

AN ELECTRIC EYE THAT SEES UNDER WATER— With This Long Sought Invention France Now Leads the World With a Submarine Torpedo Boat that Is the Terror of Europe.

FRANCE is in an extraordinary state of enthusiasm over the performances of her new submarine torpedo boat, the *Gustave Zede*, named after its inventor.

At last, it is said, a submarine boat has been invented which will do efficient work and travel under the water with a reasonable chance of coming to the surface again.

Each enthusiasm over this new weapon is, of course, directed against England. The recent dispute about Fashoda it was clearly demonstrated that the naval policy of England to France was so overwhelming that it would have been madness in latter country to go to war.

The proud and excitable Frenchmen raged at this humiliation. Now they are de- s with joy at the thought that they possess a scientific weapon which will render squadrons of British battleships almost worthless.

If the reports concerning the new boat do indeed indicate that it is a wonderful son. It not only navigates the depths with safety and discharges its torpedoes accuracy, but it is provided with an artificial electric eye, whereby it can see great distances beneath the water.

Using dummy torpedoes, this boat has struck a battle ship going at full speed with- out giving her a chance to defend herself.

Gustave Zede is an ex-director of naval construction. His first successful sub- marine boat was called the *Gymnote*.

He is claimed, was the first inventor to apply the electric motor to submarine motion. The motor undergoes no loss of weight during its operation, requires no gas, disengages no gas, and is consequently well adapted to navigation under water. The *Gustave Zede* has a cigar-shaped hull and is 131 feet long. She has a displace- ment of 205 tons and carries a crew of eight men. Her motive force is electricity stored in accumulators. She is able to sink to a depth of a hundred feet and moves out under the water at a rate of ten knots an hour.

The *Gustave Zede* was tested during the recent manoeuvres at Toulon. The captain of the battle ship *Magenta* declared that he could defend himself against any sub- marine boat. The *Zede* disappeared under water and went for him.

The *Magenta* was lying quietly at anchor, when *Bunam* came a dummy torpedo against her bottom. The captain had no idea of his danger.

The inventor of the *Zede* then promised that he would hit the *Magenta* when she was going at full speed. This promise he also carried out.

The *Zede's* motors exert so much power that, when going at full speed, she makes a considerable eddy on the surface of the water; but this is not perceptible in a rough sea and disappears when the speed is reduced.

When the *Zede* was first built her crew were unable to see under water, but since then a wonderful eye has been added to her whereby they can see ahead of them for a hundred yards or more. This is the invention of two young lieutenants.

Two things make it difficult to see far under water—the density and the obscurity of the water. Of course if the water is very muddy it is impossible to see at all, but in any case the density of it and the salts in it make it impossible to see far. The eye of the *Zede* which overcomes this obstruction consists of an electric light surrounded by very powerful refracting lenses. These are similar in construction to the lenses of a lighthouse lantern. The strength of these lenses may be judged from the fact that if the sun were permitted to shine straight through them it would burn and melt up everything in the lighthouse.

The electric eye of the *Zede* is fixed just above the conning tower of the boat.

There are two torpedo tubes in the *Zede*, one on each side. This arrangement makes a very formidable armament, and helps to balance the boat.

The immersion of the boat is regulated by the simple action of horizontal rudders analogous to those of the Whitehead torpedo. Everything is done by electricity. The motor is extremely light. It actuates the screw directly without gearing, and commu- nicates to it a velocity of 200 revolutions. The current that supplies the motor is furnished by Commelin-Desmazures accumulators.

The boat, after many trials, has been found to work with perfect ease and safety. It has gone up and down a dozen times in an hour. It has been tried in a heavy sea and proved itself quite independent of that condition.

So great is the interest of Frenchmen in this invention that it is now proposed to build one boat by public subscription. This action is intended to encourage and hasten the Government in building submarine boats. The *Matin* newspaper last week made the proposal, and started the subscription with 5,000 francs. The boat will be called the *Francis*, and will be modelled on the *Gustave Zede*. The total cost will be about 300,000 francs, and this sum will undoubtedly be subscribed very quickly.

There is no concealment of the fact that the movement to build submarine torpedo boats is directed solely against England. The idea of overcoming British naval power so cheaply is intoxicating, and Frenchmen are easily intoxicated.

