

of vinegar to 1 gallon of low wine. After mixing, the liquid is pumped into small 30 gallon casks, where it passes out through a small glass tube. The stream of wine, which is about the size of a thread, runs down through a funnel in the top of the generators.

The generators are made of ash and are about 8 feet in height and about 4 feet in diameter and filled with beechwood shavings, each generator holding about 25 bushels. These shavings are circular in shape and are about 1/4 of an inch in thickness, about 1 inch in width and about 2 inches in diameter. When stretched out they measure from 13 to 15 inches in length. They cost about from 25 to 30 cents per bushel and will last from 30 to 35 years. As the fine stream of low wine trickles down slowly through these shavings the air inside acts on the liquid, causing it to work and turn into vinegar. The thread-like stream runs continuously into the generators. Vinegar to the depth of a foot collects at the bottom of the generators, which are drawn off morning and evening. From the generators the vinegar passes into large tanks and then runs off into small casks holding from 10 to 50 gallons, for the market. The loss of low wine by evaporation amounts to about 1 gallon to the barrel. The molasses used costs about from 8 to 10 cents per gallon. The vinegar is sold by the cask from 8 to 10 cents per gallon. It is used principally by grocers pickle houses, etc.

The sketches were taken from the plant of Edward Reinecke's Sons, Hoboken, N. J., who turn out about 1,000 gallons per day.

**Armored Trains for Coast Defense.**

A few months ago an interesting test of an armored train took place at Newhaven, England. The idea of an armored train is not new, such trains having been used in our civil war, in the Franco-Prussian war and in the Egyptian campaign of 1882; but the arrangement of these trains was such that the guns could shoot only in the direction along the rails, unless the car were propped up to prevent it from being derailed by the recoil. The car was designed by Colonel Boxhall, of the First Regiment of Volunteer Artillery of Sussex, and was constructed at the shops of the South Coast Railway Company. The car is made of steel, with a vertical armored wall all around it to protect the artillerymen. Inside the car is a 40 pounder cannon mounted on a platform so that it can be turned in any direction. It is moved by geared wheels and cranks. Underneath the car are arranged extensible beams which may be pushed out on one or both sides of the car, and are arranged to abut against the ground by means of vertical screws at their extremities, so that in case of a fire at right angles to the track they transfer the shock of the recoil beyond the rails. Beneath the car are also clamps which grip the rails and prevent the car from being derailed. In the old style of armored train the guns could shoot only in the direction of the rails, unless the car were propped up as already stated. In the new style of train the cars can be anchored in a moment and can shoot in any direction.

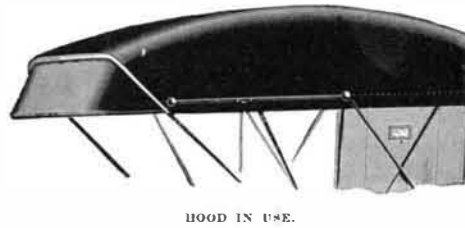
The trial of the armored train took place in the presence of a number of military men. Twelve shots with service charges were fired in a direction at right angles to the track at a target moored out at sea. Neither the car nor the rails showed any effects of the recoil, which was absorbed by the turning platform and the beams. Some shots were fired without clamping it to the rails. Of course the target offered to the enemy by the sides of the cars is of considerable size, and Lord Beresford thinks that the car should be concealed as much as possible and that thin iron plates would be a sufficient protection for the cannoners from the light projectiles of the enemy. Lord Beresford considers it preferable to arm the car with a few small rapid-fire guns. The value of such trains for sea coast defense is very great.

**Bicycles in State Militia Drill.**

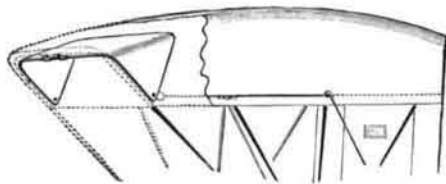
The New York Seventh Regiment has organized a bicycle corps, which had its first drill in the regimental armory March 13, superintended by a U. S. Army officer expert in the newly adopted bicycle tactics. The men were arranged in fours, six feet between wheels and eighteen feet between sets of four. Stress was laid on preserving the intervals between the bicycles and on the riders assuming a military position on their wheels. The commands, "Stand to cycle!" "Cycles front!" "Cycles rear!" "Prepare to mount!" and "Mount!" were explained, and the men went through several infantry movements on foot, pushing their bicycles. Afterward they mounted and went through the evolutions on their bicycles. Around the armory the riders wheeled, fours right and fours left in column of fours, by twos, in company front, making wide turns and narrow ones, and going through all the movements as would a company of infantry, while the military spectators looked on approvingly. The members of the corps were in uniform and presented an attractive appearance as they wheeled around with soldierly precision.

