

How it works

How is color television transmitted? (See page 166 of THE WAY THINGS WORK.) How is electronic data processing done? (See page 302). How does a helicopter fly? (See page 560.) How does "dry cleaning" clean? (See page 407.) Why does a record player play? (See page 314.) How does the simple switch operate? (See page 96.) Why do vending machines reject counterfeit coins? (See page 324.) What happens at the telephone exchange? (See page 112.) How does a Polaroid camera produce pictures? (See page 172.) What makes gunpowder explode? (See page 448.) What does a nuclear reactor do? (See page 54.) What happens in "supersonic speed"? (See page 556.)

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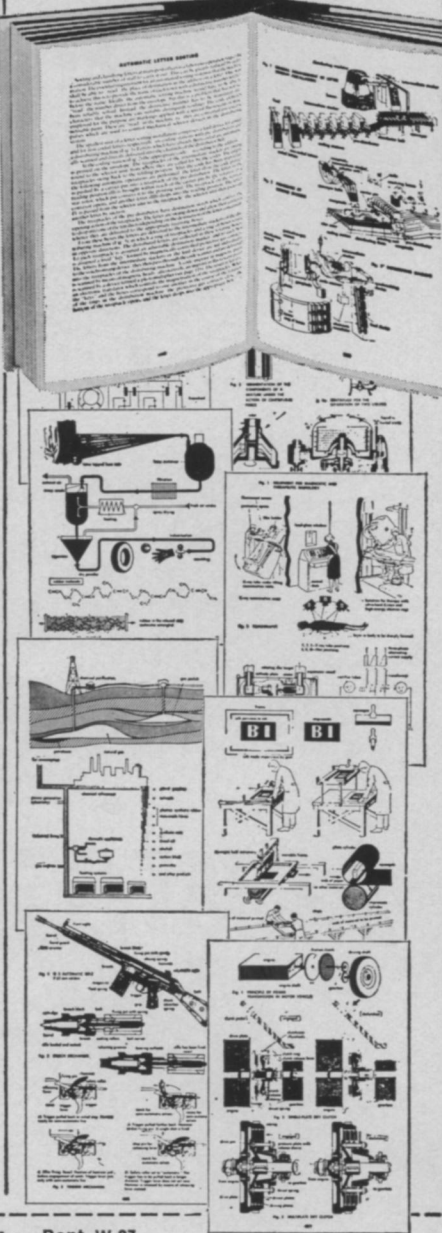
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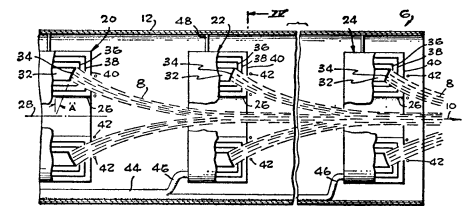
ROCKETRY

Ion engines in series

Ion rocket engines give gentle thrust for a long time. Although useless for boosting loads into orbit, they are useful for the long haul because they get more work per ounce of fuel than the fast-burning, high-power chemical rockets.

By clustering a number of engines together, a respectable thrust can be achieved. But clustering the engines means a large surface exposed to space, allowing heat losses which cut the efficiency of the engine.

A newly patented method of clustering the engines cuts down heat losses by building them with a hole in the center and lining them up in a tube, one behind the other. The



thrust from one engine is funneled through the next, and so on for up to 10 engines. That way, only the last engine is exposed to space.

In the engine, a supply of cesium is heated until it vaporizes, and then sent through a ring-shaped ionizer that strips the atoms of their electrons, leaving them positively charged.

The stream of cesium ions then passes through a metal ring that has a large negative voltage. The negative field accelerates the ions, giving thrust to the engine. Electrons are then added to the stream to neutralize it electrically.

In the tandem arrangement, invented by Hayden E. Gallagher of Hughes Aircraft Co., the ionizer exit is slightly tilted so that the ion beam is bent toward the center. In this way, the beam passes through the center of the next engine down the line, and adds its thrust to the general stream.

Besides being more efficient, the series arrangement allows for more effective control, since all the thrust is along a single axis. In the side-by-

side arrangement, if one engine goes out, it could cause the rocket to slew around, especially if it were in deep space where corrective commands would take a long time to arrive.

The patent was assigned to the National Aeronautics and Space Administration. A NASA spokesman said that when ion rockets are built, the series method would most probably be used.

Patent 3,367,114.

MEDICINE

Silicone rubber bandage

A surgical bandage that keeps out infection, keeps in body salts, allows and retains injection of healing fluids such as antiseptics or oils for burns, and lets out air and body water, has been patented by James N. Groves of the General Electric Co.

Key to the new bandage is a thin membrane of silicone rubber, which passes some fluids but not others. Attached to the membrane is a tube which allows introduction of whatever material treatment the wound requires.

In one application of the invention, a second tube could be added and continuous circulation of silicone oil for treatment of burns could be carried out. This would eliminate the need for total body immersion as in present techniques.

Patent 3,367,332.

SCRAP

Economical car salvage

Junk cars represent a vast source of scrap iron that isn't economical to recover. Other materials in the cars, such as upholstery, tires, and glass, take too much time and trouble to separate.

A one-step operation that burns out unwanted nonmetallic material and melts down iron from old cars in a continuous operation won a patent last week for Clarence C. Schott of Baltimore, Md.


In the process, two cars are squeezed together, then loaded into a furnace stack with a fuel-oil fire at the bottom. The iron is melted in the furnace, which burns with a short supply of air to keep oxidation of the metal down. The partially-burned gases from the furnace are exposed farther up the stack to enough air to burn them completely, and heat from this combustion burns out any non-metallic components of cars farther up the line.

Patent 3,367,769.



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