

THE NAVY'S DUMMY DRILL GUN.

BY WALTER L. BEASLEY.

The recent brilliant and surprising scores made by the ships at target practice at Magdalena Bay shows a marked advance over previous years, and demonstrates that the men behind the guns have been trained up to the highest point of efficiency in the various operations connected with firing the batteries, such as quick handling of shells, ammunition, pointing and sighting, and other matters entering into the performance of successful naval gunnery. As recently announced by the Navy Department, the battleship "Maryland" of the Pacific Squadron carries off the honors, winning the trophy by the fine score of 76,470; the cruiser trophy goes to the "Albany," having a score of 76,924, while the gunboat trophy was won by the "Wilmington," whose record was 67,448. The following are classed as "star ships," having obtained at least 85 per cent of the final merit of the trophy winners of their respective classes: the "Illinois," "Kentucky," "Vermont," "Louisiana," "Alabama," "Connecticut," and "Tennessee." The new ships "Connecticut," "Louisiana," "Vermont," and "Minnesota," showed remarkable efficiency with their new 12-inch 45-caliber guns, the shooting being extremely pretty and accurate, and the ships averaging about 1.5 hits per minute. The "Louisiana" made 1.7 hits with her 12-inch rifles. The work, however, of the 7-inch rifles caused the greatest surprise. The average was about 5.5 with these guns, the "Louisiana" making 5.3, while some of the ships made 5.87, 5.8, and 5.89. The "Minnesota" on one run made nearly 100 per cent with her 7-inch gun, hitting the target 11 times out of 12 shots fired.

As the successful achievements of these creditable and record-breaking performances are due almost entirely to a particular method of training, it will be of timely interest to picture and describe the dummy drill gun. By the use of this device the men become experts in lifting and loading the heavy shells, and develop into human automatic machines, handling the weighty projectiles and shoving them into the breech with great rapidity and skill. The main object of the "dummy loader" is to give the shell men an opportunity to acquire speed and proficiency in the handling of the shells without wearing out the breechblocks of the guns. Of late much attention is being paid by all the ships in the navy to these drills, for in actual service much depends upon the promptness and accuracy of the shell man. Should he "muff" a shell at the critical moment, or let it roll away from him, should he drop it—in short, should he fail to send it home safe and true when the breechblock of the big gun is swung open for him—the consequences might be serious.

The "dummy loader" is the latest invention of the Ordnance Department, and is a *facsimile* of the breech and powder chamber of a big gun up to the point where the rifling begins. Loading it requires the identical motions that are employed in the loading and firing of the real weapon. One man opens and closes the breech; the shell man grasps the projectile and quickly rams it inside, followed by the dummy charge of powder in a bag; the shell comes down the return chute on the left side of the apparatus; the "take-off" man catches the shell as it falls out at the end, and shoves it again to the loader at the front. The dummy powder charge is handled in the same way, and the whole makes a continuous operation for the loader. By the time he has put in the last shell and the breech is closed and locked, it is ready to be swung open again by the plug man, and an additional shell shoved in. A marked economic improvement in the saving of the life of guns is thus obtained. The breechblock of these costly weapons would soon be worn by the constant slamming and the denting of quickly-thrown shells.

