positions which the various parts of the bridge would take consequent upon the buckling of the lower chord at the point indicated. As the buckling took place, the now unbalanced lateral thrust in the lower chord of the cantilever arm would bring an enormous lateral shearing force to bear upon the foot of the tower, pushing the foot of the towers inwardly toward the anchor arm, until they slipped off to the ground on the shore side of the tower pier. Meanwhile the whole of the cantilever would be pivoting forward and settling swiftly into the river, the shore arm falling to the ground between the main pier and the anchor pier. The enormous impact as the bottom chords struck the ground would cause the heavy vertical posts to crumple in upon themselves, until the whole mass had sunk down into the position shown in our engravings, the top chord eye-bars being drawn forward above the mass of wreckage, a condition of things which is shown very clearly. That the foot of the towers were thrust shoreward, and that the towers were bent across the piers with the heads far out in midstream, is shown by one of the photographs, in which the lower part of the tower with its four webs will be seen against the shore side of the tower, while the crest of it is showing about 100 feet out in midstream.

As to the future of the Quebec bridge, while it is probable that it will eventually be built, we doubt whether it will be built upon the present plans, unless indeed they are subject to modification, at least as regards the posts and chords. We are informed that practically the whole of the steelwork for the northern half of the bridge, some 20,000 tons in all, has been constructed and is ready for erection. It may be possible that, in the revised plan, the compression members may be strengthened, among other means, by the substitution of cover plates for the present open latticing, and the bridge completed, except for this modification, on the original lines. This change, however, would mean a great increase of dead load, and necessitate the employment of higher unit stresses in the eye-bars.

The Current Supplement.

The American Museum of Natural History in New York recently added an exact model of a large whale to its mammalian collection. This technical achievement is explained with the aid of very excellent illustrations in the opening article of the current SUPPLEMENT, No. 1654. Dr. Rabes writes on the heart weights of various animals, and shows that the relative size of the heart is a measure of metabolic activity. The connection between physical and psychical conditions is set forth by Dr. O. Mueller. What was perhaps the most exhaustive study ever made of a single problem of ventilation was recently concluded for the Rapid Transit Subway of New York by Dr. G. A. Soper. His report is published in full. Prof. Ernst von Halle, the distinguished German authority of shipbuilding, reviews the rise and tendencies of German transatlantic enterprise. The progress of the submarine boat is critically analyzed in the light of the recent experiments conducted by the United States government. The aeroplane experiments of M. Louis Bleriot are described by Capt. Ferber, himself a well-known aeronaut. His article is a *résumé* of what has been accomplished to date in France with aeroplanes of various types, including the type invented by the late Prof. Langley. Mr. J. H. Morrison's excellent history of armored war vessels passes to a third installment, in which armor plating in the United States is discussed. Dr. Richard Wiesner contributes an instructive article on the germicidal effect of sunlight. At various times we hear the question asked: How did the ancient masons raise the enormous blocks of stone which they used in their temples and pyramids to the heights and positions in which they are now found? Mr. Clement E. Stretton endeavors to answer this question by describing some mechanical contrivances with which the ancients were probably familiar, and which answered all requirements. It is difficult in this year of grace to realize that it is only one hundred years since navigation by steam actually reached the position of a recognized commercial means of transport. For that reason an article is published in the current SUPPLEMENT commemorating Robert Fulton and the centenary of steam navigation. The recent announcement by Sir William Ramsay that he has discovered a means of degrading copper to lithium, renders of peculiar timeliness and interest a paper on the disintegration of atoms, in which the entire subject of radio-activity is authoritatively reviewed in the light of the most recent investigations. The usual notes and formulas appear in their accustomed places.

An apparatus for life saving at sea has been invented by Mr. R. Lavachery, a Belgian engineer residing at Chapultepec, Mexico. It consists of a rifled cannon from which a projectile is fired; to the projectile are attached a cable, an anchor, and a rocket. The mechanism is said to be very simple, and for humanitarian reasons the inventor has not patented it.

Correspondence.

The Evils of Train Telephone Orders.