How deeply this idea has sunk into their minds may be judged from an article in the *Journal des Debats*. This is, next to the *Temps*, the most sober and dignified news- paper in France, and occupies a position nearly corresponding to that of the *London Times*. It used these expressions in a recent article discussing the French naval programme:

"We pass by the torpedo destroyers and torpedo boats which figure in the Minis- terial programme and take up the subject of submarine boats. M. Lockroy proposes to construct six of them on the plan of the *Narval*, which is in service at Cherbourg. They are to be of 100 tons displacement, and in this respect they will hold a place interme- diate between the torpedo cruisers and first-class torpedo boats for coast defence.

"During his first administration M. Lockroy opened a competition in this naval type, and, if we remember right, M. Labeuf obtained first honors. It is his boat, the *Narval*, which is now under construction, and she will serve as a model for the other six de- sired by the Administration. Each will cost a little over 600,000 francs. But we would beware of discussing their principles and design, even if we knew them with precision. Our naval authorities give little information concerning its submarines, and we ap- prove of its discretion, but it is certain it has confidence in M. Labeuf's design since the construction of six others like his *Narval* has been started.

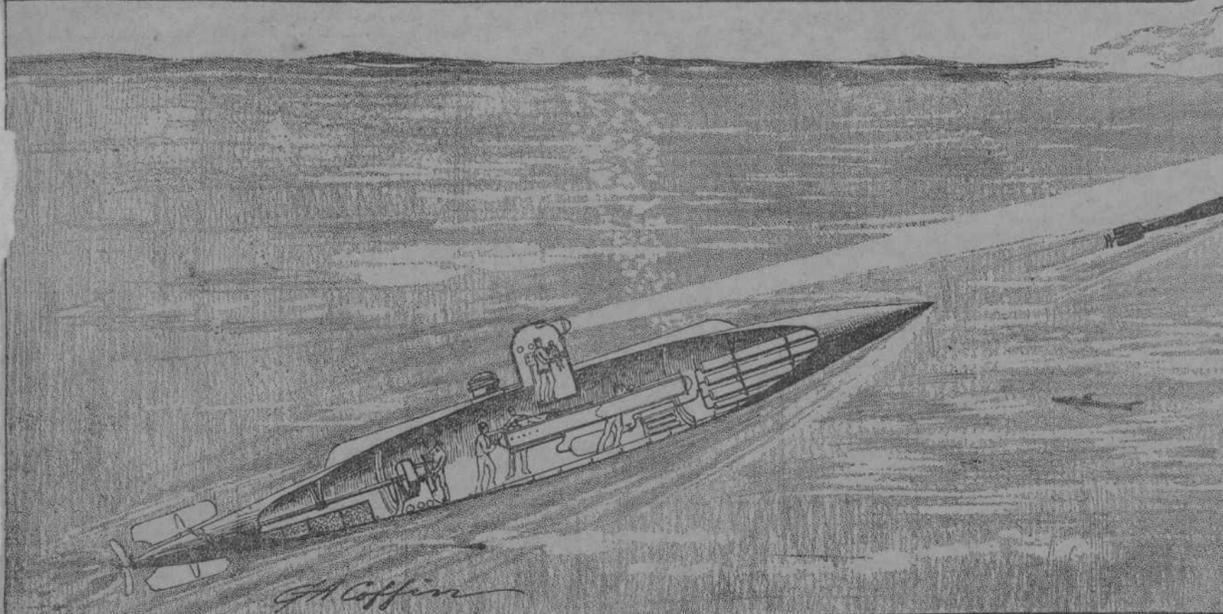
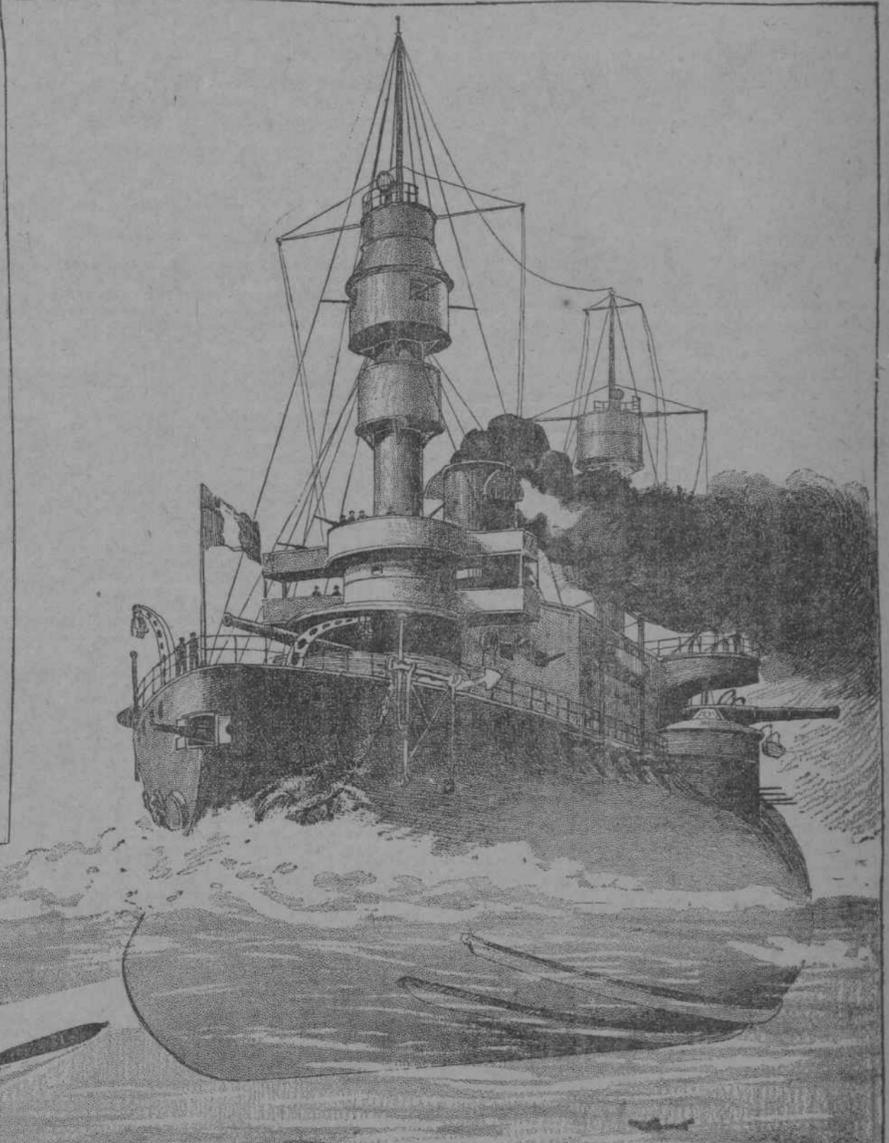
"We can affirm, moreover, that submarine navigation has reached an advanced stage in our navy, and that we are not groping in the dark. The problems of diving and ris- ing again have been solved by *Gustave Zede*, inventor of the *Gymnote*; but it seems that electricity has been abandoned as the sole source of power, and a common engine with a petroleum boiler has been adopted instead.

