hot water are added, the mixture stirred, and the suspended matter allowed to settle.

The liquid is next filtered through a small piece of good filter paper adjusted in a glass funnel, the filtrate being collected in a small clean vessel of porcelain or glass. The residues are shaken up repeatedly with small quantities of clean water, the washings being thrown on the filter, and the filtered liquid allowed to mix with the clear acid copper filtrate. The dish containing the residues, as well as the filter, must also be rinsed with a little water, so that none of the copper liquid may be lost by adhering to them. If these operations have been properly conducted all the copper will be contained in the filtered liquid. The decomposing cell into which this liquid is next placed is shown in the illustration.

The cell is an ordinary flat-bottomed drinking glass. The strips, A, *b*, and *b*, are of thin platinum foil, three inches in length and two in width. Over the upper end of each piece a strip of lead foil is doubled, with the battery wires inserted and pinched between the lead and platinum.

The lead-bound edges are forced into slits in the strip of wood, B, which suffice to hold them firmly enough in position. The outer strips, *b* and *b*, are joined by wires and connected with the positive pole of the battery, the middle plate, A, being connected with the zinc pole. Two cells of any of the common gravity form of battery used on telegraph lines may be used, but a single element of the bichromate (carbon) type is preferable and more convenient.

In using the decomposing cell the plate, A (minus the lead binding), is first heated to redness for a few moments to cleanse it, then weighed and slipped into position, with as little handling as possible. The battery being set up and connected properly, the acid solution of copper is poured into the glass, the plates immersed in it, and the decomposition allowed to proceed undisturbed until the liquid has lost its color, and a drop of it, when brought into contact with a drop of strong ammonia water on a white porcelain surface, no longer develops a perceptible blue color. The plates are then lifted out, with care if the deposited copper does not adhere firmly, and the liquid in the glass is decanted and replaced by boiling water. This cleanses the plates, and the heat imparted by it causes them, when taken out, to dry quickly. The plate, A, is at once detached, with any filaments of copper which may have separated in the cell, and weighed. This weight, minus weight of platinum, corresponds to the weight of metallic copper in the sample of ore taken. If the sample weighed one-third of an ounce avoirdupois, multiply the weight in grains of copper found by 13·714, to convert it into terms of pounds per ton.

Iron, zinc, nickel, cadmium, and other minor impurities, may be present in the copper solution, but so long as there is any copper present no considerable quantity of any of these is likely to be thrown down with the copper from the acid solution with one cell of battery.

Large Schools of Sperm Whales.

Several incoming shipmasters have reported seeing schools of sperm whales working southward along the New Jersey coast, of late. Captain Sawyer, of the bark Ibis, just arrived from Pensacola, reports "two miles of blackbacks and water spouts" off the Carolina coast, July 16. He said to a *Sun* reporter: "It was on Saturday and Sunday when we encountered these sperm whales going south or southwest, as if to round Hatteras. They were going very slowly, backs above the water, and were spouting all of the time. They were strolling along in groups, sunning themselves half an hour at a time, and then taking a header, and coming up to spout.

"First we met two schools of about 100 each, I should say. Occasionally they frolicked and flopped about heavily in a sort of dignified and elephantine sport. More followed, and the next morning, Sunday, we saw more. Altogether there were over 700 on the picnic. We passed within 500 feet of two big fellows, but they seemed preoccupied and didn't notice the ship. I don't think they knew we were there."

"Had you any means of capturing them?"

"No; and it did seem a pity to have so much valuable sperm oil indolently swimming away from us. There were some big whales there too. I said to Limerick, one of my men here, 'Now, there's a fellow that's worth $2,000,' and he must have been, and there were bigger ones in the school. It would have been a harvest for a whaling ship. A million dollars in sperm whales is too good a haul to let go by, but we couldn't do anything. Occasionally I've seen a sperm whale cruising along as far south as Savannah, and once in a while I've heard of whale ships off about there. But I never saw so many whales at one time before anywhere."

It will be remembered that the Bermudas used to be the center of the sperm whale fisheries of the North Atlantic. Of late years the pursuit of whales has been almost abandoned, and they seem to have multiplied rapidly.