**AN ADJUSTABLE STORM AND SUN HOOD FOR CARRIAGES.**

The illustration represents the application of a simple form of hood readily fitted to any vehicle top, and let down, as shown in one of the figures, as a protection during a rain storm or when driving in the face of the sun. When thrown back, as shown in the skeleton cut, it is completely out of the way and out of sight, or it may be without any trouble taken out entirely and left at home or placed under the seat. It is thrown into or out of position for use instantly with one hand. It is manufactured by the Wilbur H. Murray Mfg. Co., of Cincinnati, Ohio. The frame is made of spring steel and it is covered with greenback rub-



HOOD IN USE.



HOOD THROWN BACK.

**MURRAY ADJUSTABLE STORM AND SUN HOOD.**

ber drill, unlined. Parties ordering this hood for old vehicles should state distance between front bow sockets at bottom of quarters.

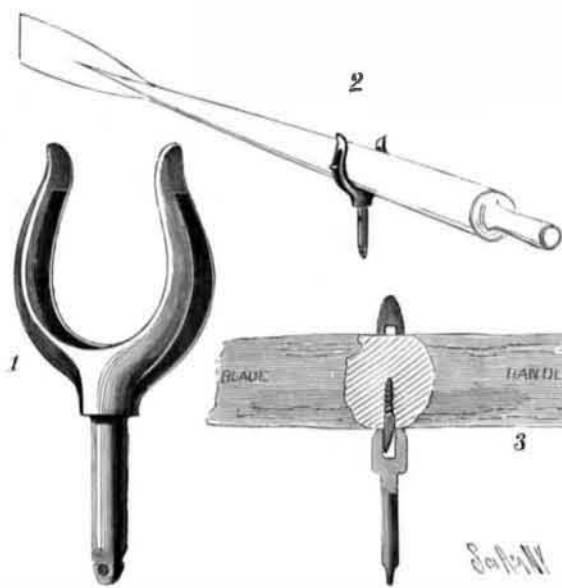
**Reflection of Light.**

The following table, showing the amount of light reflected from various substances as compared with that which falls upon their surfaces, is given by Dr. Sumner, and will be found of interest:

White blotting paper.....	82 per cent.
White cartridge paper.....	80 "
White tracing cloth.....	35 "
White tracing paper.....	22 "
Ordinary foolscap.....	70 "
Newspapers.....	50 to 70 "
Yellow wall paper.....	40 "
Blue paper.....	25 "
Dark brown paper.....	18 "
Dark chocolate paper.....	4 "
Planed deal, clean.....	40 to 50 "
Planed deal, dirty.....	20 "
Yellow painted wall, dirty.....	20 "

**AN IMPROVED OARLOCK.**

The extremely simple device represented in the illustration is intended as an improvement on the swivel oarlocks of boats employed for fishing and hunting purposes on lakes and rivers, and is especially adapted for steering and sculling boats and for use in shells. It has been patented by Mr. L. K. Scudder, No. 181



SCUDDER'S OARLOCK.

Broadway, New York City. Fig. 1 represents the oarholder, formed integral with the pintle, and with vertical slots extending through its opposite curved arms, there being also a channel of equal depth transversely through the shoulder at the top of the pintle. Fig. 2 shows the holder locked on an oar by means of a screw having one side of its shank beveled, as shown in Fig. 3, the beveled side being turned toward the in-board end of the oar. By this means the oar may be moved and turned freely as desired, and is yet securely locked in position. The feathering of the oar is in no way interfered with. The device is designed ordinarily to remain attached to the oar when the latter is removed from the boat, but may readily be detached therefrom by unscrewing the pin.

**Correspondence.**

**The Mechanical Color Test.**

To the Editor of the SCIENTIFIC AMERICAN:

I regret extremely that anything in my recent article under the above caption should have seemed to have done injustice to editor-in-chief of the Standard Dictionary. Certainly that was not my intention or desire. The statement, "Early in 1894, the question of the possibility of analyzing various colors and shades in terms of certain standards having been referred to the present writer," does not conflict with the statements of the Funk & Wagnalls Company. At the time mentioned, i. e., 1894, all previous attempts to obtain a satisfactory scheme having failed, the matter was referred to me, and the plan then developed by me and adopted was based on the very able and lucid exposition of the subject entitled "On a Color System," by Professor Ogden N. Rood, that was read before the National Academy of Sciences on November 12, 1891. That the ideas expressed in this paper in any way infringed on the original conception of the plan by Dr. Isaac K. Funk is news to me, and was certainly never expressed by him to me in the many conversations that we had on the subject. Moreover, the Milton Bradley Company, of Springfield, Mass., have had a similar plan in active operation for many years, ordering colored papers from their factory by methods similar to those described by me. A popular exposition of these ideas can in no sense violate the copyright of a dictionary, which from its very nature is a compilation of the ideas of others.