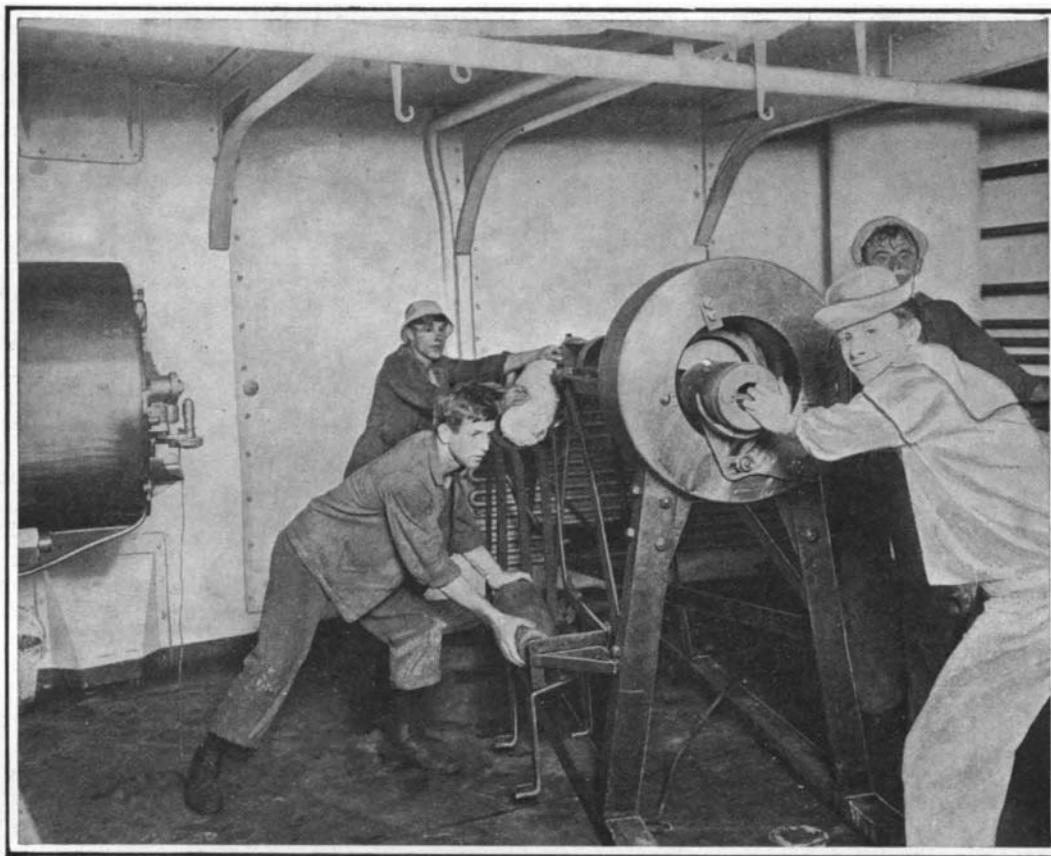
The new device is manufactured entirely in the Brooklyn navy yard, N. Y., in the ordnance machine shop. It is made mostly of steel; although there are a few parts of brass and cast iron, the supporting framework and return chute are entirely of steel. The one shown in the accompanying illustration is the latest 7-inch model, and is on board the battleship "New Hampshire." It is 7 feet 4 inches long, 4 feet 4

inches high, and weighs about 1,800 pounds, costing the government \$375 to manufacture.

Before reaching the target grounds, the gun crews are kept at systematic and continuous drills with the dummy loading machine, consequently the men have acquired the top-notch point in speed, coupled with a mathematical precision in the handling of the projectiles, powder charges, etc. When the vessel reaches the range, and as, at the speed assigned, a very short time interval is allowed for the run, it is important to begin firing at once with the rapidity consistent with "getting on" the target. The size of the target varies according to caliber and practice, but the target screens for the great guns are about 21 feet in length and 17 feet in width, and are distant from the range about 1,600 yards. The Navy Department provides four trophies for excellence in gunnery—one each for battleships, cruisers, gunboats, and torpedo craft. In addition, money rewards are distributed according to gun rank or rating among the successful crews.

A Gold-Brick Town.

There are many remarkable towns in Mexico, but none more interesting than Guanajuato, "The Hill of the Frog." It might more properly be called the "gold-brick town," for the houses have been found to contain much gold. This is a curious situation, but it came about naturally. Guanajuato—pronounced Wah-nah-wahto—is one of the oldest mining towns in Mexico; but the value of the place as a town was discovered when a railroad company decided to build a station there. It was found necessary to tear down about



THE 7-INCH DUMMY DRILL GUN OF THE BATTLESHIP "NEW HAMPSHIRE."

Our high-speed target records are due to practice with the dummy.

three hundred adobe buildings, which were made of the refuse of various mines after the ore was extracted.

When it became known that the old adobe buildings would be torn down, pieces taken at random were assayed. It was found that because of the old process, which lost much gold and silver, they assayed from \$3 to \$24 a ton. The mean value was estimated to run about \$8 gold per ton. The old buildings have brought about \$30,000 Mexican in gold, and persons who have built since the new machinery has been installed in the mines are bemoaning the fact that the new houses do not contain as much gold as the old.

Permanence of Iron Gall Inks.

Various iron gall inks which, when freshly made, had been analyzed by the Prussian government testing bureau and had been ranked in the first class, were allowed to stand three years and again examined. It was found that the quantity of iron in solution remained unchanged, but that the tannic and gallic acids were greatly diminished, in some cases by more than one half, so that many of the inks no longer satisfied the conditions established for inks of the first class. The sediment deposited in the bottles contained only traces of iron and consequently could not consist of tannate or gallate of iron, as has hitherto been assumed. It was probably composed of products of the decomposition of tannic and gallic acids. If this decomposition is favored by exposure to light, as is not unlikely, ink should keep better in earthen jugs than in transparent glass bottles.

