now widely used in Europe to dilute gasoline. All German gasoline must now contain about ten per cent. of alcohol by law, and varying percentages are used in Austria, Sweden, Czechoslovakia, and other neighboring nations.

Although it can be used in a pure state as well, its high cost has so far prevented this. Two recently developed German processes, the Scholler-Tornesch saccharization process and the Bergius wood hydrolysis process, are claimed to be capable of producing alcohol more cheaply and in larger quantities for use as motor fuel. Whether this is true or not remains to be seen.

Dilution

A number of proposals have been made and have received some support in Congressional circles in Washington for making dilution of all American gasoline with one or two per cent. of alcohol compulsory. This would conserve our petroleum resources and benefit the farmer, it is claimed, since alcohol can be distilled from corn, potatoes, and many other farm products.

Many chemists, however, feel that the first step in providing a real substitute for natural petroleum will be the synthetic production of gasoline from coal by a process known as hydrogenation of coal.

Several commercial processes have been developed for coal hydrogenation in Germany, which is almost entirely lacking in natural petroleum resources, and are being put to more increasing use with the help of government subsidies. Last autumn the Reich government organized a joint cooperative company known as the "Braunkohlen Benzin A.G." with money contributed pro-rata by the Central German brown coal companies, for the production of synthetic gasoline from coal on a large scale, using the Bergius process of hydrogenation.

In England as well as in America, a number of oil companies, have been experimenting with the production of synthetic gasoline, and a number of synthetic gasoline laboratories have already been built.

Price Double

So far, it has been impossible to produce it at a market price of much less than twice what an ordinary gallon of natural petroleum gasoline now costs. In other words, synthetic gasoline costs about 32 or 33 cents a gallon, although large-scale production would undoubtedly lower this figure.

What chemistry, spurred on by necessity, can accomplish can be seen by a glance at what is now happening in Germany, struggling to be free of foreign imports. Automobiles are being driven increasingly by illuminating gas, alcohol, benzol, Diesel oil, and a variety of non-liquid gases including propane, butane, methane, coke and wood gas.

Propane and butane are available in large amounts in the United States, as well as natural illuminating gas, which is mostly methane. Both of the former are now used in liquid form as solvents to remove impurities from motor oil in U. S. refineries. Their great versatility makes it possible to use them first as a solvent and then as motor fuel, without great additional cost. These could undoubtedly be used in an emergency, although they require additional equipment to that used in gasoline burning automobiles. Liquefied propane tanks are shown on the front cover of this week's SCIENCE NEWS LETTER.

Electricity should not be overlooked as a possible source of power for automobiles. When the automobile industry was still young at the beginning of the century, there was a great deal of competition between electric and gasoline automobiles to capture the new automobile-buying public. Although the struggle was a close one for a number of years, gasoline finally won out because of its superior speed and convenience. It took less time to say "fill 'er up" to a filling station proprietor than to wait for a battery recharge, every 75 or 100 miles.

A few electric automobiles, relics of 15 to 25 years ago, are still occasionally seen, operated by persons to whom speed is not a major consideration. The invention of a new storage battery, capable of storing much larger quantities of "juice," might enable the electric car to stage a come-back.

Scientists, on the whole, are not too greatly worried about what is going to happen after our natural resources have given out, whenever that is. Science has come to the rescue too many times in the past to fall down in this situation.

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PHYSIOLOGY

Reports Feeling No Sensation During a 1200-Foot Fall

AN ARMY doctor has fallen 1,200 feet in space just so he can tell how it feels. The strange result of the experiment is that there is no sensation to the fall, "except a very gentle, evenly distributed pressure something like being lowered slowly into a great bed of softest down."

The reason Capt. Harry G. Armstrong, of the U. S. Army Medical Corps, is alive to record his sensations (*Journal, American Medical Association*, Oct. 5) is that the premeditated fall was really a delayed parachute jump from an airplane. When he was 1,000 feet from the ground he pulled the ripcord and came to earth with parachute open.

During part of the fall, Dr. Armstrong kept his eyes closed. When his eyes were shut he felt no sensation whatever. It was as if he were suspended at rest in midair. When still about 1,900 feet up, he opened his eyes and sighted ground. Then for the first time he had a definite sensation of falling. This sense of fall increased rapidly and when, at 1,000 feet, the parachute was opened, "there was a fully perceptible vertical velocity."

The practical importance of the delayed parachute jump in both civil and military aviation led to the experiment. Dr. Armstrong is director of the physiological research laboratory of the Materiel Division of the Air Corps, and is stationed at Dayton, Ohio.

