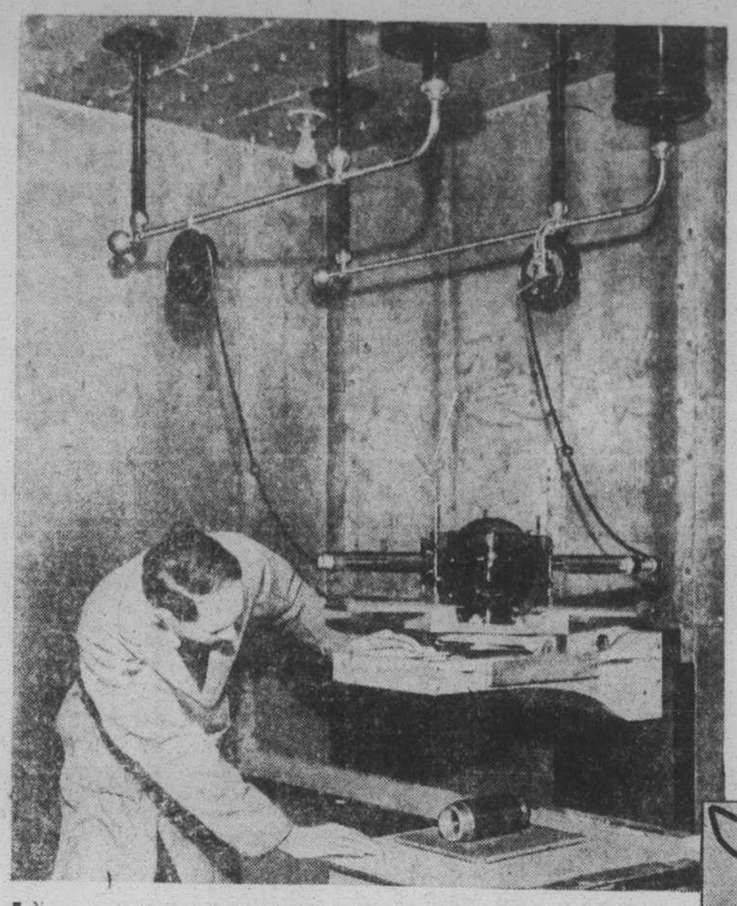
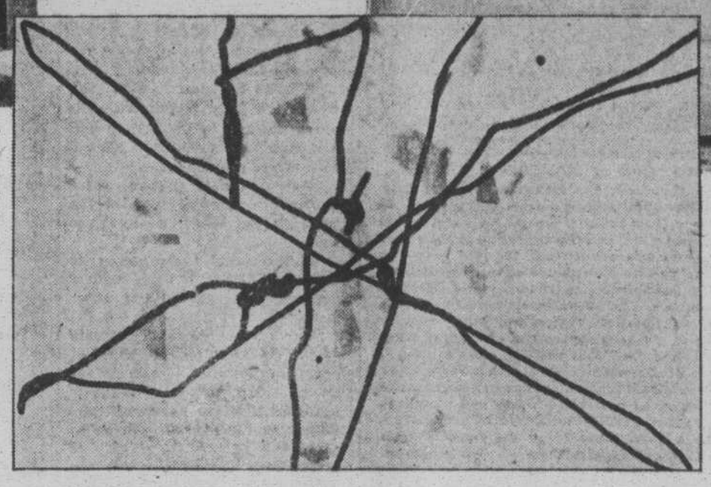
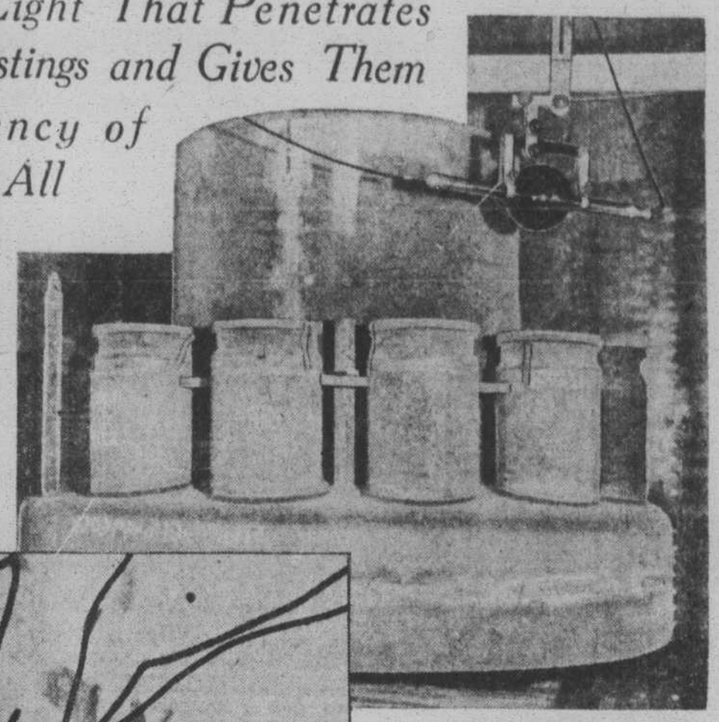
Latest Facts from Science, Mechanics and Invention