THE ICE OF THE ARCTIC WATERS.

BY DAY ALLEN WILLEY.

It is an interesting fact that the actual iceberg always comes from near the ends of the earth. Becoming detached from the immense ice masses of the north or the south polar regions, the huge pinnacles and mounds and other formations too often in the path of vessels crossing the Grand Banks of Newfoundland have made a long journey before reaching this locality, for they have come the length of that interesting river in the ocean, the Labrador current, besides floating hundreds of miles in the waters about Greenland.

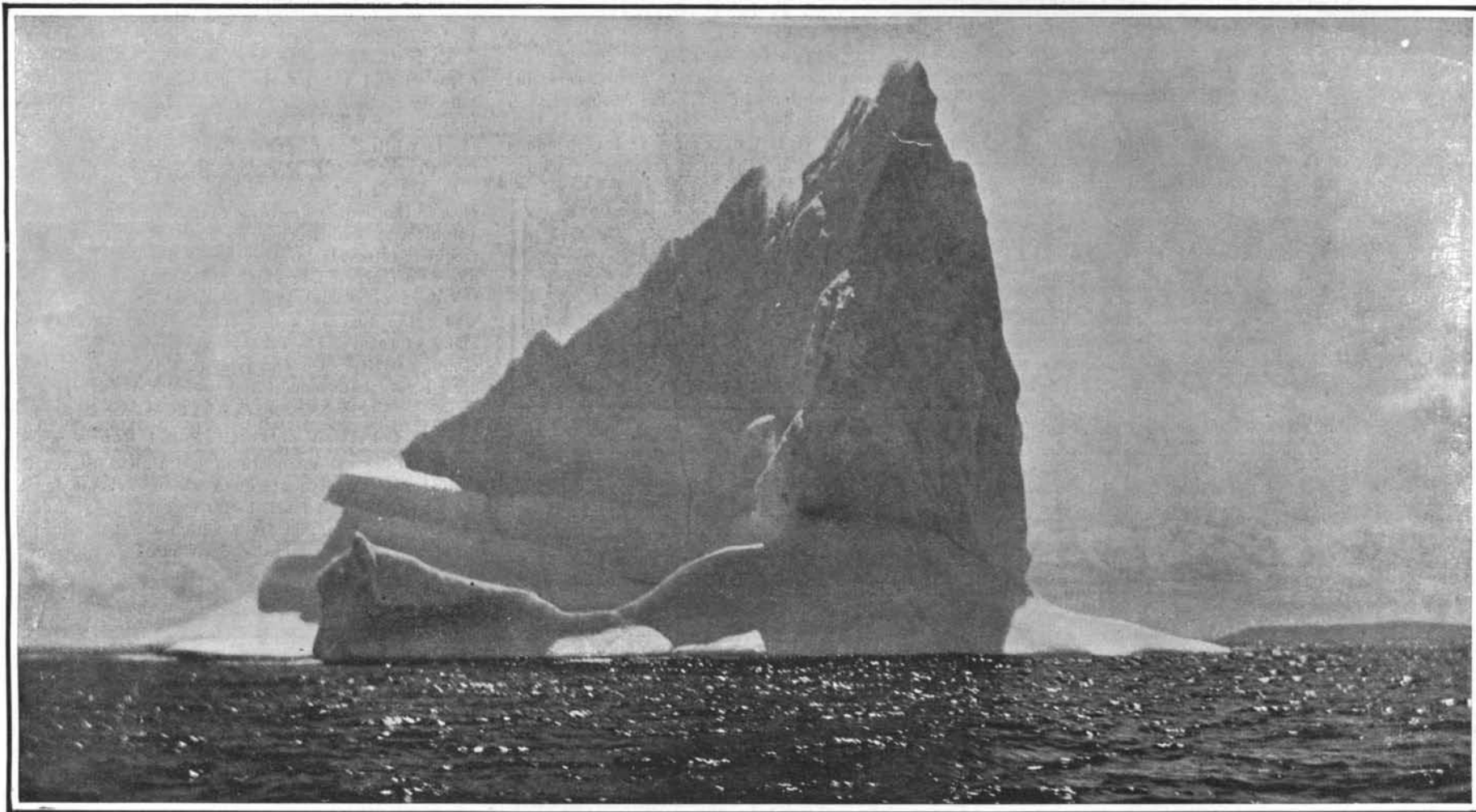
The distance covered by an iceberg of the North Atlantic from the time it is formed until it reaches the Banks is fully 2,500 miles. It may have been afloat for a year exposed to wide changes of temperature, battered by ice floes, possibly other bergs, and ceaselessly washed by the waves. Yet some of those seen 2,000 miles south of their starting point are nearly 300 feet in height and truly of majestic proportions, often a thousand or more feet in length, while it is an established scientific fact that so much more of the bulk is under water than is visible, that the largest ones may extend into the ocean to a depth of over half a mile.

