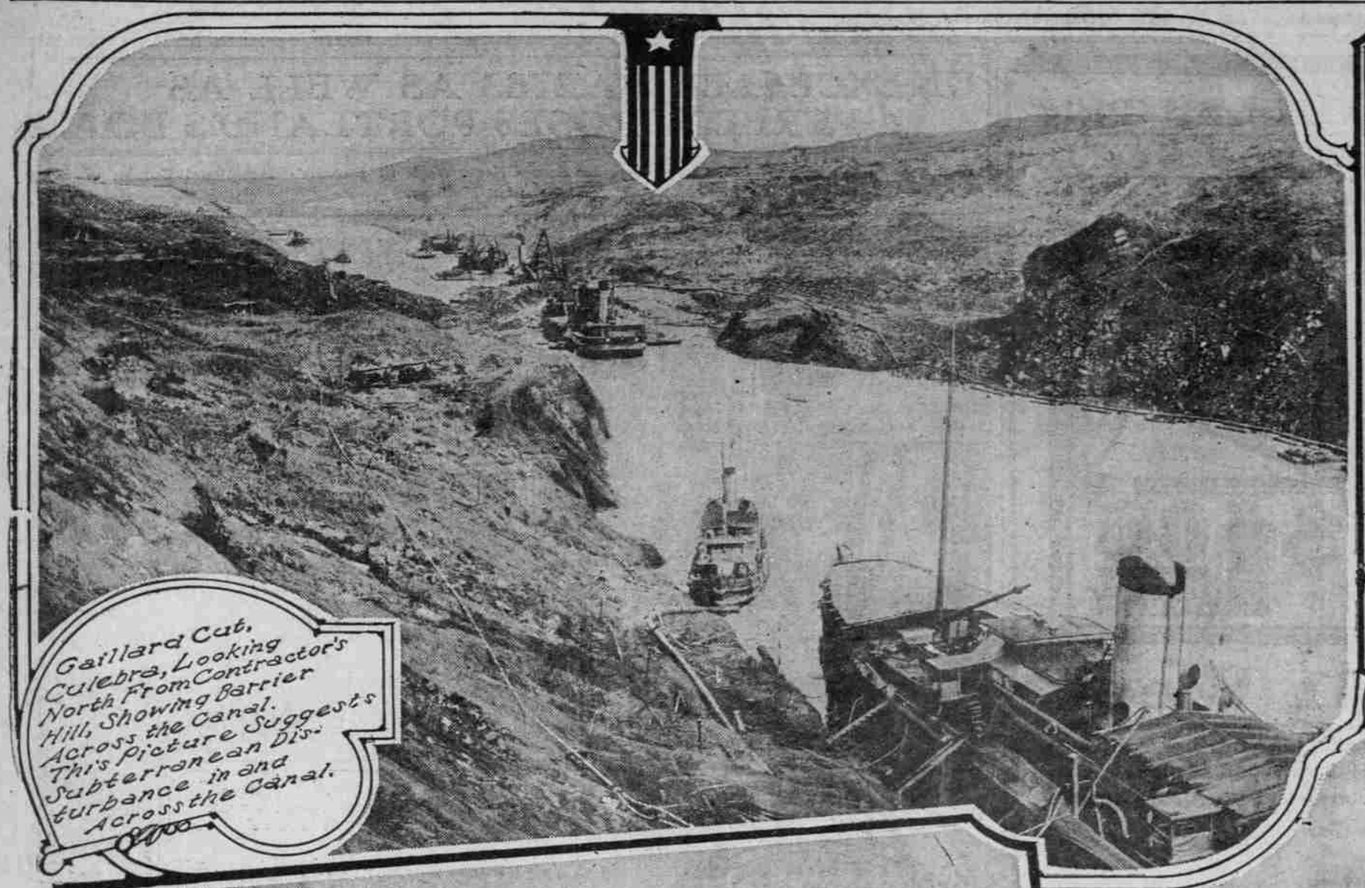
GAS IS BELIEVED TO BE CAUSE OF PANAMA CANAL SLIDES