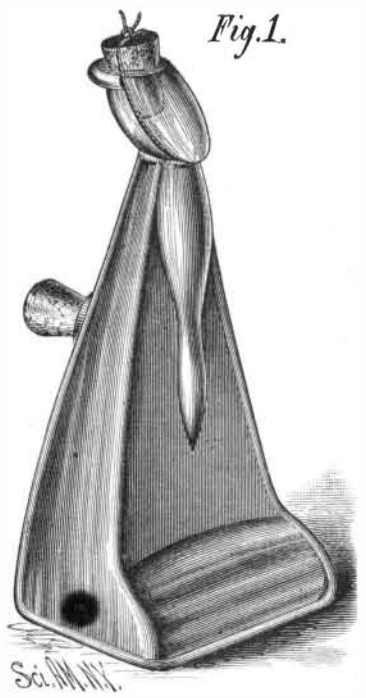
Birch Bark Rubber.

It is said that a dense black gum may be obtained from the outer layers of the birch tree bark by distillation, which possesses all the ordinary properties of gutta percha, and has the additional merit of resisting the deteriorating influence of air and the corrosive action of acids. This advantage makes it useful as an ingredient of India-rubber and gutta percha, which it renders far more durable. Whether these statements are true remains to be proved.

A NOVEL BOTTLE.

Dr. J. B. Moore, of Philadelphia, in *Druggists Circular*, has said that "it often happens, in dropping a medicine from a bottle a little too full or with a badly formed lip, the most steady and practiced hand can with difficulty drop a dose even with a near approach to accuracy." . . . "To the nervous and careworn attendants who are so frequently found in the sick chamber the task of dropping medicines becomes doubly irksome and annoying, and especially when it has to be done, as in cases of lingering illnesses, day and night, sometimes for weeks at a time. Besides, it is sometimes impossible, no matter with how much care and judgment the dropping is performed, to prevent the number of the prescription and the directions on the label from being defaced, if not entirely obliterated, as is often the case, and the outside of the bottle becoming stained and bedaubed with liquid, and especially if it be any of the stronger acids or iron preparation; and the trouble does not stop here, for the hands are liable to be stained, and the clothing, the furniture, or any damageable article that the medicine may come in contact with may be ruined or soiled."

Fig. 1.



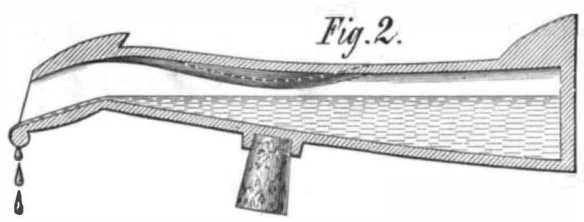
GOLDSMITH'S IMPROVED BOTTLE.

In the ordinary prescription bottle, during the act of dropping or pouring, the liquid is often two-thirds above the lower lip, and hence the air cannot find ready entrance, and either dropping or pouring becomes difficult and vexatious. In the improved bottle the liquid level (even when full) is always on a level with the lower part of the neck. Its inclined side and crooked neck form double inclined planes, which, with its shape and the airway, make it a complete dropper, obviating all the objections to the ordinary bottle. The liquid will not, during the act of pouring, "run back" outside to deface the label, the hands, or furniture. The shape secures steadiness; but should the bottle topple over a cork inserted in the recess on the inclined side will prevent breaking or spilling of the liquid, and the cork thus used will afford support and aid as a rest on dispensing medicines.

This bottle may also be used for table sauces, for perfumery, for patent medicines—for any purpose for which the ordinary bottle is employed

It does away with the necessity of purchasing a dropper, which takes time and trouble to adjust in the ordinary bottle, and which, besides the expense of first cost, is liable to be out of place or lost. In the new bottle the dropping feature is a part of the bottle and goes with each one, while the bottle can be made at a cost (not above that) of those imperfect and annoying ones, now in daily use by millions of people. It will become a necessity in every household.

Fig. 2.