Their enormous size when they become detached from the glaciers is proved by the observations of explorers along the Greenland coast. A few years ago one was measured as nearly as possible around the edges. This distance was about five miles. It had several peaks estimated to range from 300 to 500 feet high. Judging from its appearance it was a solid mass that had separated in its entirety from the glacial edge of Greenland. As Arctic navigators who venture far north often see a score or more of great bergs in a day, the tremendous glacial activity in this region can be appreciated. The majority of these that drift to the Grand Banks come from Melville Bay. Some of the distinct glaciers that terminate the Greenland ice cap on this coast extend along it a distance of fully 25 miles. Their thickness or height can only be estimated but in places near the open sea it is believed to be several hundred feet.

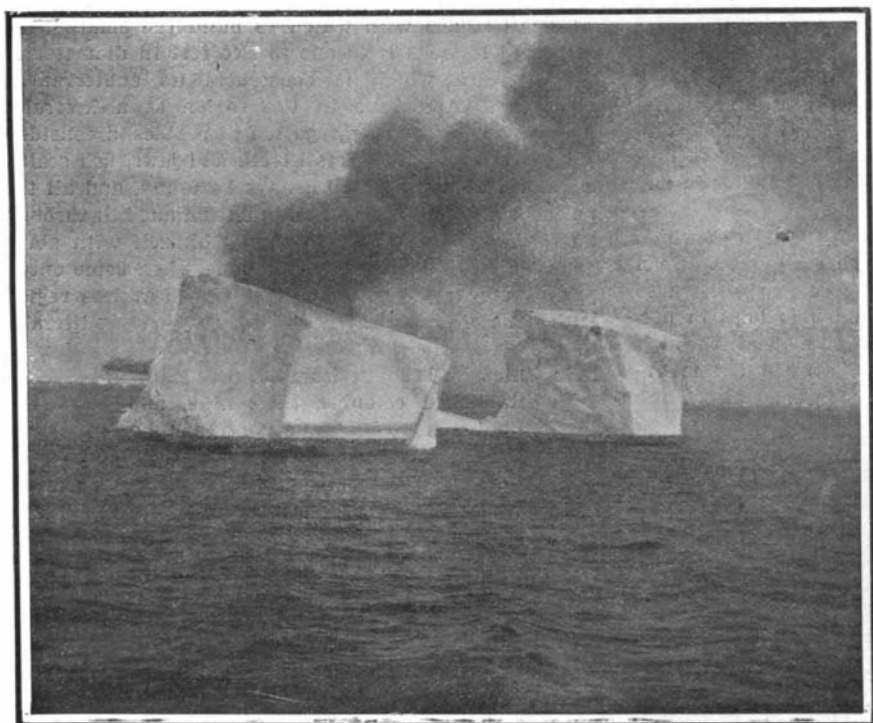
Recent examinations of this coast show that during the short summer the formation of bergs in the bay is almost continuous. The glacial movement keeps pressing the ice forward until a thick stratum often projects many feet beyond that beneath. After a time the great weight overcomes the tensile strength of a mass and it falls into the sea and a berg is created. The warmer temperature of summer may also widen crevasses on the fringe of the glacier and wave action loosens another mass. The explorers in this sheet of water say that enormous force is displayed by these ice falls and that the sound of the great body striking the water is so deep and loud that it resembles heavy thunder. The many reports that may be heard in a day indicate the rapidity with which the glaciers disintegrate in summer.

Probably the natives of Newfoundland and Labrador are more expert in the knowledge of marine ice and ice forms than any others. This might be expected since the shores of the island and the long, bare peninsula are incased in ice in some form so many months in the year while the berg-laden current flows past them on its southerly course. The seal hunter or fisherman of this region can tell the character of a piece of floating ice or an ice pack merely at a glance. When searching for seal on the ice fields in winter, if he becomes thirsty he looks for ice having a bluish or grayish tint—not the white or transparent variety. He knocks off a lump of the darker hue and tests it with his tongue. But the field may consist of a pack of pan or floe ice which, though dazzling in its whiteness and clearness, is unfit to quench the thirst owing to its salt. So it is that much suffering is endured by these fur hunters unless they chance upon a fragment of a berg which may have gone to pieces and been wedged in the pack.