The Army doctor's jump was from the rear cockpit of a two-seated biplane. It was flying on a straight and level course at 2,200 feet and at an air speed of 110 miles an hour when he jumped.

The jump was a sort of slow tumbling fall and the doctor's body somersaulted every two seconds. Careful note was made of all sensations until he pulled the ripcord. Attendants on the ground timed the free fall, and from this and a series of photographs calculated the distance of the fall. It took 11 seconds for him to fall the 1,200 feet.

As soon as he was clear of the airplane, his previous fear and excitement disappeared, the doctor states. His "consciousness was unclouded and ideation was rapid, precise, penetrating and clear." Although twelve airplanes were near, the doctor cannot recall any noise or the sound of the rush of air past the ears. He does not know whether this loss of perception in hearing was due to inattention or because atmospheric conditions.

Dr. Armstrong could see normally as he fell. There were no consciously per-

WATER FOR OIL FIRES

The time-honored rule not to use water for oil fires is successfully broken by a new fire-fighting technique. On the left is a blazing tank of oil in a recent test and at the right is the same tank a few seconds after a strong spray of water was turned on it. The water-for-oil-fires technique requires special equipment. Don't throw on water the next time your automobile catches fire.

SEISMOLOGY

Second Earthquake in Month In North Japanese Region

NORTHERN Japan was visited by a second strong earthquake shock in less than a month, a half-hour after midnight, Eastern Standard Time, on the morning of Wednesday, Oct. 2, seismologists of the U. S. Coast and Geodetic Survey stated, after studying telegraphic reports gathered by Science Service. The preceding shock in the same region occurred on the morning of Monday, Sept. 11. (*SNL, Sept.* 21, p. 190)

The exact time of the quake was 12:33 a. m., and the approximate epicenter was in about 45 degrees north latitude, 146 degrees east longitude. The focus was about 30 miles beneath the earth's surface, according to calculations made by the Jesuit Seismological Association at St. Louis, Mo.

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ceptible heart beats or other bodily processes.

During the first second of fall there was a horizontal velocity of about 175 feet per second, a vertical speed of about 16 feet per second and a tumbling motion of the body. Of all these motions he was aware only of his body's rotation.

At no time did the jumper feel dizziness, nausea or the "gone" feeling in the abdomen such as is common in elevators and airplanes. His eyes, unprotected from the high wind blast, were not irritated.

His one sensation had to do with skin sensibility and was a result of the increased air pressure on the lower surface of the body, Dr. Armstrong believes. He described it as a "very gentle, evenly distributed, generalized, superficial pressure on the surface of the body toward the earth."

Such a demonstration is expected to encourage airmen to leave disabled ships more readily and to delay the opening of the parachute until all danger of entangling with the plane is past.

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PHYSICS

Oil Fires May Be Put Out By Fine Spray of Water

WATER is being used successfully to fight oil fires, the National Fire Protection Association of Boston reports.

The water-for-oil-fire method, which apparently breaks basic rule No. 1 of fire-fighting techniques, is illustrative of progress and research in the fire-extinguishing field, says the Association.

The new revolutionary oil fire-fighting method consists of a fine spray of water forcibly ejected from special nozzles installed in sprinkler pipes or on a hose. Secret of success seems to be that the spray droplets must be of a critical size; if too large, they splash the burning oil and spread the fire; if too small, they cannot extinguish the flames. So don't rush out and throw water on the next oil fire you see.

Although not yet submitted to fire underwriters' organizations for final testing and approval, installations have already been made for the protection of electrical oil transformer and high-pressure oil systems.

Water, in a suitable spray, affects an oil fire in many ways, the NFPA points out. First, a combustible liquid will continue to burn only if its temperature is high enough to keep on creating vapor, for it is the vapor and not the liquid that does the burning.

For some types of oil fires, the spray may act by keeping the liquid sufficiently cool to prevent the needed amount of vaporization. Water suitably applied may be able to lower the temperature of the liquid below the fire point, the critical temperature for the flames.

Water, too, can affect a combustible vapor, which will not burn below what is known as its ignition temperature. The tiny droplets of water entering the flame turn to steam and in doing this absorb heat from the flame. Thus the amount of heat from the flame is reduced and vaporization of more liquid, caused by the heat, is diminished.

Water vapor can also mix in with the combustible vapor and dilute it and diminish the flame intensity.

All these happenings probably occur in varying degrees when a water spray is directed on an oil fire. Possibly also there are others more obscure.

What fire equipment companies do know is that the water drops must be shot at the fire sufficiently hard to reach the blazing surface and not be stopped by the strong upward heat convection current in the flame. And yet the drops must not hit the blazing surface so hard that they splash the oil about.

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