much interested, as nothing closely resembling the character has ever been reported out of the millions of muskrats that have been trapped for fur.

Unfortunately, the two animals were killed in the trapping, so that breeding experiments are not possible. If living duplicates can be secured and the new type of fur fixed by breeding, it might prove valuable in the fur trade.

Science News Letter, March 7, 1942

GEOPHYSICS

Hoover's Son Invents Way To Locate Oil Deposits

Invention Uses Artificial Earthquake Method of Prospecting; Seismic Wave Produced by Explosion

HERBERT HOOVER, JR., son of the former President, has been awarded U. S. Patent 2,272,201 for an invention that will make for the more accurate location of oil or other mineral deposits buried deep in the earth. Mr. Hoover has assigned his patent rights to Consolidated Engineering Corporation of Pasadena, California, of which he is president.

The invention applies to the seismic or artificial earthquake method of prospecting. The earthquake wave is produced by an explosion of dynamite. The seismic waves travel downward and are reflected back to the surface from harder or softer layers at different depths. Receptors placed at different points along the ground pick up the waves and record them on a moving strip of photographic paper. From the times of arrival of the different "reflections," the depths of the various reflecting beds can be calculated.

The invention consists of an electrical network which Mr. Hoover calls a "dispersion compensator." It corrects for the fact that seismic waves of different frequencies travel at different velocities through the earth—an effect called dispersion.

The original impulse produced by the explosion consists of a mixture of many frequencies. These become strung out into a "spectrum" as the pulse travels through the earth. Thus, if the high frequencies outrun the low frequencies and arrive first at the receptors, followed by the others in succession, the result on the photographic record is a long-drawn-out, indefinite wave that may not be distinguishable from the general commotion that is always present. In short, it is a blur.

The compensator, which is inserted between the receptors and the recorders, retards the waves in proportion to their frequencies. Thus, the high-frequency waves which arrive first are retarded the most, the others less and less. The stretched-out wave is pushed up together again. The result on the record is a sharp definite wave, easily distinguished from the general commotion, a wave whose time of arrival can be accurately measured (to a thousandth of a second or better) and the depth of the reflecting bed from which it came, accurately calculated.

This is important now that all the easy prospecting for oil has been done. The days when an error of a hundred feet or so didn't matter are gone. Today a difference of ten feet may be significant.

Due to dispersion, Mr. Hoover states in his patent, low frequency waves from one reflecting bed may arrive at the receptors at the same time that high frequency waves arrive from another reflecting bed separated from the first. Without the compensator they are hopelessly mixed and indistinguishable.

Mr. Hoover's method of correcting seismic dispersion is exactly analogous to the correction of an optical lens for chromatic aberration. In this case, a second lens is added, the dispersion of which is opposed to and equal to that of the first lens, and therefore corrects it.

Since the dispersion of a seismic impulse will be the greater the longer its path in the earth, Mr. Hoover provides a control box which by the corrective effect of the compensator may be regulated to suit the conditions.

Science News Letter, March 7, 1942

Army quartermasters required glassmakers and designers to figure out a special kind of *jar* for preserves—soldiers had to be able to clean it out with a spoon!

SIMPLE CAMERA

These few common objects enable the metallurgist to look into steel and see what's wrong with it.

METALLURGY

Coffee Can Camera Aids Improvement of Steel

See Front Cover

A TIN CAN, two small brass disks and a screw clamp compose a camera that sees into steel with the aid of radioactive atoms, and may point the way to better steel making.

The camera was devised by Dr. William E. Shoupp of the Westinghouse Research Laboratories to find out whether phosphorus added to molten steel is well distributed or bunched together in spots. To disclose its location, the phosphorus was made artificially radioactive by bombardment in an atom smasher before it was added to the molten steel. A small disk was then molded of this steel.

In a darkroom a piece of photographic film was laid on each side of the steel disk, two small brass plates were placed outside the film and the whole stack was clamped together and put in the tin can to keep out the light. After being left overnight, the film was developed.

The result of one such test is shown on the front cover of this week's SCIENCE NEWS LETTER. The light and dark blotches are caused by rays from the tracer phosphorus atoms. The light areas correspond to little air pockets or blowholes in the steel and show that the phos-