In conclusion, if I have written aught that deprives Dr. Funk of one iota of credit for the plan for a standard for colors conceived in 1891 by him, then it was done unwittingly. **MARCUS BENJAMIN.**

**A New Armor Test.**

Tests of armor plates now occur with great frequency, but the interest of the general public in these tests remains undiminished. The test of a nickel-steel Harveyized plate eighteen inches thick occurred at the Indian Head proving ground, near Washington, on March 11. This test was the first of a series which will take place between now and June, by which time nearly all the armor contracted for under the Whitney agreement, amounting in all to about \$11,000,000, will have been manufactured and delivered to the government. This includes armor for ships now nearing completion and those on the ways. The success of the trial amply demonstrates the wisdom of the Russian government in having armor plates made in the United States. The ballistic trials of our government are very severe, as the gun is pointed at right angles to the plate, while in actual battle the elevation of the gun necessarily for accurate aim and allowance for "drop" of the projectile, taken with the angle of the ship's sides, especially when rolling, will prevent a normal impact, so that the government trials are unfair to the plate, as every advantage is given to gun and projectile.

The plate weighed thirty-eight tons and cost \$20,000. It measured 17 by 7 1/2 feet. A 12 inch rifle was used, which was placed 290 feet from the target.

The first shot fired was a Carpenter projectile, propelled by 295 pounds of powder. The shell entered about 4 inches, where the point was welded to the plate, so as to almost close the aperture. The body of the projectile was shattered, but an examination of the plate failed to show any radial fracture. In the second shot the charge was increased to 395 pounds, giving an initial velocity of 1,956 feet per second. The projectile penetrated 7 inches, and the top was welded as before, while the base of the projectile was completely shattered. A long vertical crack was produced; it extended from the top to the bottom, but there was no longitudinal crack. The crack was so narrow that it was difficult to see how far it extended. Capt. Sampson, head of the Ordnance Bureau, considered the test entirely successful.

The test showed that nothing short of a 13 inch rifle would pierce this armor at a fighting distance of 2,000 yards, which naval experts consider the probable range of the fleet action when in battle. In the battle of the Yalu River the distance between the opposing fleets was greater and the armor was thinner.

**Orizaba in Eruption.**

The peak of Orizaba is in a state of eruption. The signs of disturbance began to manifest themselves on the 10th inst., and have increased in force constantly since that time. It is vomiting poisonous gases and thick volumes of smoke are emitted from 100 apertures. The earth for 100 miles around is shaken periodically with subterranean vibrations.

The Governor of the State of Vera Cruz will shortly name a commission of scientific men to make an investigation into the eruption, and to make recommendations looking to the protection of the inhabitants of the neighboring villages. The present eruption is in the heart of the best improved coffee districts in Mexico, where many Americans live.

**Abstract from Interesting Decision by the United States Circuit Court of Appeals—Fourth Circuit.**

**HULSE AND WRIGHT V. BONSAK MACHINE COMPANY. BONSAK MACHINE COMPANY V. HULSE AND WRIGHT.**

"A contract between an employer and employe, wherein the employe obtains service with the employer on condition that any improvement he may make on the machines of the employer shall be for the exclusive use of his employer, held valid."

The Bonsack Machine Company is a corporation whose business it is to construct, operate on royalties, lease, and sell machines for the manufacture of cigarettes in this and many other countries. Its principal machine is known as the "Bonsack" machine. By perfecting it and procuring and purchasing patents connected with it the company has acquired and is doing a large business. In the course of its business the company engages many persons to operate its machines. In several instances persons so employed discovered improvements in working them, and, without disclosing the discovery, took out patents, which they used or sold in competition with the company. To avoid this in the future, the company adopted a rule by which it required all persons entering its employment to agree to give the company the benefit of any improvement made while in the employment of the company or at any time afterward.

