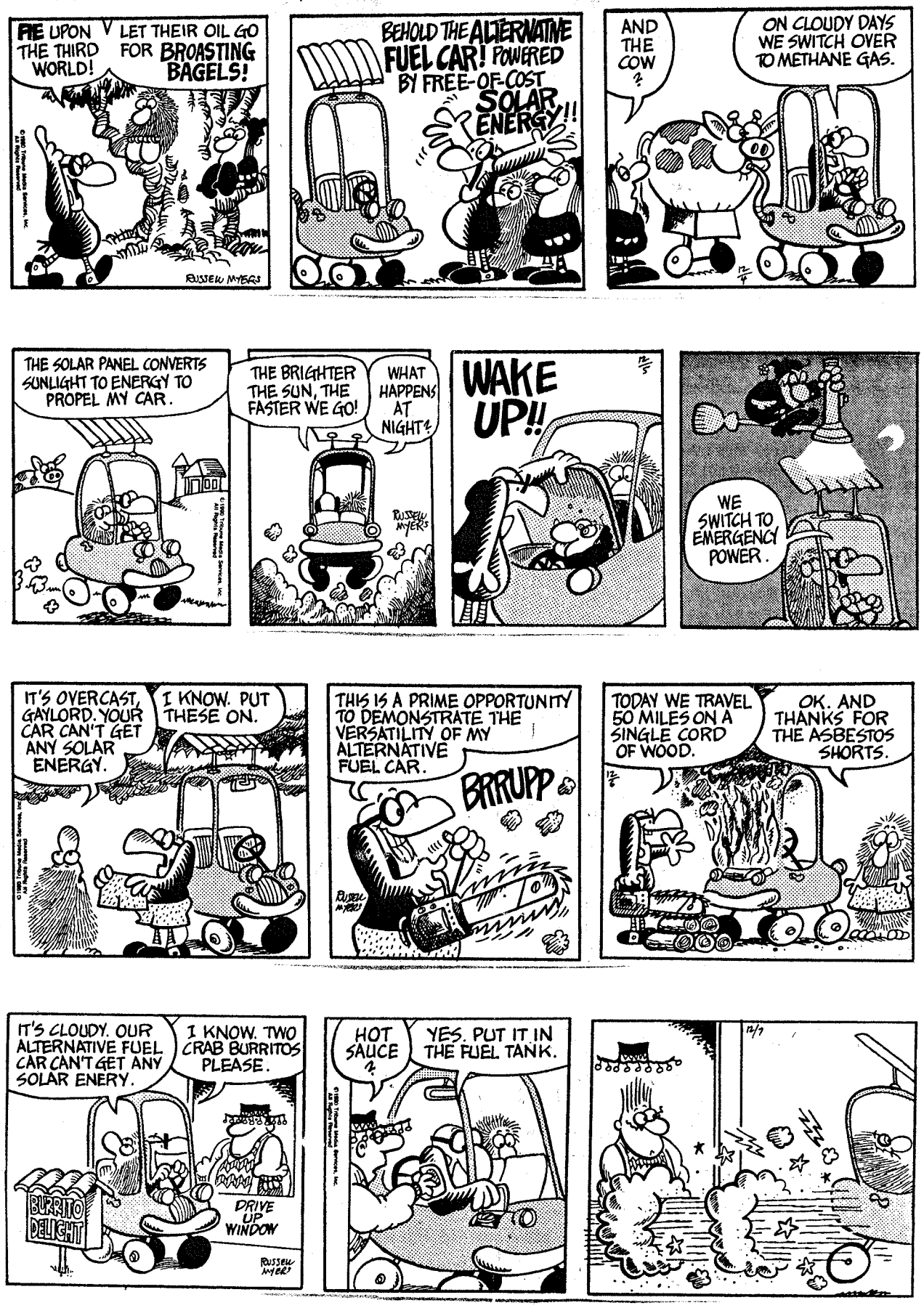
This Santa wants sun

Santa leaves reindeer and snow behind to try a solar-powered bicycle at the International Motor Show in Essen, Germany. The bike can do about 30 m.p.h.

Chicago Tribune

Ward's Automotive Reports says some Honda company insiders are upset that the automaker has been too conservative in recent years. The gripe is that the Japanese automaker has been too slow to increase production capacity. That is said to have forced delays in bringing out new products, such as entry-level and top-of-the-line Acura models, plus a mini-van and pickup truck. If forced to produce a battery-powered electric car, which seems likely based on the pressures of recent strict clean-air legislation, Honda would suffer another setback, insiders say. Production of an existing model would have to be cut to make room for the electric, which reportedly will be an electric/gas hybrid.

BROOM-HILDA


FIE UPON THE THIRD WORLD!
LET THEIR OIL GO FOR BROASTING BAGELS!
RUSSELL MYERS
BEHOLD THE ALTERNATIVE FUEL CAR! POWERED BY FREE-OF-COST SOLAR ENERGY!!
AND THE COW?
ON CLOUDY DAYS WE SWITCH OVER TO METHANE GAS.
THE SOLAR PANEL CONVERTS SUNLIGHT TO ENERGY TO PROPEL MY CAR.
THE BRIGHTER THE SUN, THE FASTER WE GO!
WHAT HAPPENS AT NIGHT?
WAKE UP!!
WE SWITCH TO EMERGENCY POWER.
IT'S OVERCAST, GAYLORD. YOUR CAR CAN'T GET ANY SOLAR ENERGY.
I KNOW. PUT THESE ON.
THIS IS A PRIME OPPORTUNITY TO DEMONSTRATE THE VERSATILITY OF MY ALTERNATIVE FUEL CAR.
BRRUPP
TODAY WE TRAVEL 50 MILES ON A SINGLE CORD OF WOOD.
OK. AND THANKS FOR THE ASBESTOS SHORTS.
IT'S CLOUDY. OUR ALTERNATIVE FUEL CAR CAN'T GET ANY SOLAR ENERY.
I KNOW. TWO CRAB BURRITOS PLEASE.
BURRITO DELIGHT
DRIVE UP WINDOW
HOT SAUCE?
YES. PUT IT IN THE FUEL TANK.