How the Industrial Doctor X-Rays His Metal Patients

A Powerful Light That Penetrates Giant Steel Castings and Gives Them the Translucency of Ice to Reveal All Concealed Flaws and Thus Prevent Any Serious "Ailments."







Above: All Ready to X-Ray a Machine Part in an Industrial X-Ray Laboratory. Right: This Strange Design Is an X-Ray Picture of the Interior of a Bale of Excelsior Revealing the Presence of Foreign Articles Perilous to Workmen Who Use the Picking. The Long Black Lines Are a Tangle of Wire and the Irregular Small Dark Objects Are Bits of Glass.

IN a spacious and busy machine shop a group of men was holding a clinic over a large steel casting that had an irregular hollow spot upon its surface. The hollow place was the "symptom" which they were attentively observing.

Was the casting sound despite that ominous cavity? Were there unknown weak places inside the casting where they couldn't be seen? The little knot of men drew closer as they discussed the problem.

"There's only one way to find out," finally decided the metallurgical technician. "Take the casting over to the X-ray laboratory and have them X-ray it."

So the metal "patient" was loaded on a truck and trundled away to the X-ray laboratory.

A long glass tube with a round, bulging center, was fitted in place directly over the cavity in the casting. Then everybody went out of the room, the walls and door of which were lined with plates of lead. The operator went to his control desk, moved a few handles and looked at a couple of indicators. Then he stepped over to a lead-glass window through which he could see the tube inside the lead-lined room.

The cathode, or strip of conducting metal acting as one terminal of the electrical circuit, was glowing brightly within the bulge of the tube. Two hundred thousand volts were galvanizing the stream of electrons shooting from the cathode and hurling themselves at the tungsten target directly in their path. Their impact upon that little surface produced the powerful X-rays which poured through the glass of the tube and penetrated the steel casting to a depth of more than three inches after an exposure of half an hour.

A picture of what the rays revealed inside the casting was caught upon a photographic film, developed in an adjoining dark room, placed in front of an illuminated transparency, and carefully studied by the "industrial doctors," the engineer and the metallurgical man. After a long consultation they emerged, smiling. The casting was sound and the cavity could be filled by welding with perfect confidence. The X-ray "diagnosis" had saved the "patient."

Inspection by X-rays is not applied indiscriminately to test materials any more than human beings are put under X-rays merely on general principles. It is used just as medical men use it—when obscure symptoms imply internal flaws in the inanimate patient.

Dr. William D. Coolidge, of the General Electric Company's research laboratory, contributed the advanced types of X-ray tubes now in use. Now an X-ray picture with the standard 250,000-volt tube can be obtained in half an hour. Smaller objects can be X-rayed in periods varying from five to fifteen minutes.

Above: Like a Big Round-Bodied Insect Hovering Close to an Ungainly Giant, the X-Ray Tube Hangs Opposite the Face of a Huge Steel Casting at a Point Where "Internal Trouble" Is Suspected in the Inanimate "Patient."