Hulse had been working at his trade as a mechanic, realizing between four and five hundred dollars a year. On or about July 19, 1886, he applied for employment in the Bonsack Company. In his interview with the president of the Bonsack Company, at which his application was granted, he entered into a written contract, the provisions of which were explained to him, especially that relating to any improvements which he might make in cigarette machines. Of that provision he expressed his approval. He served the company at an increasing salary, beginning at \$50 per month; then \$60; again \$75, and afterward \$85 per month.

The contract between the Bonsack Machine Company and Hulse is in these words and figures:

"That the said company has this day employed the said Hulse to set up and operate its cigarette machines at a salary of \$50 for the first month and \$65 per month thereafter, with such advance of salary up to not exceeding \$75 per month as the services of the said Hulse may justify. It is agreed that the said Hulse will serve the company whenever desired, the company to pay his railroad fares whenever traveling at the request of the company.

"No abatement will be made for loss of time because machines are not kept running, nor any extra payment for extra hours.

"The said Hulse agrees to do all in his power to promote the interests of the said company, and in case he can make any improvement in cigarette machines, whether the same be made while in the employment of the said company or at any time thereafter, the same shall be for the exclusive use of the said company.

"And it is agreed that in case the said Hulse be not able to serve the said company efficiently, or shall in any way neglect his duty, the company may stop his services at any time, paying up to such time; but, in case the said Hulse desires to quit the said company, he shall give sixty days' notice thereof."

In July, 1889, while employed by the company in Montreal, his health failed and he ceased to work with it.

Thereafter, on a salary of \$125 per month, he entered into employment and partnership of another party named Wright, whose business was to introduce and sell the Bonsack machines in foreign countries. While in this employment Hulse made known to the company that he had devised improvements in their machines. Thereupon he was furnished by the company with a suitable room, power, and materials to continue his experiments and to perfect his idea. While so employed, however, he did not draw any salary from the company. The experiments continued some three or four months.

Hulse then wants the company to pay him one hundred thousand dollars for the invention, which was declined, and the company brought suit to compel the delivery of the invention and patent to the company, and obtained an injunction prohibiting Hulse from assigning the patent or invention to others. The referee gave judgment awarding the patent and invention to the company, but requiring a payment to Hulse and partner of \$8,126.

The parties on both sides were not satisfied with this award and an appeal was taken to the United States Circuit Court of Appeals. Judge Simonton delivered the opinion of the court Feb. 5, 1895.

The questions made in the assignments of error are these:

First. What was the contract between the company and Hulse? Is it divisible, consisting of independent covenants; and is it, or any part of it, without consideration?

Second. Is it an unconscionable or unreasonable contract?

Third. Is it void as against public policy?

Fourth. Is the amount reported by the masters a just and reasonable compensation?

1. The Contract.—It is a contract of employment made after an explanation of its terms by one party and the approval of them by the other. No question is made here impugning the bona fides of the contract. The consideration moving from the company is the employment of the services of Hulse at a progressive salary, with no abatement for loss of time and no extra payment for extra hours, all railroad fares of Hulse, when traveling for the company, to be paid.

In consideration of these stipulations, Hulse is to serve the company whenever desired, agrees to do all in his power to promote the interests of the company, and in case he can make any improvements in cigarette machines, either while in the employ of the company or at any time thereafter, such improvements are to be for the exclusive use of the company. This last provision was stated to him as a condition precedent to his employment, was approved and consented to by him. Here we have a contract of hiring at stipulated prices and a contract of service with one detail of the service inserted to prevent any misunderstanding. It would seem to be an indivisible contract. The stipulation claimed to be an independent covenant, directed to any improvements made by him in cigarette machines, was the very stipulation which secured the contract on the part of the company to engage and pay Hulse. The consideration on the part of the company moves to all the parts of the contract. The contract was one of employment. The company was to do certain things. In return Hulse was to do certain things—set up and operate the cigarette machines and promote the interests of the company, and, to do this, give them the benefit of improvements in cigarette machines in case he made any. Can it be said that if he set up and operated the machines he had exhausted the consideration of his contract and that he could antagonize the interests of the company whenever he pleased, his agreement to promote its interests being nudum pactum? For similar reasons it cannot be said that this agreement, or any part of it, is without consideration. In the absence of fraud, mistake, illegality, or oppression, and where no relations of trust and confidence exist between the parties, courts cannot inquire into the inadequacy of the consideration of a contract or set up their own opinions respecting that which parties in good faith on both sides have agreed upon.