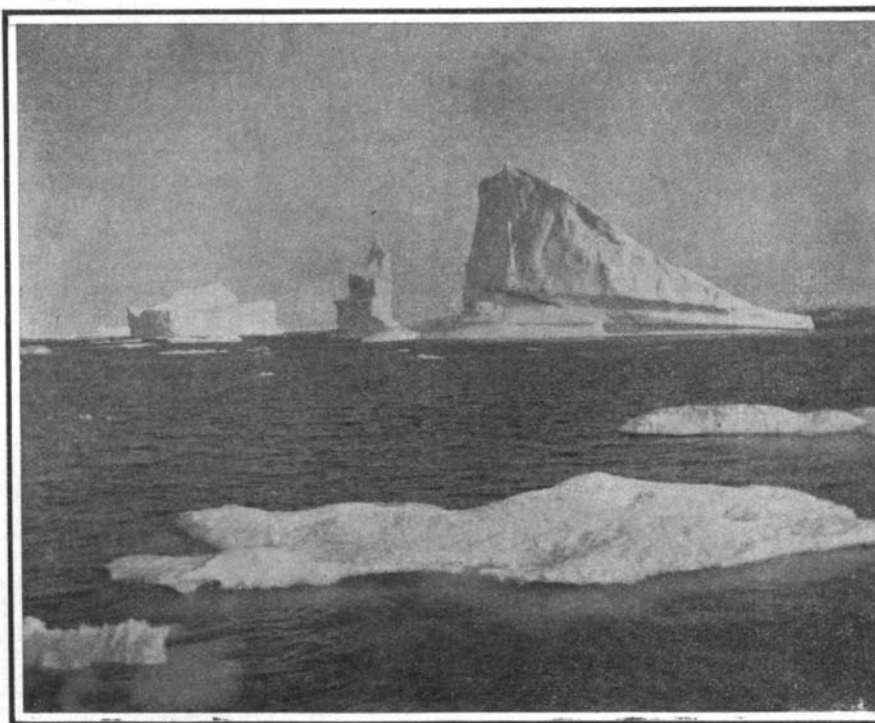
Usually the iceberg is of such large proportions that it can be distinguished from the floe and pan ice, but occasionally a berg splits apart because the superstructure becomes too great for that supporting it. Again, a storm may send two crashing against each other,



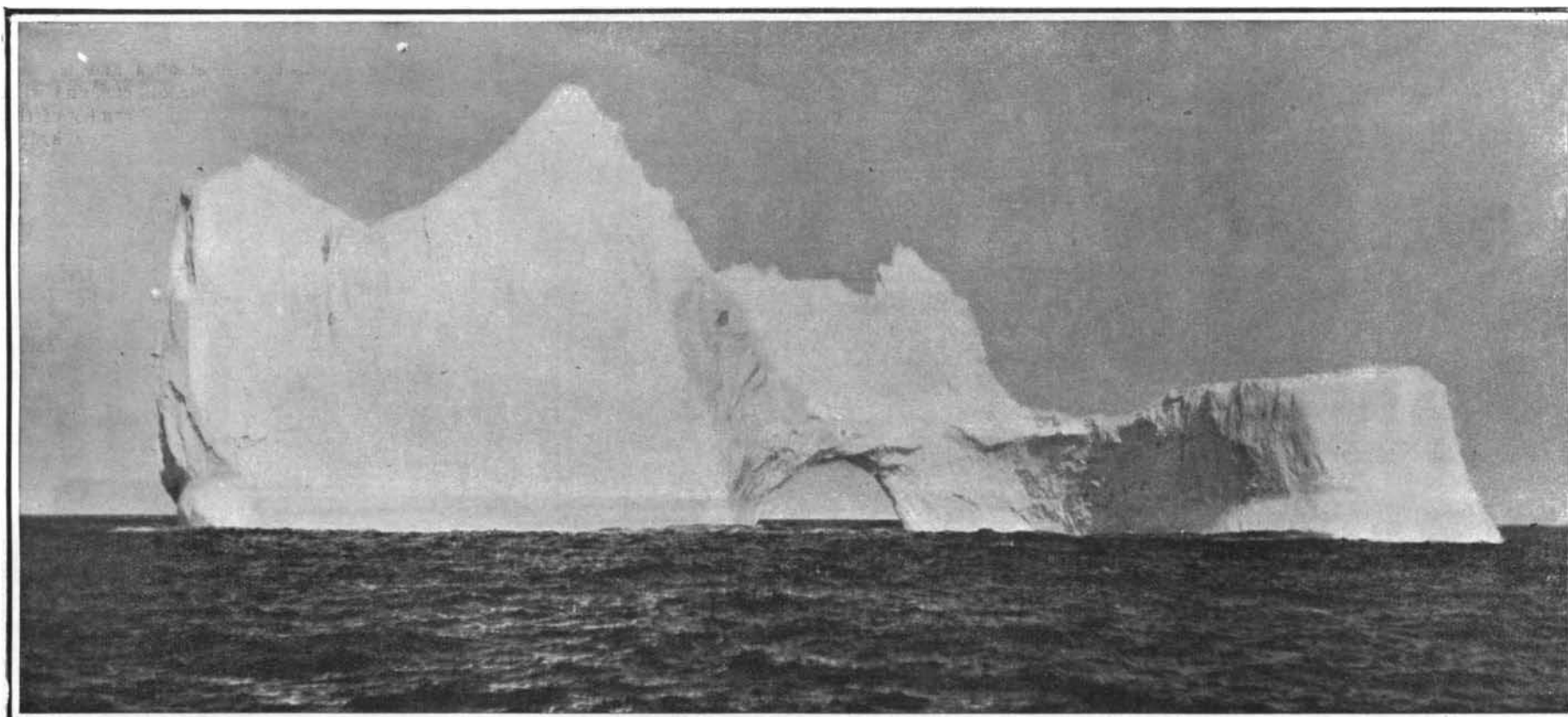
An iceberg that looks like a racing yacht under full sail.



