Correspondence.

WHY WATCH SPRINGS BREAK.

To the Editor of the Scientific American:

Being a worker in tempered sheet steel, it occurs to me that the cause of broken main springs may be because the edges are not properly finished; that is, because there are short or small places on the edge that have not been ground and rounded on the edge since tempering. To overcome liability of cracks in band saws, I find it necessary to finish the edges. The breaks in the springs begin only at the edges, and I would suggest a more perfectly finished edge.

Lumberton, Miss. J. H. Miner.

MAGNETISM AND THE BREAKING OF WATCH SPRINGS.

To the Editor of the Scientific American:

Concerning the subject of breakage of main springs, allow me to contribute the following:

Every watchmaker has observed that at certain times a large part of his repair work consists of replacing broken main springs. And it is often observed that the spring is broken into as many parts as there were coils in the spring, and sometimes a fracture occurs every half coil.

The writer on one occasion, while wondering at the appearance of a spring broken up into half coils, noticed that the pieces were magnetized, and made a simple experiment of determining the polarity of the pieces by bringing the fractured ends together. He discovered that when the pieces were fitted together as they were in the original spring, the ends of the pieces at each joint were of like polarity. He then suspended a small soft-iron indicator from a single fiber of silk in a small material bottle, and by passing this indicator along the line of broken pieces of spring, discovered that the points of fracture were of alternate polarity. This was puzzling, for the ends of the pieces at each point of fracture should be of opposite polarity.

The writer has since caused a spring to be magnetized while coiled in a watch barrel, and on extending the spring found the points of polarity fixed in the spring, alternating every half coil.

Now it is evident that the repulsive force of like polarity at a point in each half coil has somewhat to do with the breaking of the spring.

When we consider that many springs, when wound up, are strained almost to the point of breaking, if we then subject them to the magnetic strain, the breaking as described does not seem so strange.

Jersey City, N. J. Frank G. Burch.

THE RENAISSANCE CLERGY AND SCIENCE.

To the Editor of the Scientific American:

The mention of the supposed papal bull against Halley's comet at its appearance in 1456 naturally suggests the consideration of the scientific work of that time. The universities were all in the hands of the ecclesiastics. In Italy particularly practically all of the professors were clergymen. In spite of the usual impression with regard to church opposition to science, this is a great period in the history of science. Though it is not usually realized, the Renaissance affected science quite as much as it did arts and letters. During the century from 1450 to 1550 the foundation of much of our modern science was laid. In the Archives of Diagnosis (New York, April, 1909) I called attention to the fact that to a man of this period, the famous Cardinal Nicholas of Cusa, we owe the first hint as to the use of accurate methods in diagnosis in medicine. There were no watches, for the "Nuremberg eggs" were not made until the next century, and the taking of the pulse had been very indefinite. Cardinal Nicholas suggested that the amount of water passing through a water clock during one hundred beats of the pulse should be weighed, and compared with the amount of water that flowed through standard water clocks, in normal and abnormal cases of various kinds. He suggested that the same thing should be done for the respirations. He also declared that specific gravity in the study of the urine and blood would surely be of value. Prof. Karl Bins of the University of Bonn called attention to this some five years ago in the Berlin Medical Journal.