To the Editor of the SCIENTIFIC AMERICAN:

The recent accident that occurred at Mattoon, Ill., in which fifteen people lost their lives, owing to a misunderstanding of "meeting orders," given over the telephone, proves that as yet the telephone has not reached the stage of perfection where it can with safety to the traveling public supersede the telegraph for the handling of trains. It would be a very simple matter to have a set of telegraph instruments in the telephone boxes, at sidings, and either the conductor or motorman on each car be required to know telegraphy, and on regular train order blanks the superintendent or dispatcher could arrange for meeting points, the conductor or motorman signing for the same, thus avoiding in a great measure the possibility of collisions.

F. H. SIDNEY,
Signal Dept., B. & M. Terminal Div.
Boston, Mass., September 3, 1907.

Drying Kilns.

To the Editor of the SCIENTIFIC AMERICAN:

As the rapid drying of timber has rendered drying rooms or kilns a necessity to many, the following suggestions will no doubt be of value. A very useful kiln may be constructed as follows: Walls of brick, roofing of rubberoid, ceiling of galvanized iron, and floor of battens laid on joists and kept apart. Under the floor are laid steam pipes, to heat the air which enters the room below them. The ceiling is perforated with holes equally distributed over its entire area, Through these holes the air from the room is drawn by either exhaust fan, ventilators, or chimney.

For those who prefer to have the steam pipes outside the kiln, the usual arrangement of motor, fan, and pipes in a separate room is satisfactory. The heated air is delivered to the kiln preferably at the top and escapes through small holes distributed equally over the floor space. As the sides and top of the kiln are made practically air tight, the coolest air escapes first; and by making the outlets of less area than the inlet, a slight pressure may be maintained in the room, and thus create an even temperature throughout.

As the result of considerable experience with drying kilns, the writer considers them only suitable for timber that has been partially seasoned.

Carlton, near Sydney, Australia. T. HUMPHREY.

Panama Canal Problems.

To the Editor of the SCIENTIFIC AMERICAN:

I have found your editorial on "Safeguards for the Panama Canal Locks" quite interesting. For ten years or more I have given careful thought to every engineering phase of the Isthmian problem, and I am glad the commission realizes the immense loss that might follow a collision with lock gates of the ordinary type.

Perhaps any of the devices which you state have been considered by the commission may be made to give full protection against such a disaster, but would it not be best to make the gates of such enormous structural strength that they would resist any collision that might happen? In that event the ship would get the worst of it. Still it would be wise to make the head gates so that they could easily be closed even if the lower gates were carried away. That can be done, and I think it ought to be. I would rather depend upon gates that are used in everyday service, than any device designed for use only in emergencies.

There are many reasons why the work at Panama should be completed as soon as possible, and no good citizen should even think of putting the slightest obstacle in the way to that end. Now, or never, seems to be the time for helpful suggestions or to show how the general scheme of the commission could be improved, for if any defects can be discovered now, it will be wise in Congress to have them removed before the contracts are let, and it will exhibit the courage of true greatness in the President to call a halt until a right start can be made. Better a slight delay now, than to complete the task in record-breaking time only to be confronted with troubles that cannot be evaded without great delay and expense.

It seems to me that as the site at Gatun is almost as large as could be wished for three locks in flight, a single lock with a usable length of 1,200 feet could be substituted for the three, with a saving in cost of building and operation. The time to pass through a single lock with 85-foot lift would be less than to pass two or three locks having in the aggregate the same lift. I know it may be said it is not possible to build gates for such a lock, and in reply I would say that at the proper time I shall show how it can be done.

In preference to any canal plan I have seen, I would suggest that it be built with a single lock at Gatun with a lift of 70 to 75 feet, and with a second lock between Gamboa and Obispo with a 70-foot lift to reach the 140-foot summit level. Three locks on the Pacific side would be required to complete the scheme. By this plan the work on the Culebra Cut might possibly be completed in another year. The Gatun Lake at any level from 68 feet, as proposed by the French, up to 85 feet, will submerge much swampy area, but it should not be forgotten that, unless the topography is very peculiar, there will be a new area of swamps created.