A small iceberg. Its sharp edges denote great hardness.



Greenland icebergs surrounded by floe ice.



A curious arch in an iceberg.
THE ICE OF THE ARCTIC WATERS.

knocking pieces off them, perhaps weakening them so that they go into fragments. The debris of a large berg may cover a square mile, but even if mingled with other ice, the eye of the skilled observer can usually detect it by its darker color. But there is the sure test of the tongue, for glacial ice is almost invariably "fresh," containing but a slight percentage of saline matter in its composition. Still another method of discovery is to take a chunk and try to break it, at the same time putting a piece of pack ice to the same test. A blow which shatters the pack ice may only knock a little powder from the surface of the other. During the hundreds, perhaps thousands, of years it has existed, its particles have been so constantly subject to pressure from the glacial movement that the ice has solidified to a wonderful degree. It not only resists the sharp edge of the cutting tool but will remain a much greater length of time without melting than any other variety found in the ocean. This accounts for the dimensions of some of the bergs which have floated a year or more before they reach the Grand Banks. Although the temperature rises rapidly as they go southward from these shoals it is known that some have gone 200 miles farther south before they have melted or separated into fragments.

If an iceberg moving down with the Labrador current is swayed by an eastern storm or eddy too near shore owing to its "draft," as the sailors would say, it is liable to ground. Thus an opportunity to study the changes which occur is given. It has been discovered that while the summer temperature of Newfoundland is high enough to reduce the surface considerably by melting, it goes to pieces much more rapidly by the weakening of the lower portions. The action of the waves and tides tends to undermine it, so to speak, holes appear at the water line, a piece of the upper portion "caves in," then another and another, until the berg disappears in a remarkably short time considering its dimensions. There have been instances where parts of these stranded bergs remained in sight throughout the summer and were preserved by the winter temperature until the next year, but usually after striking bottom they disappear entirely before the warm season in this latitude has closed.

The novice might often mistake a piece of floe ice for a small berg not noting the difference in color and formation. Some of the hummocks formed by rafting or overlapping of pan and floe ice are fifty and sixty feet in height. Torn from the edge of the field by a gale or unusually high waves, they fall into the procession of bergs and some are of such size that they drift to the south of the great island before they disintegrate.

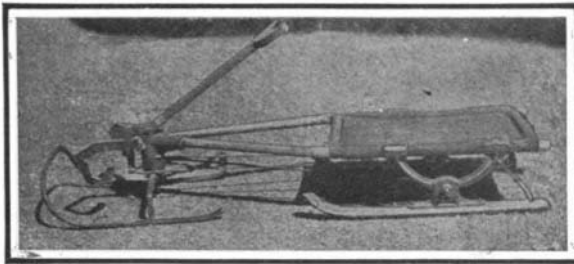
There is a continual movement of ice from the vast pack in the upper Baffin's Bay, the quantity of course varying according to the season. The field which comes southward on the Labrador current in February of each year sometimes extends outward a hundred miles from the shore line and five hundred miles to the north. Great sections of it may present a solidly frozen surface without a rift of water while another portion may be of floes and individual cakes separated by lanes of open sea. It is on this field that the hair seal is born and here is the scene of the annual seal hunt. The field is often broken by violent storms and the cakes piled into the hummocks are solidly frozen together, but this ice is soft in contrast with the "Arctic pack." Masses of this fifteen and twenty feet in thickness are sometimes broken from the pack in the Arctic basin and come south with the new ice, gradually melting until the surface is just awash. The Islanders and sailors call such pieces "growlers" because they are so hard that they will pierce an iron as well as a wooden hull, and lying almost entirely below the surface they may not be seen until the vessel strikes their sharp edges. Next to the bergs the Arctic pack is the oldest ice which is brought into the Atlantic by the Labrador current. A study of its composition leads investigators to believe that some of it may have been formed a century before it was detached from the main body which lies miles to the northward of Newfoundland.