The bottle has a conical or pyramidal shape, so that the greater part of the weight of the liquid in the vial will be concentrated at the base of the same, thus giving the bottle or vial a much better bearing and protecting it from being thrown over as easily as the bottles in use at present. This bottle has an inclined neck, with a lip or a bead at the lowest point of the edge to facilitate pouring the liquid from the vial in single drops. If the neck of the vial is inclined the flow of the liquid can be controlled much better than if the neck is straight. As is shown in Fig. 2, the liquid rests mainly on the inclined side of the bottle, and as it cannot flow up this inclined surface very small quantities of the liquid can be drawn by slightly lowering the neck of the vial. The vial is provided with an air channel for conveying air into the interior of the vial to prevent bubbling of the liquid. The air can pass through this channel from the neck to the extreme rear end of the vial. The cork is secured in the neck of the vial by means of a cord or wire, catching on a projection of the neck of the vial. For further information address the inventor, Mr. W. T. Goldsmith, 64 Corn street, Atlanta, Ga.

Correspondence.

A Remedy for Sea Sickness.

To the Editor of the Scientific American:

Having noticed from time to time the different remedies suggested for sea sickness, I concluded to give you my experience through two voyages of several days' duration, one during particularly rough weather. My first sensation on reaching the ocean was that of being in a very high swing. The same sensation of nausea immediately exhibited itself. It struck me at once that probably the same means adopted to overcome the sickness in the swing would prove effective on the sea, that was, to force the swinging. I therefore watched the motion of the steamer, and as she was about to descend I made an effort as though to force her down. Continuing this for a short time the feeling of nausea disappeared, and I had no recurrence of it during either voyage, separated by several months' duration. I have no idea that every one could be so successful, but I fully believe that nearly any one with a little determination and strength of stomach can easily overcome sea sickness by this means.

W. E. F.

Helena, Montana, August, 1881.

How to Prevent Car-Safe Robberies.

To the Editor of the Scientific American:

The late robbery of the safe of the express company on the Rock Island road leads me to offer the following plan to prevent such cases: The safe to be provided with combination locks; the safe to be locked by the express company's agent at New York city on leaving that place; the numbers of the combination to be telegraphed to agents of the express company at Chicago, San Francisco, and any intermediate places; the safe to be opened by them on its reaching their places. The messenger in charge of the car, not knowing the combination, could not, even by compulsion, open the safe, nor could it be opened by any practicable means except at the proper places.

WALTER L. SMITH.

Weston, Mass.

MISCELLANEOUS INVENTIONS.

An improved device for thawing out sink spouts has been patented by Mr. Amos Stevens, of Fairfield, Me. A pipe of considerable less diameter than the sink spout is passed through this spout and is as nearly in the middle of the spout as possible. The upper end of the inner pipe is slightly tapered outward, and passes through and is fastened to a slotted plate forming a strainer. This plate supports a cup fitting into the upper beveled end of the inner tube. If the water in the sink spout freezes, hot water is poured into the cup, from where it flows through the inner pipe and thaws out the sink spout in a short time.

Mr. George O. Denison, of Waterloo, Ind., has patented an improved bag holder made low in front and high in rear to expedite the filling of the sack and prevent the grain from running out at the rear of the bag holder. It is provided with suitable hooks adapted to be inserted into the upper end of the sack to secure it to the bag holder. The holder is partly supported by a coil spring.

An improvement in horseshoes, patented by Mr. Sebastian K. Minton, of Des Moines, Iowa, consists in the combination with halves hinged together at the toe and having their upper faces beveled inward of the toe calk, having a hole and slot, and heel calks having right and left screw threaded holes, by which the heel of the shoe may be expanded.

Mr. William T. McLean, of Sidney, Ohio, has patented an improvement in that class of earth scrapers the body of which is made of thin sheet steel with wooden backboard, the lower edge of which has always heretofore been secured to the scraper by means of rivets passing through the bottom of the scraper in such a manner that the rivet heads soon wear off by abrasion and let the backboard loose, which wholly disables the scraper for further use until repaired. The improvement consists in the construction and arrangement of the devices for more perfectly securing the wooden back to the steel body without the use of rivets.