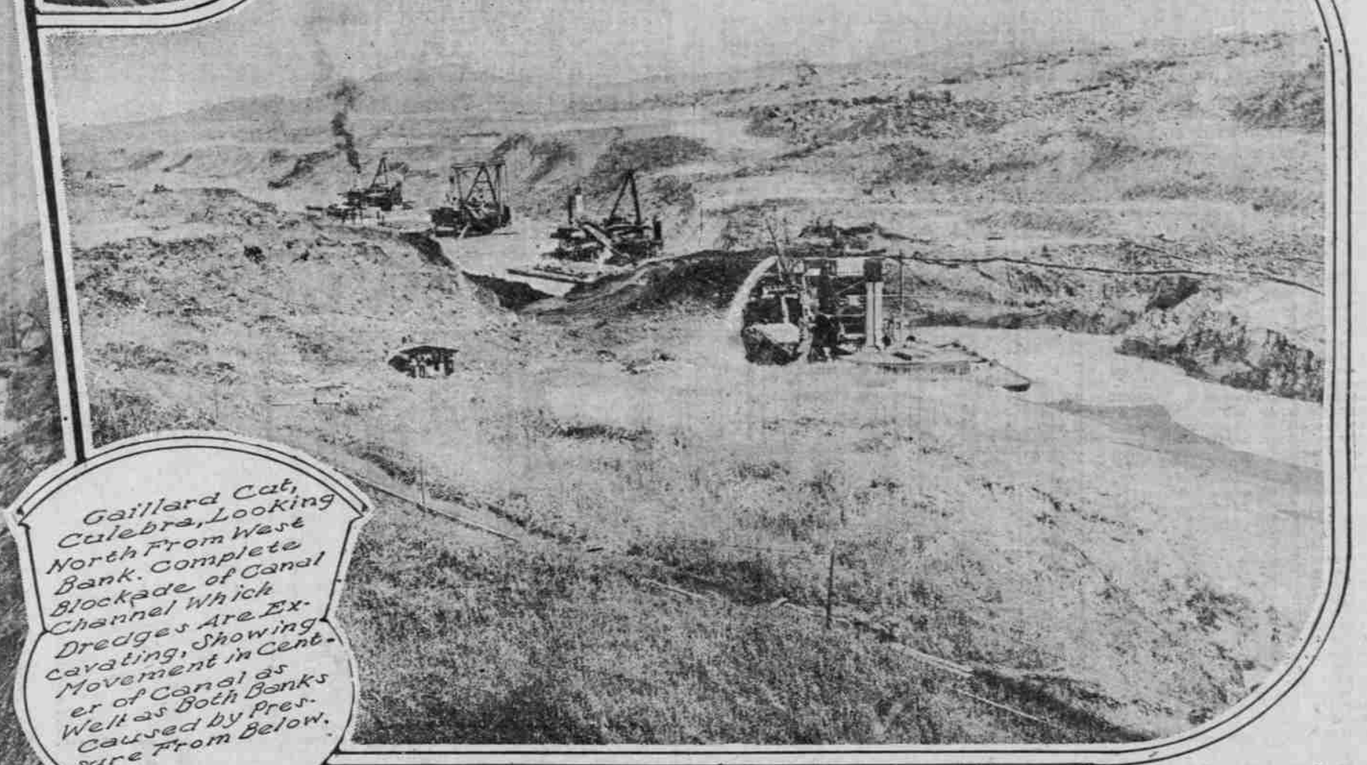
Ex-Senator Kearns, of Utah, Concludes From Experiences in Mines That Similar Trouble on Larger Scale Is in Cut.



Gaillard Cut, Culebra, Looking North From Contractor's Hill, Showing Barrier Across the Canal. This Picture Suggests Subterranean Disturbance in and Across the Canal.

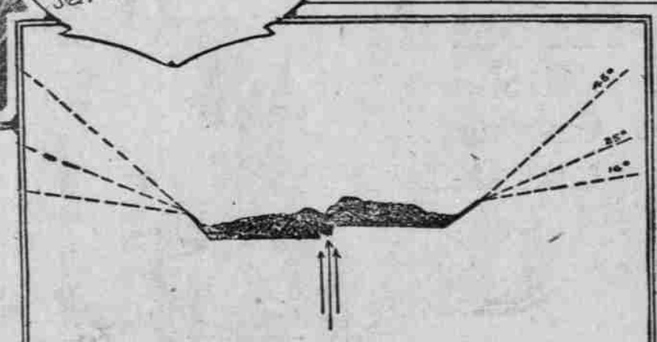
Gaillard Cut, Culebra, North of Gold Hill Showing Immense Masses of Earth and Rock. This Strongly Indicates Subterranean Trouble and the Movement of Confined Gases.

Gaillard Cut, Culebra. In Places the Pressure From Below is Raising the Bottom of the Canal, Occassionally Ten to Twelve Feet Over Night



Gaillard Cut, Culebra, Looking North From West Bank. Complete Blockade of Canal Channel Which Dredges Are Excavating, Showing Movement in Center of Canal as Well as Both Banks Caused by Pressure From Below.