The examination of some photographs taken at the observatory of Arequipa (Peru) has revealed what appears to be a new star. According to Prof. Pickering, of Harvard University, this star was of less than eleventh magnitude June 1st, 1906. It rose to a magnitude of 8.9 from June 14th to July 2nd, and then diminished in brightness. At the present time it has again fallen below the eleventh magnitude. This star is probably not new in the strict sense of the word, but is a variable star of long period, or perhaps rather of irregular period. The Arequipa photographs happen to have caught one of the maxima of brightness. It is a matter of the greatest scientific interest to make a close study of such new stars which continue to remain visible, for there is always the possibility that they may manifest some unforeseen phenomena of great importance.

TOBOGGANING AT CAUX, SWITZERLAND.

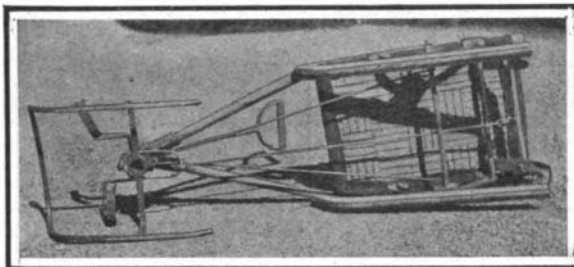
BY DESHLER WELCH.

The winter sports in tobogganing, or "lugeing," at Caux, Switzerland, reach a point of almost scientific diversion. The situation of Caux, some 3,000 feet high on the great acclivity back of Montreux, on Lake Lehman (or Geneva) is full of charm and stupendous grandeur. It has become the most fashionable winter



Swiss iron-frame bob sled.

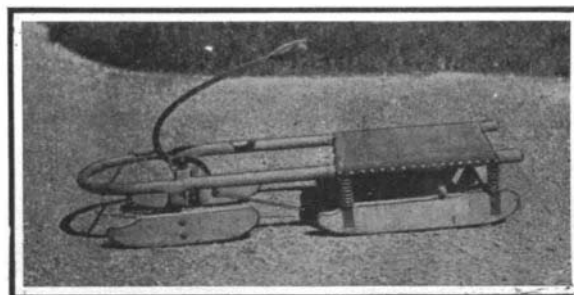
resort in Europe. The famous places of Danos and St. Moritz, where winter sports are carried on with almost professional records, are, more or less, winter residences for people suffering with weak lungs or tuberculosis. But Caux, which is called the Ermine King, is an all-the-year-around resort that is patronized by the most distinguished people in the world as a place of healthful rest and luxury. In the winter the great hotels, the Palace and the Grand, are mainly filled by Englishmen who spend all their time in ski-



Arrangement of brake on the iron-frame sled.

ing, lugeing, and skating, and a Caux "record" is now considered sufficient to establish one's standing in any one of the sports.

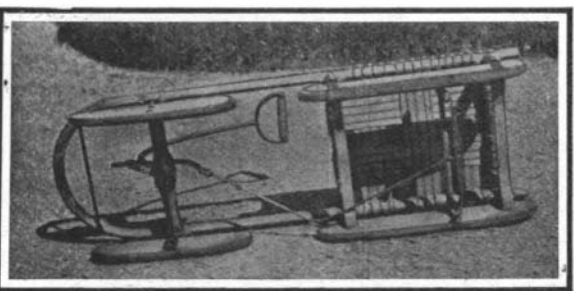
The toboggan slide is the "Cret d'y Bau" run which extends a distance of five miles, from a point between Caux and the mountain of Rocher de Naye, down to Territet—a fine, hard roadway, which is kept in perfect and safe condition by a force of men all through the winter. It curves, snake-like, around the mountain sides, through patches of pine woods and along



The wooden-frame bob sled or "luge."

the edges of great declivities that are safely guarded. All the curves are banked so as to throw the sled into a proper equilibrium.