An improved drag saw has been patented by Mr. Samuel Clemens, of Rockport, Ill. The invention consists in having the saw blade pivoted at one end of a lazy-tongs connected with the framework of the apparatus, and in having a hand lever pivoted to the said framework and connected with the lazy-tongs by means of a pitman to operate the lazy-tongs.

An improved sand guard for car axle boxes has been patented by Mr. Henry Roth, of New York city. The object of this invention is to improve the construction of the sand guards for which Letters Patent No. 235,298 were issued December 7, 1880, to the same inventor, in such a manner as to make them more effective.

An improved wagon step, patented by Mr. Henry F. W. Koehler, of St. Joseph, Mo., consists in a novel arrangement of a cam lever, a slotted crossbar, two connecting bars, and a step or steps, all arranged in a frame attached to the wagon body. By this means provision is made for lowering the steps for use or turning it up out of the way by moving the lever in one direction or the other.

Modern Bows and Arrows for Sport.

The increasing popularity of archery as a summer pastime has brought the bow and arrow once more into common use and made their manufacture an industry of considerable importance. In a long review of the development of archery clubs and the modes of shooting practiced in and about this city, the *Sun* furnishes the following information touching the construction and cost of materials used:

The best bow is one made of yew. Some yew bows that are very costly look crooked to the eye. The skillful archer, however, explains that they are quite straight. It is true that a bow may bend in and out in little irregular curves, but it is called straight all the same, because the artist who made it has allowed the grain of the yew to take its own course around knots, and has not weakened the bow by attempting to smooth it down. These strips of yew wood, from five to six feet long, and properly tipped with horn, may be worth $100 apiece, and they cannot be bought for less than $20 apiece. It is so difficult to get a piece of yew of equal quality throughout, that when a good piece of the wood, three feet long, can be obtained it is split, and two of the pieces are spliced. This gives a guarantee that each half of the bow will have equal degrees of elasticity at the corresponding parts.

You may either have a "self" bow or a "backed" bow. A self bow may be spliced in the middle, but it must be made all of the same kind of wood. A good backed bow is made in this way: A piece of dark snake wood, mottled and lined by nature like the back of a serpent, and very beautiful when polished, is trimmed into shape as if it were to be the sole material for the bow. It is elastic, but it is not strong. One side of it is trimmed into an oval or semi-circular shape, but the opposite side is trimmed flat. Upon this flat side is glued, in the most careful manner, a tough slat of hickory. This gives the bow strength, for when the bow is bent the snakewood must contract upon itself, and the hickory, being on the back, must stretch. Such a bow is worth from $9 to $12.

It is very important that the wood of a bow be properly seasoned. It should not be too dry. If the wood is too dry the first thing an archer knows he will find a chrysal in it. When he finds a chrysal in his bow, he must wind about the bow over the chrysal a fine string saturated with glue. A chrysal is a small crack in the bow, which is liable to enlarge and ultimately to cause fracture. It is a mistake to suppose a bow when at rest should bend a little backward. It rather should "follow the string" a little. Otherwise it jars the arms when the arrow is discharged, and should the string break the bow is apt to break. The wrapping of plush about the bow in the middle, where it is grasped when bent, is called the handle. The upper edge of this handle is placed about an inch above the middle of the bow. When the "weight," that is to say the power it takes to bend a bow, is to be tested, the handle is placed in the hook of a steelyard and the string loaded until it is drawn down twenty-eight inches for a gentleman's bow, and twenty-five inches for a lady's bow. Gentlemen's bows usually range from forty-five to sixty pounds, and ladies' bows from eighteen to thirty-five pounds.

Arrows in weight range from two shillings and three pence, lowest weight for ladies, to five shillings and six pence, highest weight for gentlemen. The method of weighing, or rather of recording the weight of arrows, has been handed down from early times. They were weighed against silver money, and great care was exercised then, as now, in making them of accurate weights to suit different persons and different bows.