It seems surprising at first that such thoroughly scientific suggestions for medicine should have come at the middle of the fifteenth century. A review of the scientific situation during the latter half of the century, however, showed how natural they were. Cardinal Nicholas himself wrote a series of books on mathematics. It is in one of these on mechanics that his suggestion with regard to medicine occurs, and he touched many other important scientific questions. He declared, for instance, that "the earth cannot be fixed, but moves as do the other stars." He denies that it can be the center of the universe. He was sent on diplomatic missions by the Pope, and while riding in his carriage it is said that he thought out the problem of the cycloidal curve from studying the motion of a fly on the wheel, and solved this curve. Cantor, the great German historian of mathematics, gives him some thirty pages, a whole chapter to himself. His greatest contemporary was Regiomontanus, the father of modern astronomy. Regiomontanus introduced the use of the tangent into mathematics. He was invited to Rome by the successor of that Pope Calixtus who is said to have issued the bull against the comet, to become the papal astronomer. Cantor gives him a very important place in the history of mathematics. Antonius the Archbishop of Florence was another contemporary, and his monograph on comets contains a number of interesting anticipations of ideas that did not get into astronomy until after Galileo's time. Galileo was rather inclined to think comets appearances in our atmosphere. Antonius thought them far distant. At this time Puerbach was teaching mathematics and astronomy at Vienna, and translating the Alexandrian mathematicians and astronomers from Greek into Latin for the universities of that time. A little later Novara was doing the same thing at Padua. When Copernicus, having completed his studies at Cracow, wanted to do graduate work in astronomy and mathematics, he went down to Italy. Before the end of the fifteenth century he announced his new theory of the universe. Within the same decade Columbus gave the men of his time a new world, and Copernicus what his bishop friend Ferber declared to be a new universe.

Medicine woke up as the result of the touch with old Greek medicine, just as mathematics and astronomy did. Italy was the home of graduate teaching in this as in all the other sciences. Linacre and Caius and Free from England went down to Italy to study anatomy and clinical medicine. Berengarius was teaching at Bologna, Benivieni at Florence, and Leonicenus at Vicenza, and modern medicine was receiving a great new impetus. During the century from 1450 to 1550, the Renaissance century (which we Americans should call Columbus's century) all our modern anatomy came into being. The work on it was all done in the eccelsiastically ruled universities of Italy. Vesalius, Varolius, Columbus the anatomist, Eustachius, Caesalpinus, and Piccolomini, with Fallopius and many others, did their work in the peninsula. Most of them were professors of anatomy at Rome. Eustachius, whose name is attached to several structures in the human body; Columbus, who discovered the circulation in the lungs; Caesalpinus, who first described the circulation of the blood in the body; and Varolius, after whom important structures in the brain are named, were all papal physicians. Chemistry and pharmacology woke up in the persons of the monk Basil Valentine and his great successor Paracelsus.

To think of the latter half of the fifteenth century as a time when there was lack of interest in science or any suppression of scientific aspirations, is to be ridiculously ignorant of what actually occurred; for the chapter of the Renaissance of science when the Greek masters were rediscovered and translated for the modern world is quite as important as the story of humanism or the new learning, when the Greek literary texts touched the genius of the modern world to that outburst of new thought that made one of the most interesting periods in the world's history. A little more study of science history, and not of the supposed religious history of the time, shows how utterly without foundation is the squabbling over religious intolerance. James J. Walsh,

Dean and Professor of the History of Medicine,
Fordham University Medical School.

New York city.

A New Nitrous Product.

At Mülhausen, Alsace, there is being manufactured a new nitrous product for use as fertilizer, in the shape of a nitride of aluminium, the combination of nitrogen and aluminium being obtained by a new process invented by M. Serpek. The inventor first studied the preparation of carbide of aluminium which he obtained in the form of yellow crystals by heating a mixture of alumina and carbon in the electric furnace. This carbide, like the other carbides with which we are acquainted, has the property of fixing gaseous nitrogen and thus gives nitride of aluminium. To obtain an economical production of this latter, he does not isolate the carbide of aluminium, but after the formation of this body in the electric furnace it is at once mixed with a fresh quantity of alumina and is then treated with nitrogen gas. He thus obtains masses which contain 20 to 24 per cent of nitrogen, and this can be used at once as fertilizer. Under the influence of atmospheric oxygen and moisture we have ammonia given off, which is transformed by bacteria into nitrates and alumina. The inventor is working the new process in a small factory which he installed, and has realized some interesting results during the last year. He now produces crystallized nitride of aluminium which has a high percentage of nitrogen—as much as 34 per cent. An advantage of his process is that we do not need to use pure nitrogen which requires an expensive plant of Linde or other machines, but the gas from the producer is employed, this containing 77 per cent of nitrogen and 23 per cent carbon monoxide with a little carbonic acid. Thus we have a very simple and rapid process for the crystallized nitride, and owing to the various advantages, it may compete with cyanamide.