Former U. S. Senator Thomas Kearns.



ARROWS SHOW UPWARD PRESSURE OF GASES CARRYING MUD AND ROCKS FROM BELOW THROUGH FAULT OR DYKE CROSSING CANAL

The Lines at the Sides Indicate the Slopes of the Cut Which is Being Made Now Until the "Angle of Repose" is Reached

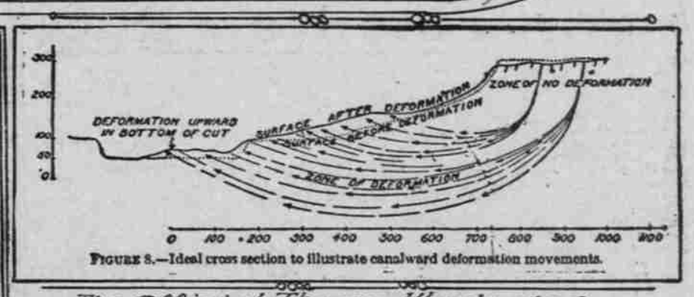


FIGURE 8.—Ideal cross section to illustrate canalward deformation movements.

The Official Theory Illustrated. This Map Serves to Show How the Canal Engineers Explain the Blockades. They Assert That the Weight of the Elevated Sides of the Canal Causes Such a Pressure Upon the Earth Below That It is Forced Out and Curves Upward to the Surface in the Bed of the Canal

Ex-Senator Thomas Kearns, of Utah, recently visited the Panama Canal in company with his engineer, by invitation of a high Government official. On his return, he was requested unofficially to put into writing his conclusions as to the cause of the so-called slides at the canal. His statement of the situation is given herewith.

ONE of the most important questions, if not the most important, in the minds of the American people today, is "Will the great waterway, the isthmian canal, prove a success, or is it a failure?" It means everything to us, not only from a commercial standpoint, but from a protective standpoint, for it makes it possible for Uncle Sam's great fleet to pass from the waters of the Atlantic into the Pacific upon a few hours' notice, and so saves the expense of maintaining two great fleets instead of one.

On account of the unfortunate present conditions in Europe, and the insistent demand of the majority of Americans for "Preparedness," many of our people are asking: "Are we going to be able to keep the great isthmian canal open or will it continue to fill up?" There are grave reasons for asking this question, for, since it was first opened to navigation on August 14, 1914, it has been closed and out of commission virtually two-thirds of the time.

Many great minds are asking the question: "If this canal condition continues, should we abandon it altogether and construct a sea-level canal at Nicaragua?" To my mind this would not help the situation. If similar conditions are encountered in Nicaragua at sea level, we should have there a harder problem to solve than the present Panama lock canal. There would not be the same opportunity to remove the cause.

In my opinion, the problem can be solved; the canal will be a success and the movements of the earth that are at present filling up the Culebra cut can be overcome.

After close personal investigation and careful study, in company with my engineer, who has been in my employ for 25 years and who has solved many similar problems, though smaller, of course, I am fully convinced that subterranean gases coming from below are causing the trouble—not soft material underlying the hillsides, nor the weight of the banks, as is maintained by most of the eminent engineers and critics who have ventured to give their opinion.

Recently Governor George W. Goethals, of the Panama Canal Zone, was quoted as saying that work had begun on the removal of from 6,000,000 to 8,000,000 cubic yards of rock and earth from the banks of the great Culebra cut. This work is now well under way, and close to 1,000,000 cubic yards a month are being removed. At this rate the work should be completed some time in the Fall.

The purpose of the removal of this immense amount of material from the banks of the great cut is to cause a definite and complete cessation of the annoying, so-called slides that have so interfered with the operation of the canal as to cause a growing doubt in the minds of the American people of the real efficiency of the canal which has cost the Government, up to the present day, close to $500,000,000.

This method of working for the solution of the so-called slide problem there has the approval of nearly every engineer who has studied the matter, and the American people fervently hope that the engineers are correct.

At the risk of the disapproval of many eminent engineers who are familiar with the conditions, I disagree with those who believe that, when the 8,000,000 cubic yards of material mentioned are removed from the banks, and the weight taken off, the question is solved.

It will make but little, if any, difference in the filling of the Culebra cut from the bottom, and I venture the prediction now, that after the banks are so lowered and the amount of dirt above mentioned has been removed, and the dredges have finished their work and have been taken from the cut, there will be a repetition of the filling from the bottom and sides within 90 days. Islands of mud and eruptive rock will again begin to appear above the surface of the water just as they appeared when they so effectively closed the canal some months ago.