"Let us pray for success to the *Narval* and her mates. If they solve the problem of submarine navigation they will effect a revolution in naval war the consequences of which are incalculable.

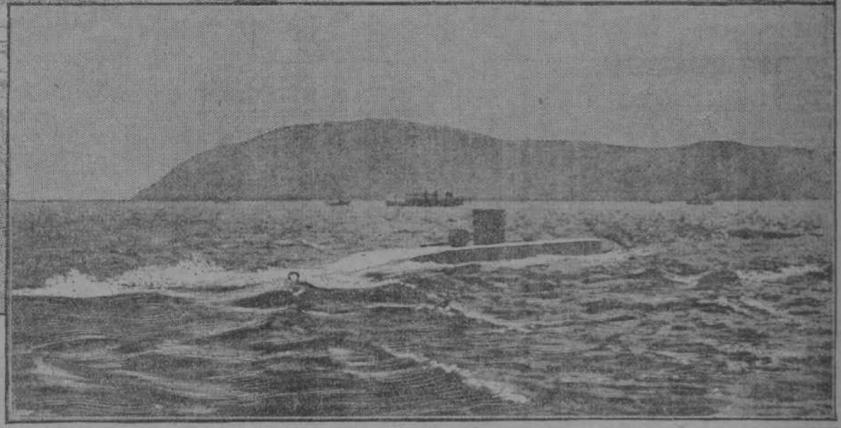
"Narrow seas like the Channel and the Pas de Calais will be then untenable by bat- tle ships. The great and admirable war ships of which our neighbors beyond the Chan- nel are so proud, and on which they rely to maintain their naval supremacy and back their aggressive policies will then only be safe behind massive breakwaters, for at sea they would have to encounter these invisible enemies at close quarters. There will be no safety for them but in flight, for which they are heavily handicapped. Their day will be over.

"The battle ship still outclasses the torpedo cruiser, owing to the progress of rapid- fire guns, but can they defy the submarine torpedo boat? We doubt it. The latter may be the arbiter of peace or war. Her advent would enable us to reduce our naval budget. We would have to tender our thanks to M. Lockroy, because he has, we must in justice say, greatly advanced submarine navigation."