A stereoscopic apparatus gives the effect of actually looking into the inside of a piece of steel or iron. To the unaided eye this chunk of steel is densely opaque; the observer can look only at its surface. Even after the customary X-ray film is handed to him he sees merely a flat area of a grayish tint with certain black markings upon it. Everything is on the same flat plane.

Another X-ray exposure is made from a slightly different position. The X-ray tube is placed at a point on the steel adjacent to the spot at which the first exposure was made. Consequently the two films, taken together, show what the two eyes of a man would see, if he could look inside the metal.

These two films are placed in front of two illuminated transparencies. Between them, mounted on a movable carriage, are two lenses, one for each film. When the proper adjustment of the lenses has been made, then, indeed, does the observer find himself looking into the very interior of the steel, three solid inches below the surface. Spots at the bottom of the three-inch area actually appear to the eye to be upon the bottom. The depth of the metallic structure is plainly visible. It is as if the steel had been transformed into a cake of ice for three inches of its thickness, but it is even more translucent than the ice.

Ice That Is Nearly Two Miles Thick

GO TO Greenland when you want to indulge in the sport of ice-skating with the assurance that there is absolutely no danger of the ice breaking through and giving you a chilling bath.

A German expedition recently measured one of "Greenland's icy mountains," which was found to be 8,850 feet thick! This great thickness of the ice is taken as confirmation of the theory advanced by the late Professor Alfred Wegener, ill-fated leader of the expedition who perished on the ice last Winter, that Greenland is a gigantic bowl full of ice; that is, the island is rimmed by high mountains while the "bowl" interior is filled and piled high with ice.

The great depth of the ice was ascertained by measuring artificial earthquake waves produced in the ice by blasting with dynamite. This method was developed at the Geophysical Institute at Gottingen, Germany.

Scientists say that the only things that can crack ice of the great thickness of that discovered in Greenland are time, the sun (heat) and dynamite.

How Will Power Is Tested

WHEN the tensile strength of a steel wire is to be tested, it is placed in a machine that pulls it with constantly increasing force until it gives way. The force employed just as the wire breaks is a measure of its strength. Somewhat the same method of testing human will power was actually employed, according to Julius Gallhuber, writing in the Leipzig Illustrierte Zeitung, in the selecting of men to take part in the British Mount Everest expedition.

The procedure was as follows: The candidate was seated in a comfortable armchair with his clothes loosened. Then he drew a deep breath and was told to refrain absolutely from further breathing as long as he possibly could. However, he was permitted to exhale.

The following phenomena became apparent: After 30 to 55 seconds a slight discomfort and the desire to breathe were apparent. This was followed by a period of more or less acute pain which increased in an extraordinarily quick manner and lasted about 40 to 80 seconds. Now an unusual exertion and self-control were necessary to suppress the breathing.

Then the pain gradually subsided, grew duller, and was easier to bear. At the same time the strain required to refrain from inhaling increased to an enormous degree, and after 3 to 5½ minutes the person experimented upon fainted, if he had not already collapsed.

The length of time that man may hold out without inhaling furnishes a will-power scale that is well qualified for the purpose of comparison. Therefore, if he is capable of eliminating inhalation until he faints, he possesses the greatest possible will-power, and seems eminently qualified for record performances.

Although this experiment made it possible to measure will-power with some accuracy, it is, however, a very serious matter and should be undertaken only after consultation with an expert physician and upon his advice.

Solving the Problem of Milk-Fed Pigs

HOW to keep a constant supply of milk on tap for a litter of motherless pigs is a problem that was ingeniously solved by a farmer of Glen Falls, New York.

A glance at the accompanying illustration shows in detail the simple device by means of which each little porker can feed itself. A siphon is fixed into an end of a large keg which is filled with milk. A nipple is inserted in one end of a rubber tube of convenient length which is attached to the siphon. All each pig has to do is to take the nipple in its mouth and drink its fill.