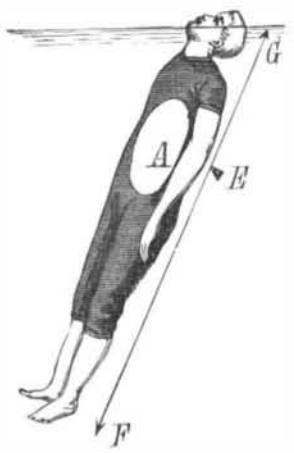
An arrow is made up of the "pile," or metal point, the "stele," or shaft, the feathers, and the "nock," or notch, of born. It may be "barreled" (largest in the center), "hobtailed" (larger at the point than at the feather), "chested" (larger at the feather than at the point), or "straight" (of even thickness throughout). Arrows may be "self," that is, made of one piece of wood, or they may be "footed" with a piece of hard wood at the pile end. The finest arrows are said to be of red deal, footed with lancewood. When the arrow is laid in position it should be at right angles with the string, although some archers think they can cause the arrow to take a higher or lower flight according as they nock it lower or higher on the string.

At the recent third grand annual meeting of the National Archery Association in Prospect Park, July 12, 13, and 14, the distances for ladies varied from 50 to 60 yards, and for gentlemen from 50 yards to 100 yards. The number of arrows fired by one contestant in a match varied from twenty-four to seventy-two.

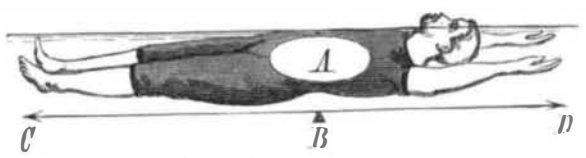
Froward, an English archer, is said to have shot an arrow from a 63-pound self-yew bow 340 yards.

THE SECRET OF EASY FLOATING.

The first lesson which the bather should learn is to float without effort on the surface of the water. The art of floating is set down as the first requisite, for several reasons. Even the most expert swimmer is liable to have his powers of endurance put to a test so severe that the art of resting on the water without effort may be of vital value to him; while to him who knows nothing of the art of swimming the ability to float securely is manifestly his only hope of



safety in case of accident on the waters. And the special merit of floating supine, as the first lesson in swimming, lies in the fact that it can be practiced in shallow water. Floating in a walking position, "treading water," is easy to learn, but it presupposes tolerably deep water; and the beginner is apt to have little confidence in the buoyancy of the unfamiliar element. Having learned to rest at ease on shallow water, the bather is able to float into deeper water without losing confidence, and can thus pass by rapid and easy stages to swimming on the back, or through the practice of treading water to the art of swimming in the customary way, face forward.



Any one who has sufficiout resolution to assume the posture represented in the large engraving can float securely, even in tolerably rough water, absolutely without muscular movement, and with very little fatigue. A still more restful, though slightly less buoyant posture, is with the arms bent and the hands clasped under the back of the head.

The philosophy of the buoyancy of this posture is illustrated in the smaller cuts. The blank space, A, includes the lungs and other buoyant portions of the viscera. The quantity of air in this part of the body but little more than suffices to float the body. With the arms extended the body is, so to speak, balanced as upon a fulcrum at B; the natural tendency of the feet to sink is counteracted, and the body floats with the mouth and nose well out of water. With the arms at the sides, as in the other small cut, the preponderance of weight is below the center of buoyancy, the feet drop, and considerable effort is required to keep the nose and mouth from being submerged, either by throwing the head back, as shown in the cut, or by paddling with the hands. It is true that a very slight movement of the hands by a practiced floater suffices to keep the feet from dropping and the body horizontal; but that little effort, if long continued, is fatiguing, and is pretty sure to be unskillfully made by a novice.

Unless one is exceptionally lean or deficient in lung capacity the art of floating with the hands under the head or extended above the head can be quickly learned; and in case of sudden emergency the non-swimmer will find it a certain and easy way of sustaining himself on water until help arrives.

PROPER POSITION FOR FLOATING.

Paste Diamonds.

