PUZZLES EXPLAINED

There are two articles in general use that have undoubtedly caused many persons to scratch their heads in perplexity—the automatic cigar-lighter and the thermos, or hot and cold water bottle.

The pocket-lighter consists of a small tube, at the bottom of which is packed some cotton soaked in alcohol, ether or other inflammable and easily evaporated liquid, at the top of which is a small framework holding a thin vertical wire. When the top of the tube is opened the wire in a short time becomes red-hot and the alcohol vapor ignited therefrom.

The first explanation one would naturally offer is that the friction of the rapidly-moving vapor would render the wire warm; but on second thought this would seem to be too great an effect for so small an amount of energy.

The real reason, however, lies in the wire itself. In most of the lighters the action is practically the same. The wire is either what is known as platinum sponge or some other metal sponge that has the power of absorbing gases rapidly. Whenever anything absorbs gases, that thing has made the gases occupy less space or volume, and whenever gases occupy less volume tney are said to be compressed, and whenever gases are compressed they invariably become hotter, the amount of this heat depending on the amount of compression.

ABSORBERS OF GASES.

A great many things possess the power of absorbing gases, charcoal being a notable example. Although charcoal absorbs a good many times its own volume of gases, it does not become appreciably hotter. It takes the metal sponge for that; for this absorbs hundreds of times its own volume of gases and does it in a short time, thus not allowing for the radiation of the generated heat. So the little wire is generally heated to redness, ignites the wick fed by the alcohol, and the thing is ready for business.

To afford some idea of the intensity of heat necessary for this, it may be stated that to red heat a wire requires several hundred degrees. When a gas is heated one degree centigrade it expands exactly one two-hundred-and-seventy-third of its volume at zero centigrade. Conversely, when a gas is compressed one two-hundred-and-seventy-third of its volume at zero centigrade, it is heated on degree.

Now, suppose that a gas is compressed to one two-hundred-and-seventy-third of its volume at zero centigrade, it will be heated to two hundred and seventy degrees, an intensity sufficient for our purpose. Thus, the sponge has to absorb only, let us say, one two-or three-hundredth of its own volume of the supplied gas. As to how it does this, or just what inherent property enables it to do it, is not well known.

HOT WATER CONTAINERS.

In the case of the hot and cold water container, the makers claim that some varieties will maintain any liquid hot or cold for a period of 48 hours. In this we have the whole theory of the dissipation of heat: for cold simply means the absence of heat. There are three ways in which heat may be carried from one body to another, or, rather, imparted by one body to another—by conduction, by convection and by radiation. If all the precautions possible be taken to prevent the action of these three operations, little transmission of heat can take place; so the hot liquid does not lose its heat, and the cold liquid does not receive heat from the heated air or bodies outside.

The principle made use of is that of the De War flask, all the bottles on the market to-day being simply variations of this piece of scientific apparatus. The bottle is made to discount as far as possible the three operations mentioned. It consists of two layers of some polished metal with a space between them that has been exhausted of air as much as possible. The two layers are connected by just as few links as possible.

Taking up the three methods of transmission in succession, we shall see how admirably each one of them has been rendered inactive. By conduction of heat is meant the transmission of heat by a solid or something acting as a solid in which the medium itself does not move as to relative situation of its parts. For instance, in heating in a poker in a fire, one end is thrust in and becomes redhot, and in a little while heat is conducted along the iron until the opposite end becomes hot. The same applies to a teaspoon in a cup of hot tea or coffee. This is why the bottle referred to has as few connecting links between layers as possible, so as to make the conduction of heat a minimum, considering, of course, a proper strength of the bottle as a whole.

The next method is that of convection. By this is meant the method of transmitting heat by moving particles of a liquid or a gas. Take, for instance, the heating of water. The kettle is put over the fire, and the bottom layer of water is heated at once by the fire by conduction. But heated liquid expands, and therefore becomes lighter than the cool liquid above; so it has to rise. It is then displaced by the cooler liquid, which in turn becomes hot and rises.

This fact is utilized in heating houses by hot water. The heated water rises through the pipes, gives out its heat to the room, and on becoming cooler sinks through the inlet pipe to be heated again.

It is the same with gases. Suppose that a bottle under consideration had a full volume of air between its layers. If the inside of this bottle is hot the inside of the air space immediately becomes hot by conduction; this hot part rises, and the cooler air flows in to be heated likewise. But the heated air flows to the outside layer and heats it by conduction, and this in turn is delivered to the outside air. But take all the air out and no convection can possibly take place. Thus is the second objection overcome.