"If there is one thing more than another that public policy requires, it is that men of full age and competent understanding shall have the utmost liberty of contracting, and that contracts, when entered into fully and voluntarily, shall be held good and shall be enforced in a court of justice. (Jessel, M. R., Printing, etc., Co. v. Sampson, L. R., 19 Eq., 465.)"

Some consideration is requisite to support a contract; but the sufficiency of the consideration cannot be inquired into. (1 Sedg. on Dam., 455.)

Is this contract unreasonable or unconscionable?

The Bonsack Machine Company owned valuable patented machines employed in the manufacture of cigarettes. Comparatively, the invention was in its infancy, and the machinery was known to be difficult of operation and open to improvement. Any one entering into the employment of the company had full opportunity of learning the merits of the machines, and by constant and daily use could see where the machine was defective and where improvement was needed. If any improvement suggested itself to his mind, he could, by using the machine and the time and material of the company, experiment upon it and ascertain its value. The improvement would be his own idea; but it owed its suggestion and origin, its progressive development and perfection, to the business, the practical working, the opportunity afforded by the company. When, therefore, the company, taught by costly experience, determined to protect itself from the discovery of improvements by its own servants, it did a natural and reasonable thing, and when it protected itself by a covenant in advance of any employment with those seeking its service it did a fair thing. Nor was that part of the contract which put in the same category improvements made while in the employment of the company and those made at any time thereafter unconscionable or unreasonable. Without this safeguard the contract on this point could be easily evaded and be made valueless.

Is the contract void as against public policy? Does it injure the public?

Here we have the case of an ingenious man, without opportunity of developing his talent, and struggling under difficulties, enabled by this contract to secure employment in a large and prosperous corporation, where he could give his inventive faculties full play. He in this way was afforded every opportunity of discovering and removing defects in cigarette machines. He secured this employment by signing this contract. He could not have obtained it if it had been understood that this contract had no validity. Then, in all human probability, the public would have lost the benefit of his discovery. In this point of view a contract of this character cannot be said to be against

public policy. Sir George Jessel, in discussing the subject, holds that not only is there no rule of public policy against such a contract as this before us, but that public policy is with it. (Printing and Numerical Co. v. Sampson, L. R., 19 Eq., 466.)

We concur in the conclusion reached by the circuit judge in his opinion in this record:

"The public, in so far as questions relating to public policy are concerned, has no interest in this matter. Should the claim of the Bonsack Machine Company fail, the public would have no right to use the improvement. The device would then belong to Hulse, would be his secret, protected by patent and guarded from the public use by provisions of law. The restraint provided for in the contract does not interfere with any interest of the public, and it only gives a fair protection to the party in whose favor it is given, for which proper compensation was stipulated for the party making it."

The last assignment of error is the amount found by the master and allowed by the court.

The question was what compensation should, under the circumstances, be allowed. The Bonsack Company had declared that the compensation would be liberal. The deserving party was Hulse and the compensation was really his. Wright deserved nothing. He was only a speculator seeking a share of Hulse's reward. Hulse voluntarily, or for considerations which he considered adequate, agreed to divide with him. When, therefore, the master awarded the gross sum of \$8,126.36, this was his finding of what would be a liberal compensation for Hulse's service in and about the improvement. We see no error in this of which either party can rightly complain.

It is ordered that the decree of the Circuit Court be affirmed in all respects, each party paying its own costs in this court.

**Snow as an Atmospheric Purifier.**

BY JOHN B. COPPOCK, F.C.S., SCIENCE MASTER, CAMBERWELL INSTITUTE.

When a flocculent solid body falls through a fluid, it drags down in its falling suspended matters contained in the fluid.

We should therefore expect that snow falling through the atmosphere will cleanse it by taking out most of the suspended matters. The present year has afforded many opportunities of getting a quantitative value for the purifying action of snow.

The first analysis gives figures yielded by snow collected in the suburbs of London, where the district is fairly open. This snow fell on January 13, having a depth of 4 inches approximately. One characteristic of this snow was its great porosity, the crystals were also regular; both indicating that the snow was formed in a calm atmosphere.

The snow was melted and then analyzed as water, the impurities being stated in grains per gallon.

Total solid matter.....	10.65
Mineral matter.....	5.75
Carbonaceous matter.....	4.90
Free ammonia.....	3.20
Albuminoid ammonia.....	4.62
Oxygen to oxidize.....	0.721

A further analysis was made of snow from the same district after the fall of January 30. The result was almost identical with the above figures; but this fact came out that the first few strata of snow contained the largest amount of impurities. Fifty per cent of the snow's thickness yielded 75 per cent of the impurities.