Let us suppose for a minute that I am correct in this prediction. What is then to be done? Must the canal, which involved so much labor and expense, and which means so much, not only to the American people, but to the convenience of the world, be abandoned as useless? Surely it would seem that the greatest engineers that America has produced would have exhausted their talents in their efforts to stop the so-called slides—that they will have failed in their theory. In my humble judgment, the situation would not be so serious as one might fear.

Limited Area Affected.

It is a fact that the Army engineers have accepted the theory of the earth's "sliding by its own weight" into the canal and are proceeding in accordance with this theory, and, until such time as the 8,000,000 cubic yards have been removed and the banks cut down to where the weight has been taken off, it would be useless to suggest any other remedy. Those estimates were made about February 1 of this year, and the work should be well toward completion by October 1. I sincerely hope that the engineers are correct in this theory and that the problem will be solved so that the canal may remain open after that date.

Of course, this proviso was made with that certain condition—that it would solve the present difficulty, but, if the two highest points within the area of movements, known as Gold Hill and Contractor's Hill (which were one and the same hill before the channel was cut through), should develop a movement into the canal, it would add to the difficulty. There would then be many additional million cubic yards to be moved.

However, in my judgment, from observation and the nature of the rock in those particular hills, they will not experience any such trouble from those points. The movements are all within a space of about 2500 feet, or about half a mile, and my firm belief is that the trouble is all caused by subterranean gases formed in the earth, which, when permitted to escape through certain channels or breaks in the earth, carry with them eruptive material, sometimes for a long distance.

My conclusion is based on somewhat peculiar personal experiences with similar earth movements encountered in mining operations, and my opinion is not formed all from theory. It is based mostly on practice and experience. Are there gases confined in subterranean channels that have burst through the earth's crust at the Culebra Cut and produced earth waves which have caused such havoc at that point in the canal? In my judgment, it is possible to trace this zone to disturbance and then to tap the gas chamber beneath the rocky rim and so relieve the pressure at that point.

As far as my investigation has gone and from the knowledge I can gather, neither the French government nor our own Government thought it worth while to determine the character of the rock and subsoil through which the canal was constructed.

A little more than 400 years ago Balboa climbed the mountain range at the Isthmus of Panama and beheld the great Pacific Ocean. Almost immediately the idea of constructing a waterway across the Isthmus of Panama was conceived. Since that time every generation has looked into the feasibility of a canal at Panama, but from Balboa to Goethals no one ever made a comprehensive test of the formations below the surface, either by boring or shaft-sinking, which should have been made at least 500 feet beneath the water level, that they might know what foundation the canal bed would rest upon.

When a business block, a railroad or a great bridge is to be constructed, the first thing that the owner or contractor does is to learn all about the ground on which it is to stand. The contractor, as well as the owner, desires to know the character of the soil or rock, that he may determine the cost of excavation, and he also must know that he has a firm foundation on which his building or bridge is to rest.

Yet, building contractors in New York and other cities spend more money in determining the nature of the ground beneath a prospective skyscraper than did the Government of the United States in determining the character of the soil or rock beneath the channel of the Panama Canal.

Gases Blamed for Trouble.

If corporations or private individuals prosecuted their work in this manner there would be more failures than there now are. Personally, I think that the first $1,000,000 should have been spent on a thorough test of the formation, at least to a depth of 500 feet below the channel, the same to mark the first page of the great undertaking, and I firmly believe that a similar test, in a lesser degree, say to a depth of 500 feet, will yet have to be made in and across that particular section of the Culebra Cut.

That is, of course, providing the present theory of the engineers fails and the removal of the weight from the banks fails to remedy conditions at the canal. Time and the expense now being incurred should prove to the public that subterranean pressures and gases are, to a large degree, causing the trouble. This should be determined within a short space of time, say the first of the coming year.

To a practical geologist, a great break in the formation at the place of the greatest disturbance is visible, crossing the canal itself almost at right angles. This break should be carefully tested and followed and absolutely located at its source, which may be some five or six miles away, and there relieved of its constantly accumulating gas pressure, which is now forcing its way and carrying with it great quantities of eruptive material to the place of least resistance—namely, into the bottom of the canal at the Culebra Cut.

A trained, experienced and practical mining engineer, who has encountered such difficulties on a smaller scale, should be able to follow the rock signs so potent with meaning to the trained eye, which would enable him to follow the course of this fault plane with certainty. Drilling along the course of this fault, I believe, would establish the fact that this break in the earth's crust is filled with porphyry, eruptive material and soft clay, similar to that found in other sections of the country where eruptions of this kind are not

(Concluded on Page 7, Column 4.)