While the inventor of this novel device points out that his pigs are fed without spilling one drop of milk, he does not explain what his procedure would be in case one porker should try to "play pig" and monopolize the source of the food supply.

A Motherless Pig Feeding Itself With Milk from a Siphon Apparatus Which Is Always Ready When Needed.

The COMING of the AMAZONS

SO long ago did the Amazons, a race of giant Greek women warriors, rule men that for hundreds of centuries stories of the deeds have been legends. The Amazons, as known today, were a mythical race of female warriors who established an independent kingdom in Pontus, near the Euxine Sea. They allowed no man to live in their country, but each year they visited the Gargareans who dwelled nearby.

These women warriors either put to death all their male children or returned them to their fathers. The Amazons kept all their female babies and trained them in the arts of agriculture, hunting and warfare.

The Greek Amazons find a counterpart in the history of the eighth century when a band of women warriors who, under Vlasta, fought against the Duke of Bohemia, enslaved or killed all their male captives.

Orellana, the Spanish explorer, related that he came into conflict with women warriors in South America on the river then known as the Maranon. As a result of this meeting the name of the river was changed to the Amazon.

Such is the recorded history of the Amazons. Will they again return and rule men?

Present-day writers see evidence of such a happening. Sherwood Anderson, the novelist, for example, sees modern man, as a victim of industrialism, meek and subdued and subservient to the will of women.

Owen Johnson in his novel, "The Coming of the Amazons," recently published by Longmans, Green and Company, peers 250 years into the future and in an amusing satire pictures a society in which woman is the supreme ruler, having reduced man to a mere instrument for perpetuating the race.

The central character of Mr. Johnson's novel is John Bogardus, a New Yorker of the present year. During a discussion of the mystery of hibernation with his friend, Dr. Sachaloff, a biologist, Bogardus learns that the scientist has perfected a refrigerating machine in which a living body can be preserved for centuries in a state of suspended animation. Intrigued by the fascinating thought of thus being enabled to sleep away the centuries and awaken in a new world, Bogardus submits himself to the experiment.

Two hundred and fifty years later, in the year 2181, Bogardus, under a thawing-out process awakens to find himself in an aerial hospital floating three miles above New York City. He is surrounded by a score of flat-chested women clad in flowing Grecian robes. They are all of an uniform stature and are seven feet tall. They have blue eyes, are bald and appear to be from 25 to 30 years old.

One of the women, who, apparently, is of superior rank, takes charge of Bogardus, introducing herself as Acquilla. She is a resplendent, ruthless and unmoral Amazon. She does not look older than 24 years, although she unhesitatingly admits that she is all of 76.

Sentiment plays no part in this women's world. The men have been disfranchised; marriage and the family have been abolished. The secret of the determination of sex has been discovered and birth control is obligatory to meet the challenge of machinery. All children are brought up in state nurseries. In fact, everything belongs to the state which fixes the income of each individual according to merit.

Being a man of the twentieth century, however, Bogardus naturally rebels against the laws of this matriarchal state, but he is quickly brought to the painful realization that "whatever woman can conceive in her imagination, she will achieve by her will."

When Bogardus sees how the powerful Amazons have segregated their men into clubs, a sort of glorified seraglios, his fighting blood is aroused. Later when he sees the men formed into a beauty parade of male debutants he becomes hot with indignation and incites a rebellion.

In his flight of fancy into fictional prophecy Mr. Johnson gives a vivid picture of life, as he imagines it, two a half centuries hence, all of which affords him a fine background for an attempted solution of vital social problems of the present and for keen comment on today's battle of the sexes.

SEES AMERICAN MEN SUBDUED BY WOMEN

Sherwood Anderson Is Gloomy Over Devitalizing Effect of Modern Industrialism.

OLD FIGHTING SPIRIT GONE

Madame Marthe, a French Lion Tamer, Who Presents the Appearance of a Perfect Type of Amazon. The Insert Is a Reproduction of a Recent Newspaper Head of an Interview in Which Man Is Described as a Victim of Industrialism and Has Become Subservient to the Will of Woman.