An analysis of the snow of January 30 was also made upon snow collected in the quadrangle of Somerest House. The following shows the difference in the impurities. This physical condition of this fall was favorable to its picking up in its meshes much suspended matter.

Total solid matter.....	17.32
Mineral matter.....	6.25
Carbonaceous matter.....	11.07
Free ammonia.....	4.65
Albuminoid ammonia.....	6.50
Oxygen to oxidize.....	1.16

The carbonaceous matter in each sample was ordinary soot particles.

These figures point out the value of a fall of snow from a manurial point of view, and also its value from a hygienic point of view. In a city where the air is often saturated with carbon particles, a fall of snow may be regarded as a mechanical contrivance of no mean value.—Chem. News.

**Bleaching Straw Braid.**

Take 7½ pounds pure oxalic acid and dissolve in 45 gallons of water, using the latter as soft and as cold as possible; then stir in, in small quantities at a time, 4½ pounds peroxide of sodium, waiting between each addition until all action has ceased. When fully dissolved test with litmus paper and make the bath feebly alkaline by adding more peroxide, or ammonia, or silicate of soda. Enter the straw braid, which has been previously cleaned, and leave in the bath until it is bleached, or has a faint straw tint, then lift, rinse, and pass into a bath of tartaric acid. By using less water, the bath may be made stronger and quicker in working.

**A New Use for Mica.**

A recent device of the tailors is the figure of a man done on mica. This figure is about a foot high, and is set in a square of cardboard. Sometimes it is in the shape of a man wearing a sack suit, while in others he wears a cutaway outfit, and in others again a frock suit. The man himself is transparent as to body, but his face is painted on, and he wears a collar and necktie of the latest style, in paint. He serves as an illustration, and he is designed to do away with one of the banes of a tailor's life, the man who comes in to look at goods and says:

"Ah, yes; it looks very nice in the piece, but I'm not sure it would suit me so well made up. I'll wait until you cut a coat for some one else, and then I'll come around and see how I like it."

Now when a customer springs this ancient remark the tailor produces one of his mica manikins, lays him over the piece of cloth in question, and lo! he stands forth fully clothed in a wrinkleless suit of that pattern. With a cloth of uniform color or small pattern this device works very well.

**THE ICY COASTS OF NORTH AMERICA.**

Among the severest trials of mariners who navigate the northerly coasts of America during the winter season is the formation of ice upon the decks and rigging of their vessels. The past winter has been an especially trying one in this respect. Many vessels have been damaged and nearly lost by the accumulation of ice, due to the rapid congelation of the spray which beats upon the bows and other exposed parts. An example of these ice difficulties is seen in our engraving, which is from a photograph of the forward deck of steamer Barnstable as it appeared on the arrival of the ship at Boston, Mass., in February last, after a voyage from the tropical regions of Jamaica.

**The Value of Torpedo Boats in War.**

A Blue Book recently published deals with partial mobilization of the British fleet and the maneuvers of 1894, which began on July 18 and came to an end on August 7. The conclusion of the book may be quoted: "No ship was put out of action by a torpedo boat. The lightness of the nights seems to have had a twofold effect. No. 80 (Red side) in evading a 'catcher' at first missed the Blue Fleet, but managed to keep up with it and got within range of the rear ship, which was not attacked because she was supposed to belong to Group 3, a class exempted from torpedo attack by the rules. The light apparently was not sufficient to permit the real character of the ship to be ascertained. On the other hand, it is reported that the nights were never really dark enough to afford concealment to the torpedo boats. The torpedo lieutenant in command of No. 80 makes the interesting observation that, owing to the speed of the 'hostile' fleet, the boats were unable to regain their position for attack when once it had been lost. From this it seems permissible to infer that high speed will be of itself no unimportant protection to ships traversing at night narrow waters infested by torpedo boats. The torpedo boat operations were upon a too restricted scale to supply much valuable instruction; but, as far as they went, they tend to confirm the view that the most effective employment of the torpedo boat in war will be limited to sending her to attack an enemy's ship in a known position within the boat's range of action, and that the whereabouts of the enemy must be first ascertained and be communicated to the commander of the boat. The necessity of combining with torpedo boats vessels of other and larger classes to scout and discover the

enemy—where exact information as to his position cannot be obtained by other means—seems to be established, and, if so, it carries with it the obligation to consider a mere flotilla of torpedo boats by themselves as a helligrent factor of distinctly imperfect efficiency."