The third and last one, that of radiation, is difficult to overcome entirely, as are the others. Radiation means that method of transferring heat or energy through ether waves. By radiation we get light and heat from the sun. By radiation we feel the direct heat of a coal fire or, in fact, any flame or source of heat. These ether waves have the power of hastening the vibration of the molecules in any material body and thus causing heat.

It has been found that these waves can be reflected by a polished surface, a mirror, for instance, just as light can; that they are absorbed by a black or rough surface, just as light is; that they are radiated from a black or rough surface that is hot itself.

REFLECTING THE WAVES.

It has been found that if two copper balls of the same size be heated to the same degree of heat, and having on of them painted black and the other one polished and smooth, the black one almost immediately gives up its heat and becomes cold, while the polished one remains hot indefinitely. So the last requirement for such a bottle is that all its surfaces be smooth and brightly polished—and such will be found to be the case in trade products.

As to further application of these two principles, now that the way has been blazed in actual commercial successes, time alone can tell. If platinum and metals of like property were not so high in price a great deal could be made out of the absorption phenomenon. Certain it is that a great amount of energy is generated almost automatically in a few seconds by the process. And if some natural method were found of making the metal disgorge its contents that remained after much use, such as allowing it to lie in the sun some time, it is possible that power on a large scale could be obtained therefrom for a nominal price. The platinum, of course, wears out after a while, and, therefore, a cheaper substitute would have to be found.

Applications of the hot and cold water bottle could be made in icehouses and refrigerating plants. They could certainly be built of airtight compartments and of polished material. This alone is necessary.

"Do you really believe in miracles?" "Of course I do. My husband gave me some money this morning without my asking for it."—San Francisco Chronicle.

Daily Paper In Caesar's Days

It is about 210 years since the starting of the first London newspaper, and the fact turns one's thought back to the origin of an institution might have been supposed.

If to our first parents we owe our desire for knowledge, then it is to Caesar that we owe the first western attempt to satiate that desire by means of a newspaper. It was a daily record of not only official news, but of small scandal; the latest police news, the arrivals in the city, even the gossip of the countryside. There were also extracts from the latest speeches at Cicero and the freshest epigrams of Martial. These last appeared by way of advertisement of the author's latest works, before they should appear in collected form and be sold along with the latest thing of Ovid's or those improper little novels that came from Greece in the fine shops that bordered the Forum's Head and stretched around the Palatine hill.

It would certainly have bored on one to have strolled with Horace, that little fat man who, as Suetonius tells us, waddled rather than walked, his mind wallowing in the curiosities of life, and ever alert, since that memorable afternoon when he was first buttonholed, lest he should meet the famous bore lying in wait at some street corner. It would have been delightful to see the little man's eyes light up with pleasure at the sight of a friend whom he knew would listen to his latest bit of eroticism or walk along beside him down the Appian Way through the clear afternoon. Again, we would not lounge in the silk curtained Forum, surrounded by the masterpieces of Praziteles, and there discuss the news that had just been posted on the rostrum, exhibited for the instruction of the crowd as to the doings of their betters? Then you would have sauntered out, in all probability, to join the married women as they, too, promenaded in the usual Roman fashion.

It was this simple promenade that delighted the Romans and in Caesar's camp so astonished the Veronians that they thought the promenaders crazy and offered to lead them to their tents. In the city it had its object. There was much to discuss, many interesting people to meet. Here were the fine shops which edge the Via Sacra, shops in which you could buy perfect silks and xylons for a few sesterces, also the essences and unguents so necessary when the gong of bronze announced the opening of the bath. There were also the yellow wigs for those who, by decree of the Aedile, had obtained the "licentia stupri," the right to the antique livery of shame, and were, as such, civilly dead since the publication of the XII. Tables. Useful drugs, too, were on sale in the porphyry arcades through which fashion strolled—hemlock, aconite, mandragora and cantharides. It was there wealth passed in its chariots; smart men who smelled of cinnamon instead of war; nobles, matrons and cocottes. To these, as well as to the chowd of the city and the provinces, Caesar the Consul gave news.

Fortunately at that period the very name of China, with her corruption, her printing press, her powder and her tea, were unknown. The Acta Diurna, or Daily News, was the work of literarii—handwork, careful and elegant, whether written with the stylus on papyrus or inscribed on a wall coated with chalk (album). As we have seen it pictured in that third rate city, Pompeii, the citizens stared around, agog with interest. This lack of a printing press was surely a fortunate circumstance, since it goes far to account for the epigrammatic terseness of the Latin style, for the delightful endeavor to express in one syllable what the garrulous take a couple of phrases to misinterpret.