I would have a concrete dam built at Gamboa as near to the line of the canal as may be and carried from the bedrock (about sea level) to an elevation of 75 feet at the crest. Sloping from the crest I would continue the dam up the Chagres Valley with rock-fill construction and at intervals of 500 feet or more have a concrete curtain cross the valley extending from the surface of the rock-fill down to bedrock. This would make it water-tight, and if the strata of rock-fill were thick enough it would be safe against any possible erosion. Hydraulic giants and the Chagres would furnish the means—the water and the power—to wash almost any loose material from the slopes of the banks of Gamboa Lake to fill in back of the dam up to the level where rock-fill should begin. As soon as the 150-foot level was reached by this process the water supply for the 140-foot summit level would be assured. As a higher level was attained with a corresponding increase of lake area, increased power would be available to extend the fill back of the crest of the rock-fill dam even for a mile or more (with shallow depth). Such a dam would be safe from the start and could be made more and more safe each year. It might be that a variation of 20 feet in the lake level would, with the possible flow through the flumes to the turbines, prevent any flow over the dam except at rare intervals. It seems reasonable to believe an effective control of the Chagres would thus be gotten, but not until the lake area for the different levels was known could its nature be determined with exactness.

The available power of the Chagres might in future years wash out enough of the Culebra Cut so that the summit level could be brought down to 70 feet.

The canal will be subject to shoaling by sediment and debris carried into it by the various streams which must flow into it. How to remedy this condition is a serious matter. I have not learned that an adequate solution of the problem has been found by the commission. I have a plan, partly developed, that may be successful, but I am not ready yet to make it public. I want, however, to suggest in closing that the power of the Chagres can be made to help in the removal of such deposits. HENRY FITCH.

Washington, D. C.

Official Meteorological Summary, New York, N. Y., August, 1907.

Atmospheric pressure: Highest, 30.33; lowest, 29,71; mean, 30.00. Temperature: Highest, 91; date, 8th; lowest, 59; date, 29th; mean of warmest day, 80; date, 8th; coolest day, 65; date, 24th; mean of maximum for the month, 79; mean of minimum, 65.1; absolute mean, 72; normal, 72.7; deficiency compared with mean of 37 years, —0.7. Warmest mean temperature of August, 77, in 1900. Coldest mean, 69, in 1903. Absolute maximum and minimum for this month for 37 years, 96 and 51. Average daily deficiency since January 1, —1.4. Precipitation: 2.48; greatest in 24 hours, 1.66; date, 23d and 24th; average of this month for 37 years, 4.53. Deficiency, —2.05. Accumulated deficiency since January 1, —5.79. Greatest August precipitation, 10.42, in 1875; least, 1.18, in 1886. Wind: Prevailing direction, south; total movement, 6,766 miles; average hourly velocity, 9.1 miles; maximum velocity, 28 miles per hour. Weather: Clear days, 10; partly cloudy, 16; cloudy, 5; on which 0.01 inch, or more, of precipitation occurred, 10. Thunderstorms, 13th, 24th. Mean temperature of the past summer, 71; normal, 71.83. Precipitation of the past summer, 6.95; normal, 12.16.

Micro-Photography in Colors.

Micro-photography in colors by the new Lumière process was the subject of a paper read before the Académie des Sciences by C. F. Franck. He used the Lumière color photography plate which we recently described. The experiments with micro-photography on the new plates were commenced last March in the laboratory of the Lumière firm at Lyons, and are the first of the kind which have been made. The author is now continuing his researches at Paris, at the College de France, where he has a well-equipped micro-photographic laboratory at his disposal. He has succeeded in making enlargements of microscopic specimens from 30 to 1,000 diameters. These enlargements are photographed in their natural colors, and some interesting specimens of such photographs were shown to the Académie. Among these were gneiss crystals, and a longitudinal section of the vertebral column of an embryo, showing the ossification. Different organs of the frog and insects were also shown. Preparations which require the use of polarized light are taken upon the plates as easily as the others. As an instance we find the gneiss of Mont Blanc, with all the different colors and tints, well shown upon the color plate. The great advantage of colored micro-photographs will at once be appreciated and the method will no doubt be used to a large extent in the future.