**The Electrical Aspects of Calcium Carbide.**

In a critical notice of Professor Lewes' Society of Arts paper upon carbide of calcium (See SCIENTIFIC AMERICAN SUPPLEMENT, No. 998), the Electrical Review discusses the electrical aspects of the proposal to manufacture the compound on the commercial scale, and the prospects of acetylene as an illuminant. It is considered that the commercial success of the calcium carbide industry depends upon cheap water power; because of all the heat produced by the coal in a boiler furnace working a steam electric plant, only about 5 per cent is recoverable by an electric furnace. Our contemporary is inclined to regard acetylene as a genuine improvement in gas as an illuminant, and one likely to aid gas in competition with the electric light. Apart altogether from its illuminating properties, it is admitted that acetylene has a much more important commercial aspect, because from it a great many hydrocarbon compounds can be made, such as benzene, hydrocyanic acid, ethylene, alcohol and many other bodies. It is not thought that, at Professor Lewes' estimate of their comparative duties in light given for

**A "Letter" Officially Defined.**

A ruling was recently made by Postmaster Coveney, at Boston, Mass., upon the question as to what constitutes a letter "in its usual and ordinary form," and it has just been confirmed, according to the Boston Transcript, by a communication from Washington. The ruling and its confirmation were the outcome of a complaint recently made to the postmaster by a gentleman who desired to send through the mails a sealed roll properly stamped and directed to the Commissioner of Patents at Ottawa.

He said that the roll contained plans and drawings relative to a patent. He had offered this roll to the clerk at the foreign window, and following out the rules of the office, the clerk refused to receive it. When asked for reasons, he was referred to the postmaster. Col. Coveney gave a decision to the effect that the term letter is to be construed to mean and embrace sealed packages consisting of an envelope of any size, but flat, as is the usual letter. The objector did not think that this ruling and definition of a letter was correct, and gave his opinion that a letter "was a package containing personal matter of no salable value."

In the communication from Washington, N. I. Brooks, the Superintendent of Foreign Mails, says that "the Canada office and this department concur in the opinion that the term letter in its usual and ordinary

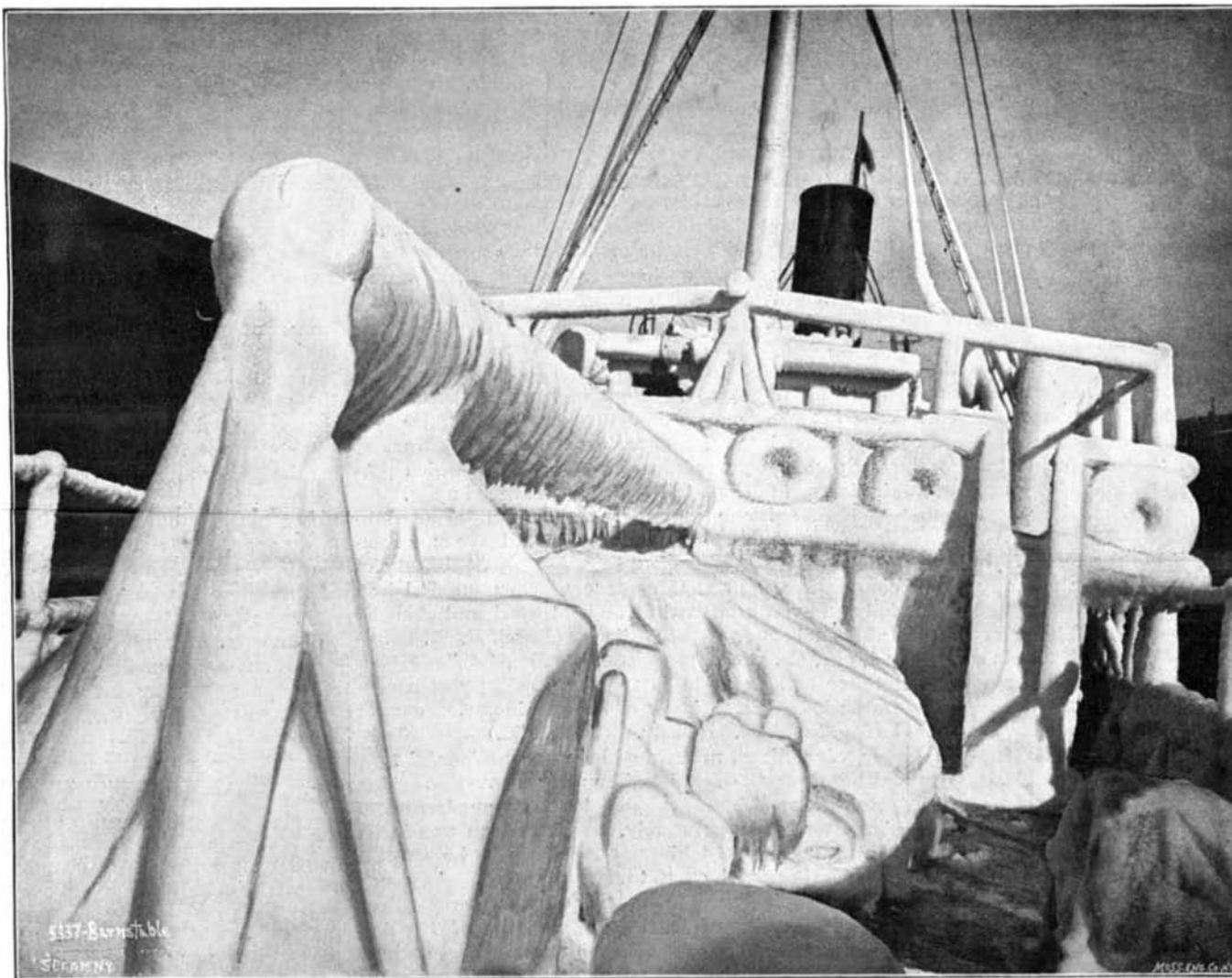
form is to be construed to embrace sealed packages consisting of an envelope of any size, but of the usual letter shape and its contents; but that rolls or a package not included in an 'envelope,' as the word envelope is generally used, cannot be considered to be 'a letter in its usual and ordinary form.' A sealed package in the form of a roll is therefore not entitled to transmission in the mails exchanged between the United States and Canada, and your office was correct in declining to receive the sealed roll mentioned."