Huebener in his dissertation on the Acta Diurna has collected forty-five passages from ancient authors, all of which relate to these "Acta Populi," which is only another name for this emgryonic newspaper. They are all of a nature to interest the public, reading or otherwise, even to-day. Fortunately they are told in Latin, in which language they had best remain. The more ordinary relate to public affairs, the sayings and doings of political personages, notably Caesar's refusal of the title of king; the defections of Lepidus and the more notable cases before the courts.

Both Pliny and Ascanius relate the case of Scaurus as having been fully reported. Dion Cassius relates the avidity with which men read of the punishments to which important persons had been condemned and the anxiety of the crowd to know whether they met their end as gentlemen or cowards. Tacitus mentions the newspaper account of Claudius Pomeranium, the extension of the circumference of the city by the erection of a new wall. Lampridus tells us that he got his idea of the fulsome adulation with which the Senate acclaimed Alexander Severus from the current issue of this daily paper, a document which must have been, approximately speaking, 100 years old when Lampridius saw it, and mendacious at that. There were extracts from the new laws, decisions relating to provinces, and, naturally, naturally, passages from the discourses of the god of Rome.

Under the empire there was the Court Circular, which chronicled the various doings of the imperial house, the approaching accouchements, the progresses, the funerals; not, however, the likelihood of the Emperor's death, as it was only the unwise astrologer who would care to draw such a bow at a venture. The Emperor Commodus, so Lampridius assures us (not that his knowledge was above suspicion), was inordinately proud of his achievements in the arena. No matter whether he were last in the race, it was to him that the palm was awarded, or rather he awarded the palm to himself, and then quite magout the details of the wage scale or nificently shouted, "Commodus Caesar, victor in the race, gives his crown to the people of Rome."

Then there were the faits divers, all the bits of information in the city. Pliny cites the newspaper accounts of the funeral of the celebrated jockey, Felix. The erection, fall and restoration of public buildings were recorded, so were the births, marriages and divorces in illustrious families; likewise prodigies and curiosities. The same Pliny sneers effusively about the record of a line of titles, and because in another place an old priest swore that he had seen the arrival of the first phoenix in Rome.

Petronius gives us an admirable parody of what the Roman got in his daily paper. It was during a feast at the house of that ostentatious plutocrat Trimalchion, who so far forgot his imperfect veneer of aristocratic good manners when in his cups as to describe the origin of his wife, much to that lady's discomfort, for she was still climbing assiduously and did not appreciate being thus given away in public. When Trimalchion was sober he could think of little else save how best to impress the world with his magnificence, and, in consequence, used to send for his actuary, who read to the company a sort of process verbal (tanquam urbis acta), of which the following is a translation:

"VII. Cal Jul: There were born on the domain at Cumae, which belongs to Trimalchion, 30 boys and 40 girls; 500,000 bushels of wheat were transported from the fields to the granaries; 500 oxen were used for the transport. On the same day the slave Mithradates was crucified for blaspheming the tutelary deity of Gaius, our master. The same day 10,000,000 sesterces were taken to the bank, because it was impossible to find a use for this money. The same day there was a fire in the gardens at Pompeii, which originated in the residence of the farmer Nesto," etc.

The last mention of this Roman daily sheet is in the late days of the empire. Vospicius, in his "Life of the Emperor Probus," knew of its existence, after which time, it is thought, it disappeared along with such other literature as Constantine and his new advisers found inconvenient.

JAPAN'S HUGE NAVY PROGRAMME

Honolulu cable: An eight-year naval programme, costing $824,000,000, has been decided upon by the Japanese Government, it was announced here to-day in a cable message to the Shinpoub, a Japanese daily newspaper. The programme includes the construction of four 40,000-ton battleships of the Naglo class, four battle cruisers, 28 light cruisers, 80 destroyers, 70 submarines and 30 other craft.

PROOF TO THE CONTRARY.

There is a certain long-suffering father whose nerves sometimes give way under the constant fire of questions from his talkative eight-year-old son.

"Dad," asked the youngster, just as the old man had one evening settled down for a perusal of his newspaper, "Dad, am I made of dust?"

"I think not!" responded the unhappy parent; "otherwise you'd dry up onw and then."

Life may be a fleeting show, but that's a whole lot better than having no show at all.