The Migrations of Mackerel and Herring.

Although the mackerel fishing season usually ends in October, thousands of mackerel have been caught after October in recent years in the English Channel. In November, 1901, a bank was discovered which often yielded a catch of six tons in two or three hours. Several similar winter assembling places have since been discovered. It had previously been assumed that mackeral seek the North Atlantic in winter, and return in spring to the North Sea and the coasts of Cornwall and Brittany, but these new discoveries indicate that they do not migrate, but simply seek greater depths in the same locality for their winter resting places, where they remain assembled during the day. At night they disperse in search of food and are consequently seldom caught in the nets.

Localized schools of herring have also been discovered in recent years. There may be migratory schools as well, observes Prometheus, but it appears certain that the herring is a more sessile fish than has hitherto been assumed. During its first year, or until it attains a length of 4 or 5 inches, and probably until its length has increased to 8 or 9 inches, at the end of the second year, it remains near the place of its birth. After the second year it begins to appear sporadically. At all seasons the waters of the English Channel contain adult herring which are evidently of the same breed with the young fry of spring. Even in winter a few herring are caught, but only at great depths, although large numbers are caught near the surface in summer. The assumed migration of herring to Arctic waters is made doubtful by the discovery of these sessile schools. This discovery also explains the existence of the distinct local races, which are recognized by the fishermen, and which always reappear on the same fishing grounds at the breeding season.

"Cork Metal."

BY F. J. WILLOTT.

At one of the recent aeronautical exhibitions samples of a metal were shown under the name of "cork metal," which was said to be 40 per cent lighter than aluminium, and to have numerous other properties which should make it a rival of the latter.

Great secrecy was maintained as to the nature of this wonderful metal, but its properties were such as to rouse my interest, as a consequence of which I have submitted it to chemical analysis.

In appearance the metal resembles very strongly the alloys known as magnalium. The surface presents a lusterless whitish gray color, both sheets and bars showing the scorings and scratches so frequently found on badly rolled or drawn aluminium. Careful analysis gave the following result:

Aluminium	0.04	per cent
Iron	0.017	per cent
Zinc	0.48	per cent
Sodium	0.21	per cent
Magnesium	99.30	per cent

It will be seen therefore that essentially "cork metal" is nothing but magnesium to which a small amount of zinc has been added. Whether this latter has been purposely introduced or, as is more probable, is merely present as an impurity, I am unable to say.

As the metal evolves hydrogen when immersed in water, I found it necessary to use organic solvents for the determination of the specific gravity. In alcohol this was found to be 1.762, thus confirming the conclusion that cork metal is, in fact, magnesium.—Chemical News.

The Current Supplement.

Of the two chief constituents of the atmosphere, we have hitherto been accustomed to look upon oxygen as the fundamentally important element. Nitrogen, however, is of vital importance; so important, in fact, that the task of finding out and opening up new sources of nitrogen compounds has become one of the most interesting and pressing problems of the day. The subject is well discussed in the current Supplement, No. 1767, by Mr. A. Bernthsen. The Schneider torpedo-testing station is elaborately described and illustrated. Mr. Snowden B. Redfield describes the making of automobile tires. The stars are due to fall on the nights of November 12th to 14th, a fixture in the celestial schedule of events. The display is called the Leonid shower, and is discussed in the current Supplement. A new gas-electric motor car for the Third Avenue Railway Company of New York city is illustrated. The article on the Paris Aviation Exhibition is concluded. The usual engineering notes, electrical notes, and trade notes will be found in their accustomed places.