These remarks require some explanation. The *Narval* is the type of submarine boat at present under construction by the Government, but the *Gustave Zede* is the type which has excited the enthusiasm of the public by its recent performances. The *Narval* is at Cherbourg, in the Channel, while the *Gustave Zede* is at Toulon, in the Med- iterranean.



How the "Gustave Zede," With the Aid of Her Wonderful Water-Penetrating Eye, Planted a Torpedo in the Bow of the "Magenta" When She Was Going at Full Speed.



Fashion's Stunning New Spring Collars.

There are wonderful creations in the shops just now called collars, which are said to be the first heralds of the fashions of the Spring.

In reality they are collar and bodice trimmed combined. The model exciting the greatest attention shows a very high stock studded with jet spangles, with here and there an embroidered chenille star in some bright, effective color. At the sides of the stock toward the back are conspicuously high ear-shaped pieces of silk. They tower, wing-like, far above the wearer's ears.

They are made of silk, matching in color the chenille stars in the stock. Many of them are edged with the spangles.

But this is not all of the remarkable new collars. To emphasize their novelty they have dangling from the front of the studded stock a cascade of jet beads. Some collars are made with but three rows of beads, while others have as many as seven, the last row reaching to the waist line, and thus forming an effective corsage trimming for the bodice of any gown.

Then there is the coral studded collar with its rows of coral beads. This collar is generally made of white velvet, with the high velvet centered with corals.

The velvet ear-shaped pieces are lined with coral tinted silk, and in front rows of coral beads take the place of the jet ones.

A number of these novel collars are made with the cascade of beads exactly match- ing in color the velvet used for the stock.



First Strange Fashion of Spring.

QUEER THINGS SEEN WITH YOUR MIND'S EYE. A Tell-Tale Prison Cell Telegraph.

THAT we sometimes see with our minds as well as with our eyes is brought out interestingly by Joseph Jastrow in the current *Popular Science Monthly*. The following sections, with their illustrations, afford striking examples of the tricks our eyes sometimes play on us:

True seeing, observing, is a double process, partly objective or outward—the thing seen and the retina—and partly subjective or inward—the picture mysteriously transferred to the mind's representative, the brain, and there received and affiliated with other images.

Illustrations of such seeing "with the mind's eye" are not far to seek. Wherever the beauties and conformations of nature

A much larger class of ambiguous diagrams consists of those which represent by simple outlines familiar geometrical forms or objects.

In one position it runs from the left-hand rear upper corner to the right-hand front lower corner, while in the other it connects the left-hand front upper corner with the right-hand rear lower corner.

Fig. 3 will probably seem at first glimpse to be the view of a flight of steps which one is about to ascend from right to left. Imagine it, however, to be a view of the under side of a series of steps, the view representing the structure of overhanging solid masonry seen from underneath.

At first it may be difficult to see it thus, because the view of steps which we are about to mount is a more natural and frequent experience than the other; but by staring at it with the intention of seeing it differently the transition will come, and often quite unexpectedly.

The blocks in Fig. 4 are subject to a marked fluctuation. Now the black surfaces represent the bottom of the blocks, all pointing downward and to the left, and now the black surfaces have changed and have become the tops pointing upward and to the right. For some the changes come at will; for others they seem to come un- expectedly, but all are aided by anticipat- ing mentally the nature of the transforma- tion. The effect here is quite striking, the blocks seeming almost animated and mov- ing through space.

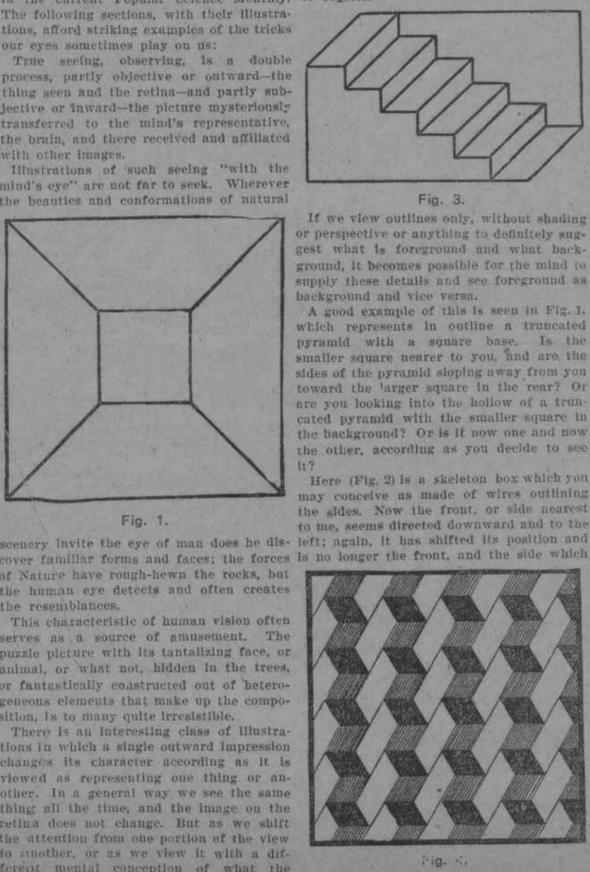
All these diagrams serve to illustrate the principle that when the objective features are ambiguous we see one thing or another according to the impression that is in the mind's eye; what the object factors lack in definiteness the subjective ones supply; while familiarity, prepossession, as well as other circumstances influence the result. These illustrations show conclusively that seeing is not wholly an objective matter depending upon what there is to be seen, but is very considerably a subjective mat- ter depending upon the eye that sees.