The Providence *Journal*, which comes from the vicinity of immense cheap jewelry factories, has the following on "paste diamonds," which are simply glass of great purity:

"When imitation diamonds were introduced, it was found that to cut glass precisely like a diamond did not produce the sparkle characteristic of the diamond; therefore to secure this the flat surface on the top of the diamond was made pyramidal on the imitation, and, of course, ended in a point. By certain laws of light this pyramidal surmounting of the glass provided for the required distribution of ray surface to produce the diamond sparkle, or something akin to it. A real diamond is never cut with the pointed apex, and hence it was possible always to distinguish the real from the spurious. But after a time the buying public learned this little circumstance about the cutting process, and other means were resorted to. The glass was cut precisely like the diamond, and the sparkle was given to or provided for it by a coating of white foil applied to the lower side of the glass. The setting of many diamonds is arranged in such a way that the buyer may see the under side of the gem. This was overcome by arranging the setting so as to prevent inspection of this kind, which could not be done unless the stone was dismounted, if we may use that term.

"With these facts known to the buyer of diamonds, he need not be deceived except in the latter case, where the setting hides the under surface, and if he has any doubt about that he can let it alone. But the object of imitation diamonds is not to deceive buyers; if it was they would not be offered for two dollars. No one, however deficient in diamond criticism, need be deceived in buying diamonds. No dealer of any repute ever attempts to sell imitation for real diamonds. No reputable man ever thought of it. His reputation and occupation would soon be gone. There are very few persons who buy trinkets who do not test their wares at other than the buying place, particularly if the gem is a costly one, and it is certain that no one was ever presented with jewelry of presumable worth who did not set out at once to learn its purity and value, and very disappointing it has doubtless been to find in some cases that the gold or diamond was only brass or glass."

A Large Collection of Tobacco Pipes.

A collection of tobacco pipes, now on view in London, is pronounced by the *Times* one of the most interesting of minor art exhibitions. The collection includes specimens of all countries, and belonging to many periods, of the graven images and idols of clay which have been dedicated to the worship of tobacco. From France come pipes of Sèvres made in the national porcelain factory; from Germany old Dresden pipes and the pipe formerly smoked by the giant in the procession of the guilds at Cologne; from Holland several hundreds of the æsthetic clay called "Early Dutch," collected by Heer Van der Want, Master of the Pipemakers' Guild at Gouda. The Dutch contribution includes also specimens of the bridegrooms' pipes, clay ornamented with ribbons, which the farmer of the polders smokes on the day of his wedding and then lays by on the shelf, to be taken down once a year when the anniversary comes round of the momentous occasion. This pipe is regarded with great interest by smokers as an example of the various uses which tobacco serves in calming feelings of ecstatic joy and mitigating the pangs of regret. There are 700 early English pipes; Scandinavian pipes, with modern Runes inscribed upon them; Siberian bowls, the consolation of the exile, made of hard wood and mammoth ivory; Basque pipes, and the costly meerschaum and amber toys smoked by pachas in their seraglios. Ninety-six of the Japanese pipes are in ivory, twenty-four in wood, horn, rock crystal, agate, etc. The carvings illustrate the social life of Japan in its most amusing relations. One pipe which formerly belonged to Enomoto, foster brother of the Emperor, bears the imperial symbols, and the central portion is entirely inlaid with gold. The bowls are extremely small. A pipe contains merely a whiff. A piece of tobacco is rolled up to the size of a pea, and one long, soothing exhalation exhausts it. The smoke is retained for some time in the lungs, as usual in the East. It is no matter of surprise that, according to the narrative of the Earl of Elgin's mission, a Japanese will smoke fifty such pipes in a morning.

From China come the opium pipes, which balance the finances of India—tubes of jade or tortoise-shell, bowls of silver and enamel. Hookahs from India, the calumets of peace and war from North America, the pipes of the Aztecs and the Caribs, the latter called "tabaco," whence the European name of the weed originally consumed in them is said to be derived; pipes smoked at the great "customs" in Central Africa, the sperm whale's teeth carved into bowls, pipes from Caledonia and New Guinea, are also to be seen.