It is here that the "luge" itself has been notably developed on scientific principles. Mr. Hugo Eulenstein, director of both the hotels, has been an active participant in all the winter sports and has accomplished some remarkable feats with the luge. He owns one called "Bob-Phoenix," manufactured in Couvet, Switzerland, that cost 1,200 francs, on which he has



The "luge" turned over to show the brake.

TOBOGGANING AT CAUX.

sped down the run at the rate of 120 kilometers an hour. It has a double truck and carries four or five people, with a wheel steering gear. An American make of "skeleton" has also been popular and was first exploited here three seasons ago by Mr. Henry Harrison, a guest from Chicago.

Mr. Eulenstein has now patented a "dirigible-brake

luge" that is splendidly adapted for long runs. It is for one person, who has absolutely full control over it, no matter how steep the run. The brake is quickly adjusted and the steering mechanism is exceedingly sensitive. The "bobs" are so arranged on an axle that ruts or bumps are glided over with hardly a jolt. He is willing to dispose of the patent for American manufacture.

Lugers on the "Cret d'y Bau" have a great convenience in the inclined railway that runs between Territet (Montreux) and Rocher de Naye. A car is run at frequent intervals to carry back people and sleds, and affords a merry opportunity for social contact. During the days of special races the scenes at the roadway where the lugers "slide" through Caux, and where many of them start, are brilliant in color and interesting activity. On carnival days the lugers are decorated very handsomely and ingeniously.

Collection of Small Fossil Bones.

Paleontological members of the United States Geological Survey have hit on a unique scheme for the collection of small fossil bones in certain parts of the West. The mammals from which the bones are derived are pretty generally distributed but are never abundant, and on account of their small size are seen with difficulty. They may be more frequently found in what are locally known as "blow-outs," and are almost always associated with garpike scales and teeth, and teeth and bones of other fish, crocodiles, lizards, and small dinosaurs. These remains are frequently so abundant in "blow-outs" as to attract attention easily. When such a place is found, careful search is almost always rewarded by the discovery of a few jaws and teeth of mammals. This has been known for a long time, but it was only more recently that it was discovered that a certain species of ant, in excavating its burrows and in collecting material from and beneath the surface, brings together great numbers of small stones with which to build the small hemispherical hillocks from one to two feet in diameter in and beneath which it constructs its subterranean chambers. Anywhere in the region at a favorable locality among this aggregation of pebbles, a considerable number of small fossil teeth and jaws, fish scales, small vertebrae, etc., will always be found, and all the paleontologist had to do was to sift an ant hill through an ordinary flour sifter to supply himself with abundant material. The next step came when some enterprising sluggard, wishing to sample an antless region with little effort, followed Scripture, and went literally to the ant. He deliberately "sowed" the place with ants which he brought from several miles away. The ants established colonies, built hills, and when the paleontologist went back the next year, he found that they had collected thirty or forty teeth, etc., to each hill. This particular locality, which is in Wyoming, has proved almost inexhaustible, having yielded several thousand isolated teeth and jaws of the diminutive mammals. Paleontologists generally, therefore, owe a debt of no inconsiderable gratitude to the ant in making known the wealth of small mammals and other diminutive vertebrates that inhabited the region in ancient times, and the Biblical injunction takes on a new significance.

Fibrous Plastic Masses.

In Reif and Gonnermann's process (patented in Germany) for the production of plastic compositions of fibers of all sorts with oil, fats, and tar, the fibrous material is impregnated with alkalies and is then sprayed simultaneously with the tar, oil, etc., and with sulphur chloride, in order to secure uniformity of the mass, effect vulcanization and neutralize the hydrochloric acid set free in that process. In previous methods of combining fiber with tar and the like these binders were not chemically altered, so that it was necessary to knead the mass and also to subject it to a process of drying and hardening. In the new method the fibers are connected by thin layers of vulcanized material which require no further treatment. The alkali required to neutralize the acid formed in vulcanizing is applied to the fiber, because it would interfere with the spraying if it were mixed with the oil or the sulphur chloride, while neutralization of the composite mass, even if it could be effected, would come too late, as the fiber would already have been injured or destroyed by the acid.

A writer in a recent number of *l'Industrie Electrique* describes a method of using the wires of a power transmission line for establishing telegraphic communication between the generating plant and the sub-stations. By using an induction coil, which obtains its power from the transmission line, a local high-frequency current is generated, which may be superposed on the current in the power line, and thus affect instruments at the receiving station. It is not necessary to use two lines for a system of this sort, because the circuit can be completed through the ground.