Here (Fig. 2) is a skeleton box which you may conceive as made of wires outlining the sides. Now the front, or side nearest to me, seems directed downward and to the left; again, it has shifted its position and is no longer the front, and the side which

scenery invite the eye of man does he discover familiar forms and faces; the forces of Nature have rough-hewn the rocks, but the human eye detects and often creates the resemblances.

This characteristic of human vision often serves as a source of amusement. The puzzle picture with its tantalizing face, or animal, or what not, hidden in the trees, or fantastically constructed out of hetero- geneous elements that make up the com- position, is to many quite irresistible.

There is an interesting class of illustra- tions in which a single outward impression changes its character according as it is viewed as representing one thing or an- other. In a general way we see the same thing all the time, and the image on the retina does not change. But as we shift the attention from one portion of the view to another, or as we view it with a dif- ferent mental conception of what the figure represents, it assumes a different aspect, and to our mental eye becomes quite a different thing.



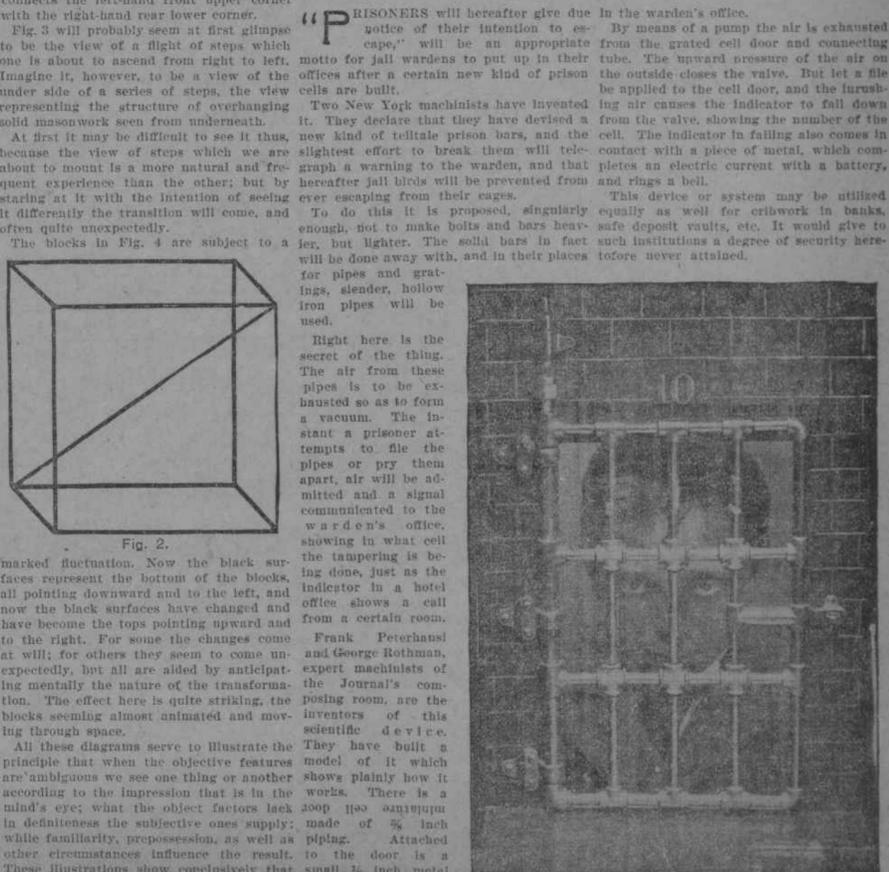
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The New Scientific Cell Grating.