Complaints of the kind made by the gentleman who wished to forward the sealed roll have been numerous, but this is the first time in the history of the department that it has been called upon to decide

what constituted a letter. By this decision no sealed packages nor rolls will be taken at the Boston Post Office for transportation to Canada, as the regulations of the Postal Convention say that "sealed packages other than letters in the usual and ordinary form are not allowed to be dispatched to Canada, even if postage has been prepaid in full at letter rates." This is no new law or regulation, as it was enacted about ten years ago, and has always been enforced more or less.

**Wood Stains.**

A solution of 50 parts of commercial alizarin in 1,000 parts of water, to which a solution of ammonia has been added drop by drop until a perceptible ammonia odor is developed, will give to fir and oak a yellow-brown color and to maple a red-brown. If the wood is then treated with a 1 per cent aqueous barium chloride solution, the first named become brown and the latter a dark brown. If calcium chloride be used instead of barium chloride, the fir becomes brown, the oak red-brown, and the maple a dark brown. If a 2 per cent aqueous solution of magnesium sulphate be used, the fir and oak become dark brown and the maple a dark violet-brown. Alum and aluminum sulphate produce on the fir a high red and on oak and maple a blood red. Chrome alum colors maple and fir reddish brown, and oak Havana brown. Finally, manganese sulphate renders fir and maple a beautiful dark violet-brown and oak a dark walnut-brown.



STEAMSHIP BARNSTABLE—ICE FORMATIONS UPON FORWARD DECK AND BRIDGE.

power consumed, steam-generated carbide of calcium and acetylene can compete with incandescent electric light.

Professor Lewes put the comparison thus: Acetylene, 44; electric, 28. But it is held that the difference is not quite so great; for with incandescent lamps at 4 watts per candle it comes out as 40:50 very nearly. With electric lights working at 3.25 watts per candle, power for power, the two light sources are equal. With arc lamps the superiority is reversed; the figures coming out at 80 for the electric arc, as against 50 for the acetylene light. It is admitted that the question is not altogether one of power, although this consideration is of interest as settling whether carbide of calcium can be profitably made with existing steam power plants. If water power can be obtained at the American estimate of cost, which is 50 cents per hour for 180 horse power, the acetylene will cost as little as its advocates claim, or 6s. 4½d. per 1,000 cubic feet. Although this is about double the average price of ordinary coal gas in England, acetylene gives 15 times the light or 7½ times the candle power for the same money. Now, to compare its cost, light for light, with incandescent electric light, 6s. 4½d. will buy 13 units of electricity, which, at 4 watts per candle power, works out to 3,250 candles gross; while 1,000 cubic feet of acetylene give 28,000 candle power for the same money. Meanwhile, the inquiry is made as to what is the cost of large water power.